

AI

Artificial Intelligence
Das andere Ich



ARS ELECTRONICA 2017

FESTIVAL FOR ART, TECHNOLOGY, AND SOCIETY

AI

Artificial Intelligence
Das andere Ich

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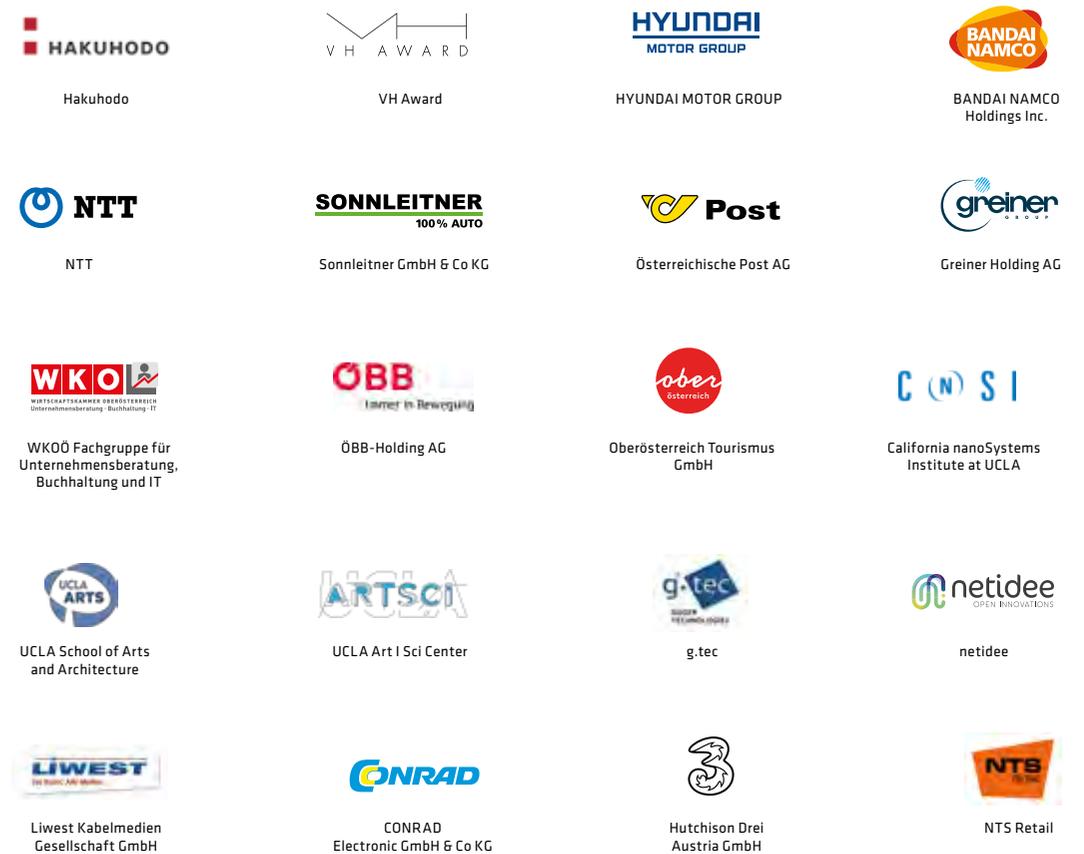
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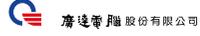
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Gerfried Stocker (AT)

AI

Artificial Intelligence The Other I

The 2017 Ars Electronica Festival Theme: AI–The Other I

Artificial Intelligence has made it back to the top of the hit parade of hot topics! Now that Facebook, Uber and Co. are suffering from an increasingly bad public image, the reinvention of virtual reality has already lost its allure, and the Internet of Things doesn't seem to be able to get beyond the self-replenishing refrigerator, the thrill engendered by futuristic super-machines is dominating the headlines. So what are we to make of artificial intelligence? Gigantic job eliminator? Or the next step in evolution, the one in which technology finally asserts its mastery over us? Whatever—this is a great way to get prominent media play.

But, of course, there's good reason for all this attention. After all, the latest developments in artificial intelligence truly are astonishing, and they will soon be advancing exponentially. Never before has so much investment capital been in pursuit of successful technologies and promising innovations. The concentration of scientific and economic power as now exists among the so-called Big Four of the Internet is shifting scientific research from the military and elite universities into the private sector, and establishing it on a broad basis.

Thus, the expectations are high and the investments promise to yield huge future profits. Deep learning, self-learning neuronal networks, autonomous mobile robots and smart digital assistants are said to be the next big game changers, and they

undoubtedly have the right stuff to do so, even with the very rudimentary possibilities that we can already anticipate.

The Other I—Technology as Antagonist or Alter Ego?

And once again we see a technology as a projection surface for our yearnings as well as our fears. Accordingly, the burning question of what will still differentiate us from such machines, what could endure beyond their advent, and what only human beings are capable of are superbly suited as the centerpieces of a process of reflection upon the images of human beings and the world-views that are widespread in this digital age of ours.

But how are we to come up with ethical principles for these super-robots when we are unable to accomplish this among our fellow human beings? Will we ever even be able to accept the fundamental otherness of such an artificial intelligence, considering how difficult this is for us in our interactions with other people with a different skin color or of another religion?

Is AI only the next level of escalation of the efficiency of digital systems or an evolutionary jump to a new “species” of machines? Perhaps we should resist obsession with the frisson of conceivable Terminator scenarios a century hence;

maybe we should stay focused on how we want to configure technology's upcoming quantum leap. After all, regardless of the actual development and application possibilities and no matter how long it will actually take until the anticipated consequences are reality, artificial intelligence is already a universal metaphor for humankind's ambivalent relationship with the technology our kind has created.

So this is reason enough to dedicate an Ars Electronica Festival to this topic, and, in doing so, not being content with a consideration of the technical and economic potential alone, but bringing the cultural, psychological, philosophical and spiritual aspects into play as well.

Ars Electronica 2017—The Festival as Platform

What we are experiencing at present can very justifiably be termed the Cambrian Explosion of Digitization. Just as so many futurists have been foretelling for decades, the digital has been proliferating explosively in all conceivable directions, and this propagation has been even more intense and wide-ranging than anyone ever imagined. And wherever the technological maturity level is not yet sufficient, abbreviated reportage in the media and our own fantasies and fears are doing the rest of the

job. For those who were born in the previous century, it can be said that the future has arrived and people are actually getting along with it quite well. Mirroring this Cambrian explosion of digital development is the explosive growth of the program lined up for the 38th year of Ars Electronica's activities. The tremendous interest in this field on the part of experts as well as laypeople coincides with the extraordinary opportunity to take advantage of the virtually unlimited space available on the premises of a former Austrian Postal Service logistics facility as a setting for interesting collaborations and new festival formats. For the third year in a row, these two aspects are determining the character of the festival as an international platform and stage for encounters with culture and society in the digital age.

In the wake of its technical and economic successes, this digital revolution is now asserting itself in terms of its social, cultural and, especially, political consequences, and it is becoming clear that all the negative, undesirable aspects are also proliferating to the same extent.

Progress in machine learning seems as if it has just triggered the next round. In any case, what everyone can agree upon is that we are nowhere near the end of the line of this developmental process, but it is high time to begin grappling with the cultural and social consequences.

New Formats and Programs at the 2017 Festival

In addition to long-established events on the lineup, this year's program features a series of new formats. The festival is experimenting on itself yet again. On the one hand, we are opening up more and more to the general public; on the other hand, we are intensifying our efforts—particularly in selected areas of emphasis—in the avant-garde media-art genre that has been the soul of Ars Electronica since its very inception. The [Ars Electronica Animation Festival](#) has already established itself as a festival within the festival. [Music Monday](#) has gained stalwart status as well—once again paired with [Sonic Saturday](#) following the successful launch last year of this program focusing on digital musics and sound art staged in cooperation with the Anton Bruckner Private University.

This year's debutants include a program dedicated to [Theater and Digital Media](#), with a symposium, workshops and a series of fascinating projects and performances, and an [Art Market Initiative](#) staged in response to growing mutual interest on the part of media artists, collectors and galleries as a setting for protagonists to compare experiences and to discuss, among other topics, such core issues as the long-term maintenance and conservation of media-art projects and the many new formats and business models manifesting themselves on the growing online art market.

A very special Ars Electronica highlight is the premiere with Linz's new conductor. Markus Poschner will conduct his first concert with the [Bruckner Orchestra Linz](#) in conjunction with the [Big Concert Night](#), in which the program will concentrate on connecting as well as juxtaposing tradition, the state-of-the-art and modernism.

As a festival of art, technology and society, an essential part of Ars Electronica's mission is monitoring and mediating encounters with technological and social developments. In this spirit, we are hosting a [Small City Forum](#) to spotlight regional

potential for creativity and innovation, and staging a special event entitled [Future in a Nutshell](#) to offer a highly condensed look at the coming decade's most important technological trends.

Another don't-miss appointment for those into innovation and technology is the [Spaxels Research Initiative](#) just launched by Ars Electronica Futurelab Director Horst Hörtnner to discuss the future of unmanned aerial vehicles and swarm logistics together with private-sector professionals.

Symposia, Workshops, Tutorials and a BR41N.IO Hackathon

The subject of AI—and especially the perspective evoked by this year's subtitle “The Other I”—determines the core of the program. Symposia staged throughout the festival's run will shed light on the social and cultural aspects of the development of and discussion about artificial intelligence. The lineup of [symposia](#) and [lectures](#) is being enhanced with [workshops](#) and [tutorial sessions](#) that will deal primarily with the artistic possibilities of machine learning. The opening symposium on Thursday asks “[How Cultures Shape Technology](#)”. The cultural and social aspects of artificial intelligence R&D will dominate these proceedings on Friday; technical aspects occupy the spotlight on Sunday.

In light of the latest discussions of AI, we will also be considering HI, human intelligence. How in the world are we supposed to understand or come to terms with the utter Otherness of artificial intelligence—*ex machina*, as it were—when we still know so little about our own intelligence and the essence of so-called natural intelligence.

A large-scale [BR41N.IO Hackathon](#) with an extensive program of ancillary events for festivalgoers as well as interesting artistic takes and experiments constitutes the core of this confrontation.

Theme Exhibitions

The theme exhibitions have been structured according to two fundamental approaches, though there is also a great deal of overlapping among them: art and technology projects, the origination of which was motivated primarily by research and exploration, make up the exhibits in the large halls on the 1st Upper Level; art and technology projects that are primarily means of artistic expression predomi-

nate in the large exhibition parcours arrayed in the spectacular spaces of the lower levels. Naturally, such a subdivision is never characterized by total rigor and can certainly be questioned from the perspective of art theory, but it works quite well as an organizational principle when it comes to setting up installations in premises measuring almost 100,000 square meters.

POINT ZERO— Human.0, Machine.0, Data.0

The art projects assembled in the spacious confines of this venue's lower levels are dedicated to the question of essences—of being human, of the machine, and what it means to be born out of code. Set in a spectacular bomb shelter and spaces housing this building's mechanical infrastructure, this exhibition takes full advantage of the unique atmosphere of a former postal service logistics facility.

Media Art between Natural and Artificial Intelligence

This exhibition offers a comprehensive look at current forms of artistic work with machine learning and AI. It is supplemented by a tutorial program by and for artists to impart what you have to know to get started using machine learning in artistic projects.

The Practice of Art and Science

The rapprochement, as it were, of art and science, the artistic exploration of new applications, is a key factor in the increasingly social dimension of new technologies in order to comprehend how reciprocal human-machine relationships, interactions among individuals and globally networked systems can

not only be better understood but, above all, better designed. International crews of artists and scientists have taken up this task, and now present their works in this exhibition space.

STARTS—Science, Technology and the Arts, Initiative of the European Commission

A very special part of this new practice of cooperation among art, technology and society is reflected by the STARTS Initiative of the European Commission, on behalf of which Ars Electronica, for the second straight year, successfully conducted a major international competition to identify and honor exemplary collaborative projects. The prizewinners as well as other honorees and nominees are on display in this impressive exhibition.

Artificial Intimacy

Can a human love a robot? Can a robot love a human? When it comes to the question of how deep the emotional bonds between human beings and machines can get, then it pays to take a peek at a very special branch purveying futuristic technical visions: smart sex toys, tele-dildonics and sex robots. “Artificial Intimacy” permits you to enter this erogenous zone.

Ars Electronica as Music Festival

The Big Concert Night at Ars Electronica

A unique and extremely successful cooperative relationship is being carried on and reinvented. Ars Electronica's Big Concert Night in collaboration with the renowned Bruckner Orchestra Linz is a jewel of the festival. There is hardly another such opportunity to experience such an intensive encounter of instrumental music-making and digital sounds, and of the music of the past and present. This year, Markus Poschner, the new conductor of the Bruckner Orchestra, will add a new musical wrinkle to this encounter amidst the huge *Gleishalle* (Track Hall) of POSTCITY. Poschner is also a superb jazz pianist and has invited several other soloists working in this genre to join him on his Big Concert Night. Classical orchestral music—the *scherzo* and *adagio* from Bruckner's 8th Symphony—jazz, sound art and digital visualizations will be presented on multiple stages set up throughout the *Gleishalle*, among which the audience can experience the evening's tonal realms in peripatetic fashion. Next up are the prizewinners in the Prix Ars Electronica's Digital Musics & Sound Art category. The third part of program is dedicated to the 30th anniversary of the ORF—the Austrian Broadcasting Company's—Ö1-Kunstradio.

Maki Namekawa in Concert

A special concert will conclude the festival on a high note—a performance by pianist Maki Namekawa of the entire cycle of Philip Glass's *20 Etudes for Piano* with visualizations by Cori Olan. This grandiose achievement by Maki Namekawa, which premiered in February at National Sawdust in New York, can

now be experienced in Austria. The concert, which is divided into two parts, each lasting about an hour, impressively elaborates the compositional universe of Philip Glass.

Ars Electronica Campus Programm

Sixteen universities from throughout the world will be using the 2017 Ars Electronica Festival to showcase the results of their educational programs at the interface of art and technology.

This year's star is the University of California at Los Angeles, whose art-and-science pioneer Victoria Vesna has put together an extraordinarily impressive exhibition entitled "Feminist Climate Change: Beyond the Binary." Universities in Australia, New Zealand, Brazil, the US and Europe are prominently featured on Campus. A key role is played by Linz Art University's Interface Cultures program, which has produced and developed the Campus event for many years now. Meanwhile, this successful collaboration has proliferated to other departments at Linz Art University, to the Anton Bruckner Private University and to the Upper Austria University of Applied Sciences' Hagenberg campus.

Cyberarts 2017: The Prix Ars Electronica Prizewinners

A mainstay of every Ars Electronica Festival is the exhibition of projects singled out for recognition by the Prix Ars Electronica, as well as the Prix Forums at which the prizewinners talk about their work.

Time's Up as Featured Artist in the LENTOS Art Museum

A new generation of artists emerged in Linz in the 1990s, where, as you might expect in a town of heavy industry, they began concentrating on the technological changes happening in our habitat. Particularly noteworthy is the Time's Up collective headquartered in the "idyllic" setting of Linz Harbor. The group, which has gone on to make a name for itself worldwide, is this year's Featured Artist. The LENTOS Art Museum will showcase its work.

VRLab, Deep Space 8K and Pacathon at the AEC

Whether on the gigantic 8K projection screen or in the new generation of VR glasses, whether the reality is virtual or augmented, whether the content is a technical demo or an art project—the Ars Electronica Center's new exhibitions enable you to experience the state of the art of virtual reality right

up close and to get hands-on experience with it. The AR scenario of the Pacathon is a cooperative effort with Bandai Namco Entertainment Inc., the inventor of PAC-MAN and Tamagotchi.

Media Art in the Dome—Projects in Linz's *Mariendom*

Our broad basis of cooperation with the City of Linz makes possible the events staged at unusual venues that have come to be a defining feature of the Ars Electronica Festival. One of the absolute favorites over the past several years has been St. Mary's Cathedral, the largest ecclesiastical space in Austria. A huge interactive projection sculpture from New Zealand and a dance performance from Taiwan will take full advantage of the *Mariendom's* special atmosphere—in conjunction with its redesign, the church's interior has been cleared of virtually all its furnishings, which means that the space's enormous dimensions are brought to bear even more dramatically.

This cursory description of some of the items on this year's lineup can provide only a rough idea of the character of this festival, and constitutes only a small part of a very extensive festival program that is jam-packed with offerings of consummate quality.

This is made possible by collaboration with the festival's countless partners and supporters throughout the domains of art, technology and society. They all contribute to this festival with their ideas, visions and commitment, and have earned our sincere thanks.



CONFERENCES, LECTURES, WORKSHOPS

The subject of AI—and especially the perspective evoked by this year’s subtitle “The Other I”—determines the core of the program. Symposia staged throughout the festival’s run will shed light on the social and cultural aspects of the development of and discussion about artificial intelligence. The lineup of symposia and lectures is being enhanced with workshops and tutorial sessions that will deal primarily with the artistic possibilities of machine learning. The opening symposium on Thursday asks How Cultures Shape Technology. The cultural and social aspects of artificial intelligence R&D will dominate these proceedings on Friday; technical aspects occupy the spotlight on Sunday.

Conferences

Opening Symposium: How Cultures Shape Technology

We usually focus our considerations on the impact that the introduction of new technologies makes on culture and society. But technology has always been a central part of culture, and not only in its applications. Perhaps even more strongly, in its development, in the visions and intentions that human beings thereby pursue, it is a direct expression of the cultures and the times from which it emerged. How different cultures form technological developments and applications is the question at the opening symposium of the 2017 Ars Electronica Festival. Philosophers and technology designers will scrutinize these interesting dynamics.

Theme Symposium: AI—The Other I

The first day of the "AI Artificial Intelligence. The Other I" conference considers theoretical implications of the increasing implementation of neural networks and machine learning in advanced as well as everyday technology. Ramifications of an automated society force us to rethink concepts of work, education and income. Never before has the idea of basic income and the importance of public safety nets been discussed so intensely. Current techniques of mirroring human thought and emotional processes onto machine intelligence give us the opportunity or even the obligation to re-evaluate ourselves and redefine our organization of society. In the end, the primary objective might even be the reflection on what constitutes us as human beings. Especially since humanity is already experiencing many conflicts of interpersonal communication, there will be a demand for regulating "inter-intelligent" communication. What makes anyone good, worthy, morally right or wrong?

I Reality and Expectations

Even if artificial intelligence seems to be a long way away, many aspects of our lives are already being influenced by autonomous machines and systems. But what constitutes neural networks and machine

learning processes, and at which point in its development are we right now? This panel aims to give a deeper insight at the applications of AI and at the promises, fears and potentials of these evolving technologies.

II Ethics, Philosophy and Spirituality

What are the sociocultural implications of intensifying our reliance on digital means? The contemporary discourse on and around AI developments extends well beyond the technological and economic horizon. Ethical, philosophical and spiritual questions that arise are being discussed in this panel.

III The Other Intelligence

In mirroring our human strategies for learning and recognition in the designs of artificial intelligence we are forced to reflect on our own thinking processes: How is human thinking constituted? When transferring thinking and learning processes to neural networks it becomes almost impossible to trace how these machines actually proceed. Questions on "the other intelligence" are this panel's focus.

IV AI Creativity

Art has been considered as a distinct human expression of creativity. This understanding is being questioned by the novelty effect of artworks created with the help of intelligent machines. Can autonomous systems understand and evoke emotions, which are an essential part in creating and perceiving artwork? How sensual is music composed by machines? How original are paintings created by neural networks, and can they provoke a contemplative experience within us? The definition of art and creativity finds itself in a state of transformation, which in turn challenges the function of the artist.

The Practice of Art and Science

Dedicated to the practice of art and science, this symposium focuses on synergies between both disciplines and collaborations with other sectors. After numerous years of realizing art and science projects, the results will be presented and discussed by participating artists, stakeholders and scientific institutions at this conference. Hiroshi

Ishii, professor of Media Arts and Sciences at MIT Media Lab, presents work created by the MIT Tangible Media Group, which is dedicated to the conjunction between research and technology in its practical and experimental applications. The Spaxel Research Initiative intertwines their art and science practice with economic applications. Their collaborations with industrial enterprises, innovation labs and startups are introduced. The day's last panel poses the closing point of the European Digital Art and Science Network.

Future in a Nutshell

The recent years have given rise to many very dynamic technical and scientific developments, all of them with a high potential to change our world, the way we think, the way we work, the way we make business. Digitalization is often used as the overall term for these trends, which go as far as robotics and autonomous mobility, the Internet of Things and smart environments or AI, machine learning and digital assistants. The new Ars Electronica Program "Future in a Nutshell" is a special and unique opportunity to get an introduction and overview of these game-changing new technologies—understandable to everybody yet presented by selected experts from these fields.

Lecture Program

Media Art and the Market—Symposium and Round Tables

A new addition to the lineup, The Art Market Initiative will be held in conjunction with a symposium on Thursday kicking off a series of round tables throughout the festival. This is a superb opportunity for media artists and gallerists to meet and greet, and for discussions of the challenges of maintaining and conserving works of media art, as well as current scenarios on the online art market.

Gluon Session

The Gluon Foundation fosters collaboration among artists and scientists. At Ars Electronica, they will present a new model for cooperation among artists,

scientists and art collectors. This entails placing scientists-in-residence as staff members in the ateliers of top-name artists, with interested collectors acting as patrons of these cooperative efforts and thus being able to acquire the works that result from them. To kick off this new initiative conceived by Christophe de Jaeger, Ars Electronica is hosting a round table at which curator/art manager Hans Ulrich Obrist (Serpentine Gallery, London) and Paul Dujardin (BOZAR, Brussels) converse with artists and scientists; the moderator will be Ars Electronica Artistic Director Gerfried Stocker.

Expanded Animation

The computer animation category has been a Prix Ars Electronica mainstay since the competition's very inception. In the meantime, the field of computer animation has been expanded by an amazingly broad spectrum of technical and artistic possibilities and applications. The current state of the art and the most important trends in this dynamic process will be the subjects of this symposium.

Prix Forum & STARTS Forum

One of the absolute highlights of every Ars Electronica is the opportunity to meet Prix Ars Electronica prizewinners and to attend Prix forums to hear the artists elaborate on their oeuvre and current work. Moderated by Prix Ars Electronica jurors, these discussions provide fascinating insights into the individual categories. At the STARTS Forum, honorees will present works at the nexus of art and technology singled out for recognition by the European Commission with prizes awarded for the second time in 2017.

Different Places

A symposium at Anton Bruckner Private University celebrating 30 years of Ö1 Kunstradio

This year Ö1 Kunstradio together with the Anton Bruckner Private University and the Ars Electronica Festival is organizing the Sonic Saturday symposium "Different Places: From broadcasting to transmitting to processing". With the Bruckner University this special format found a highly appealing place

for the engagement with advanced forms of Digital Musics and Sound Art. A symposium that is not only of great interest for specialists of this art form.

Campus Forum

Educational offerings at the interface of art and technology are as diverse as art itself. Here, an essential role is played by the weighting accorded to the respective areas of emphasis—artistic and technological. The Campus Forum is a great chance to obtain information about the various strategies and curricula available at different universities and to learn about their experiences. This year is an especially good opportunity, with 15 universities from all over the world enrolled in Ars Electronica's Campus.

Women in Media Arts Symposium

When it comes to equal opportunities for women, things don't seem to have improved too much in new media and technologies of late, and that holds true for the media-art genre as well. What initiatives are in place to remedy this situation and what can/should institutions contribute to a solution? The Women in Media Arts symposium will face these issues.

Guest Conferences

At the Ars Electronica Festival in recent years, consideration of the dominant role of digitization and the omnipresent question of the right strategies to deal with the consequences of digitization has been provided an interesting platform and stage for presentations by associates working in a wide range of fields.

A Series of Symposia: Perspectives of Political Education

This World Is My World—How much globalization can humankind stand?

What effects are globalization and digitization having on children who are growing up in this world now, as well as on adults who are waking up to such a world today? In this age of "alternative facts," the ability of the individual and society to deal with media in a mature, responsible way has become a

technique of political culture as a means of configuring globalization in a humane, sustainable way. As a very fitting adjunct to our discussion of artificial intelligence, we are dedicating a day to scrutinizing human learning. Experts will discuss the necessary changes to schools and the educational system in order to meet the challenges and advantages posed by the digital age.

Third Conference for People Providing Aid to Refugees

When the text elaborating on the festival theme poses the rhetorical question "How in the world are we supposed to understand or come to terms with the utter Otherness of artificial intelligence, when we still have such a hard time accepting human beings from other geographical, cultural and religious backgrounds?" then this conference can be seen as getting down to business answering it! Consider this: no sooner had we concluded Ars Electronica 2015—the first to be staged in POSTCITY, where artists and experts from all over the world had just gathered to discuss the future of cities—than the festival venue was converted into temporary quarters for refugees from the war in Syria. The job of providing aid to all those who have remained in Austria ever since is being done by a diversified array of associations and volunteer helpers. This is the second year that they will be gathering to share experiences and also to see what possibilities new media afford to help them do their vital work more effectively.

Austrian Tourism Days

In conjunction with the festival, the tourism sector is convening in Linz to use what is for them surely a most unusual venue as a setting in which to discuss the impact of digitization on their industry. AirBnB, autonomous mobility, blockchain, robotics and artificial intelligence—exciting and inspiring exchanges are in store. Book your reservations today!

Future Emerging Arts & Technologies

What happens when artists are invited to work in techno-scientific environments such as high-performance computing (HPC), quantum physics, genetic research and genome editing? What are

the kinds of questions that are asked when artists and scientists meet in laboratories, studios, offices or university canteens? And in what ways do productive misunderstandings between artists and scientists lead to interesting new raw material for artists and to inspiration for scientists? Future Emerging Arts & Technologies is a project in which six artists were given a nine-month period to work in the inner laboratories of the EU-funded Future Emerging Technologies (FET) programs.

The Small Cities Forum

When we talk about innovations, new technologies and cool gadgets we usually think of the big cities as the epicenter of the future. And of course there are many good reasons for this, after all it's there where the elite universities are, the big companies and the investors. But what about the small cities and regions? Can't they become vital places for future innovations as well? Places where new ways of doing business in a much more sustainable way are being developed? What role can art, design and creativity play and what support is needed to put this potential into effect? *The Small Cities Forum* is an initiative by Pordenone Design Week and Ars Electronica Linz to promote the power of small cities and to provide a place for the exchange of experiences and best-practice models.

Theater and Digital Media

Theater, for many an epitome of analog, strictly human-based art, has always been a forerunner in the exploration of technologies for new forms of storytelling and stage performance. The latest hype of virtual and augmented reality has caught the attention of people from the theater, and new artistic forms are being developed focusing on the narrative and performative potential of this medium. This interest is reciprocal, because the technical-design challenges that come with the increasing social dimension of new technologies could also benefit a great deal from the expertise of theater. In collaboration with the European Theatre Convention, Ars Electronica is hosting a special program to deepen the reciprocal exchange of practical experience about the work on the intersection of digital media and theater.

Gameful Learning and Civic Engagement

In the field of gaming, the popularity of digital devices and smart technologies has triggered critique pointing at a fragmentary implementation of game elements, lack of storytelling, simplistic gameplay and lack of player experience that mainly produces "clicktivism." This round table therefore discusses the current practices, challenges and limits of serious games and playful approaches as they relate to players, actors and stakeholders.

Workshops

AI Tutorial Sessions

These are tutorials by artists for artists—and, of course, for anybody else interested in this field. How hard is it for individuals to work with machine-learning software and what creative possibilities do they make available? Experienced users such as Memo Akten will present their own projects to illustrate what you need to know. This is not a quickie course in AI development, but it is a great chance to get prepared to actually work with machine learning.

BR41N.IO Hackathon

In light of the latest discussions of AI, we will also be considering HI, human intelligence. How in the world are we supposed to understand or come to terms with the utter Otherness of artificial intelligence—*ex machina*, as it were—when we still know so little about our own intelligence and the essence of so-called natural intelligence. A large-scale Brain Hackathon with an extensive program of ancillary events for festivalgoers as well as interesting artistic takes and experiments constitutes the core of this confrontation.

STARTS Roundtable

What is the European Commission's STARTS Initiative and what objectives does it pursue? What opportunities does it offer and how can you participate? These questions will be answered at a round table attended by representatives of the organizations commissioned to conduct the STARTS program.



EXHIBITIONS



AI THE OTHER I EXHIBITION

AI is the perfect projection surface for a process of reflection upon our conceptions of human beings and machine beings as well as of the world-views that are widespread in this digital age of ours. The "AI-The Other I" theme exhibitions explore the topic of artificial intelligence from various perspectives: focusing the attention beyond the technological and economic horizon they also scrutinize cultural, psychological, philosophical and spiritual aspects. The ethical-philosophical question, the most central issue we face in this context, focuses primarily on what it means to be human and far less on a definition of AI. Ars Electronica is interested above all in the visions, expectations and fears that we associate with the conception of a future, all-encompassing artificial intelligence. There is the very central, ethical approach that questions the essence of being human as well as of human intelligence. Connected to this is the very concrete, scientific-technological approach; and then there is a third area in which artistic work is being created with technologies like machine learning. And amidst it all are two poles: the affirmative and the critical. Among the artistic approaches, there are apocalyptic scenarios just as there are elaborations on how artificial intelligence can be deployed in positive ways that are compatible with humankind.

POINT ZERO-Human.0, Machine.0, Data.0

MORFES, Maria Yablouina

The art projects assembled in the spacious confines of the venue's lower levels are dedicated to the question of essences—of being human, of the machine, and what it means to be born out of code. Set in a spectacular bomb shelter and spaces housing this building's mechanical infrastructure, this exhibition takes full advantage of the unique atmosphere of a former postal service logistics facility.

Cod.Act (CH) Nyloïd

Nyloïd is an impressive sound sculpture, a huge tripod consisting of three six-meter-long nylon limbs animated by sophisticated mechanical and sound devices. Sensual, animal and threatening, this mobile draws its dramatic power from the reactivity of its plastic and sound material to diverse mechanical constraints. Similar to a living object, its tension, effort and suffering, which result from its contortions and its vocal manifestation, can be sensed.

This work constitutes a new stage in the artists' researches. They carried out new investigations, each within their own domain, on plastic and sound organicity in order to combine them into this

fascinating object: a return to life operated by means of mechanics and sound processing. The approach is a long-term analysis culminating in an advanced and complex minimalism. *Nyloïd* is a rudimentary structure. Often extreme, its movements are at the junction between mechanical perfection and raw material. Its impressive sounds, which seem to emanate from the material itself, are the result of an extremely sophisticated vocal research. The combination of raw material, mechanical and sound perfection results in a kind of hypnotic and dramaturgic choreography from which, in a paradoxical way, perfectly random kinetics arise.

Cod.Act is André and Michel Décosterd



Xavier Voinot

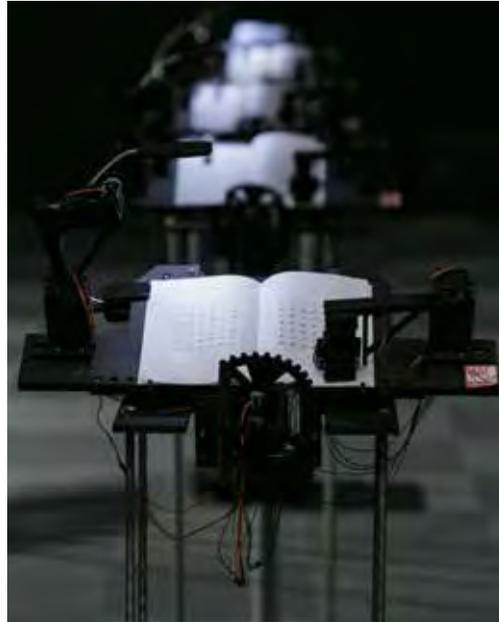
Lien-Cheng Wang (TW)

Reading Plan

Reading Plan is an interactive artwork with 23 automatic page-turning machines. When audiences enter the exhibition room, the machines start to turn the pages automatically and read their contents in the voice of elementary school students. The machines are a metaphor for a Taiwanese classroom. In 2016 in Taiwan there was an average of 23 students per primary school class. "When people go to school in Taiwan, they don't have much power to decide what they want to read and study. It is like being controlled by a huge invisible gear. The authorities' education policy prioritizes industry value and competitiveness. The government wants to promote a money-making machine rather than self-exploration and humanistic thinking. This is a complete realization of dogmatic rules and state apparatus." (Lien-Cheng Wang)

The machines read an extract from *The Analects of Confucius*—a book that has influenced Asian countries for thousands of years in ethics, philosophy, and morality. The content reads: "The Master said, 'Is it not pleasant to learn with a constant perseverance and application?' 'Is it not delightful to have friends coming from distant quarters?' 'Is he not a man of complete virtue, who feels no discomposure though men may take no note of him?'" The essence of the book is a metaphor of ancient China, which wanted to control surrounding countries for thousands of years. *Reading Plan* creates a space of discussion localization, education, thoughts and state apparatus.

Supported by the Department of Cultural Affairs, Taipei City Government



Haochiang Chien, Kaohsiung Museum of Fine Arts



GayBird

GayBird (HK)

Fidgety (In Between Up & Down)

The adjective "fidgety" describes a nervous and jumpy feeling. Normally people see this as a bad feeling. However, the artist treats it as a musical idea. For this work the Chinese character 「忐忑」 was designed as a pictograph using the words 「上」 for "up" and 「下」 for "down" over the word 「心」 for "heart" to describe this feeling. With a 40-channel speaker system, the setting of the speakers looks like a path resembling veins. All 40 speakers play the sound of the artist's heartbeat. When

the speakers start to play one after another they produce a range of various rhythmic and musical compositions.

The heartbeat is the most important element in this work; however, it is not easy for the audience to hear, since it was designed as a triggering force rather than an audible element. The low frequency of the heartbeat causes the speakers to vibrate, which then triggers the kinetic installation to produce sounds.

Eduardo Kac (BR)

Inner Telescope

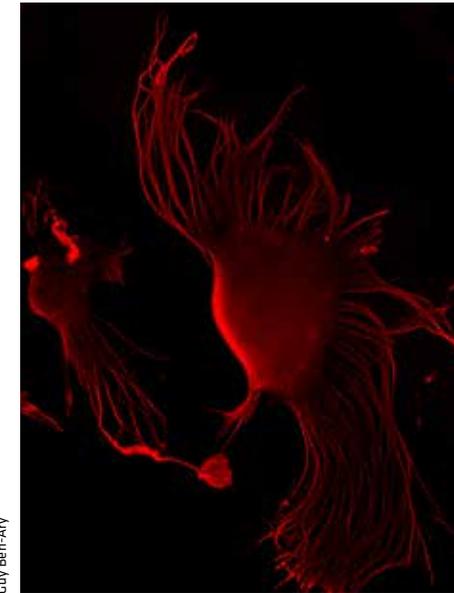
Inner Telescope is centered on a visionary artwork conceived by Eduardo Kac and realized in space in collaboration with the French astronaut Thomas Pesquet. The work was specifically conceived for zero gravity and was not brought from Earth: it was made in space by Pesquet following the artist's instructions. The artwork was made from materials already available in the space station. It consists of a form that has neither top nor bottom, neither front nor back. Viewed from a certain angle, it reveals the French word *MOI* [meaning "me", or "myself"]; from another point of view one sees a

human figure with its umbilical cord cut. This *MOI* stands for the collective self, evoking humanity, and the umbilical cord cut represents our liberation from gravitational limits. *Inner Telescope* is an instrument of observation and poetic reflection, which leads us to rethink our relationship with the world and our position in the Universe.

Inner Telescope is made possible by the Observatoire de l'Es-pace, the art-science lab of the French Space Agency, with the generous support of the European Space Agency (ESA), and the Daniel et Nina Carasso Foundation.



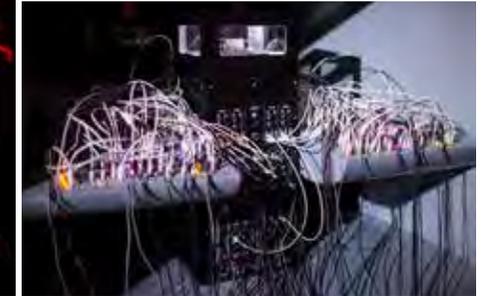
Eduardo Kac, *Inner Telescope*, 2017. Single-channel video, sound, 12 min. Stills from the video, image credit: Thomas Pesquet



Guy Ben-Ary



Rafaela Pandolfini



Alex Davies

HONORARY MENTION • PRIX ARS ELECTRONICA 2017 • HYBRID ART

Guy Ben-Ary (AU)

cellF

cellF is Guy Ben-Ary's self-portrait but also the world's first neural synthesizer. *cellF*'s "brain" is made of a living neural network that grows in a Petri dish and controls analog synthesizers that work in synergy with the neural network in real time. Ben-Ary had a biopsy taken from his arm; then he cultivated his skin cells and, using iPS technology, he transformed the skin cells into stem cells, which were then differentiated into neural networks grown over a multi-electrode-array (MEA) dish to become "Guy's external brain." The MEA dishes consist of a grid of 8 x 8 electrodes. These can record the electric signals the neurons produce and send stimulations back to the neurons—a read-and-write interface to the "brain". Human musicians are invited to play with *cellF*. The human-made music is fed to the neurons as stimulation, and the neurons respond by controlling the synthesizers. Together they perform

live, reflexive and improvised sound pieces that are not entirely human. The sound is specialized into sixteen speakers. The specialization reflects the pockets of activity within the MEA dish. Walking around the space offers the sensation of walking through Guy's external brain.

cellF was initiated and spearheaded by the artist Guy Ben-Ary. It is also the result of a collaborative work involving Ben-Ary as well as the designer and new media artist Nathan Thompson, electrical engineer and synthesizer builder Dr. Andrew Fitch, musician Dr. Darren Moore, neuroscientist Dr. Stuart Hodgetts, stem-cell scientist Dr. Michael Edel and neuro-engineer Dr. Douglas Bakkum. Each contributor played an important role in shaping the final outcome.

The project is supported by the Australia Council for the Arts and the Department of Culture and the Arts WA. The project is hosted by SymbioticA @ the University of Western Australia.



Theresa Reimann-Dubbers

Theresa Reimann-Dubbers (DE)

A(.I.) Messianic Window

A(.I.) Messianic Window is a project addressing AI's oversimplification of complex human concepts. The stained-glass window depicts an artificial-intelligence interpretation of the term Messiah. The context of *A(.I.) Messianic Window* is the current trend of applying humanistic, cultural and non-universally defined concepts to artificial intelligence. Machines become intelligent by being fed with information about the world. Who feeds them and selects this information? What biases and perspectives are transferred to machines? Religion is one such nuanced concept—the understanding of it differs throughout the world. The term Messiah refers to different figures or ideas depending on one's religious belief. Pioneering AI

research is predominantly situated in the United States, where 70 percent of the population identify as Christian. To highlight resulting potential Western bias, religion is simplified to mean Christianity, so the term Messiah is represented by Jesus Christ. Using artistic impressions of Jesus Christ to train a deep convolutional generative adversarial network (DCGAN) and subsequently to generate images, I obtained an artificial-intelligence interpretation of the term Messiah. These generated images comprise the stained-glass window.

Technical support: Andreas Schmelas
Project created within the framework of the New Media Class at Berlin University of the Arts

Maria Yablonina (RU)

MoRFES_02: Robot Ecologies for Construction

MoRFES_02 (Mobile Robotic Fabrication Eco-System 02) is an iteration of a series of experiments and demonstrators conducted by Maria Yablonina as part of her ongoing research on collaborative mobile robots for architectural fabrication. This body of research explores and demonstrates fabrication processes for tensile filament structures enabled through the deployment of multiple species of mobile robots on the construction site. For this project, two species of four semi-autonomous robots are deployed to create a continuously changing structure in the gallery space. Throughout the

exhibition, mobile robots are to continuously work on an object, removing and adding parts and changing its geometry, demonstrating the potential of the fabrication process live. Collaboration between the different types of robot allows one to view these machines as more than merely tools, but as a micro ecosystem that has the potential to grow and expand over time.

Maria Yablonina, Institute for Computational Design and Construction, Achim Menges
Research assistants: Olga Kalina, Jingcheng Chen



Michele Spanghero (IT)

Ad lib.

A medical machine for pulmonary ventilation plays a musical chord on a few organ pipes, a fragment of music (in reference to Johannes Brahms' *German Requiem*) frozen to the constant rhythm of the automatic breath. The action of this artificial organ raises ethical questions about the will and responsibility involved in this mechanical requiem, a metaphor for a limit that people

delegate to technology. Ad lib., the abbreviation of the Latin *ad libitum*, literally means "at will" and is generally used to express the freedom of a person to act according to their own judgment in a given context, but it is also a musical caption that gives the performer the discretion of interpretation, allowing certain bars of the score to be repeated at will.



Michele Spanghero



Kikuyama

So Kanno (JP), Takahiro Yamaguchi (JP)

Asemic Languages

Characters are a means of visual communication and recording a language. Civilizations throughout the world have created various characters that convey their culture and history. This project focuses purely on the form of the characters rather than their meaning. The characters have been learned by artificial intelligence (AI) not for their meaning but for their shape and patterns. The AI has created and drawn lines that look like characters but do not have any meaning.

This work was publicized at the Aichi Triennale 2016 international art festival. It was implemented by collecting handwritten artist statements or descriptions of work by an extremely broad international group of ten participating artists. By learning

handwriting with one writer in each language, the artificial intelligence collected information on the shapes of each character system, as well the idiosyncrasies of each writer. The lines generated are written as if they mean something important; they also look deceptive.

Machine Learning Programming: Hironori Sakamoto
Supported By Nihon Unisys, Ltd., Haps
Sponsored by Japan Media Arts Festival and Bunkacho-Agency for Cultural Affairs, Government of Japan

Handwriting provided by: Valsan Koorma Kolleri, Lai Chih-sheng, Gulnara Kasmalieva & Muratbek Djumaliev, Kio Griffith, Ali Cherri, Taloi Havini, Song Sanghee, Shreyas Karle, Kawayan De Guia, Uudam Tran Nguyen

Refik Anadol (TR)

Wind of Linz: Data Paintings

Wind of Linz: Data Paintings is a site-specific work commissioned by Ars Electronica that turns the invisible patterns of wind in and around the city of Linz into a series of poetic data paintings within a 6' x 12' digital canvas. Refik Anadol Studios developed a range of custom software using a one-year data set collected from Linz airport to read, analyze and visualize wind speed, direction and gust patterns along with time and temperature at ten-second intervals throughout the year.

The resulting artwork is a series of three dynamic chapters, each using data as a material to create a unique visual interpretation of the interaction between the environment and the city. Each chapter brings different aspects of the data sets to life with distinct and varied painterly, emotive aesthetics, making the invisible beauty of wind as a natural phenomenon visible.

Each of the three chapters focuses on one distinct characteristic of the wind of Linz. The first chapter, "Hidden Landscapes" highlights the anemometer's most radical readings to create an immaterial, spatial experiences. "Porcelain Memories" recalls the intangible power of a gale when reimagined outside of the traditional constraints of time. "Fluid Structures" explores the paradox of a soft, gentle wind blowing from the Danube toward the site in the harsh cold of winter.

Refik Anadol studio members and collaborators: Raman K. Mustafa, Toby Heinemann, Nick Boss, Kian Khiaban, Ho Man Leung, Kerim Karaoglu, Bahadir Dagdelen, Yusuf Emre Kucur

Supported by: Barco Residential, Niio.Art for a digital age., Screen Innovations



Refik Anadol



Toby Smith

Unknown Fields (UK/AU)

All Up In My Grill

As the beat drops and the stage lights strobe, pop stars dripping with bling flash their jeweled gold teeth for the camera in a flurry of choreographed dance moves. A world away, in a hole in the ground in the wild-west mining town of Ilakaka, Madagascar, another ensemble of bodies move in rhythm, to dig dirt by hand out of the bottom of a precious gem mine. Here it is cheaper to pay workers in rice than it is to buy and maintain mechanical mining equipment. The human conveyor belts of Ilakaka shovel dirt in perfect synchronization, each man paid with 50 g of rice, their bodies repurposed as digging machines.

Unknown Fields have used the amount of rice the human conveyor belt consumes in a day to manufacture a precious stone that embodies the systems through which these worlds are intimately

and profoundly connected. The red Madagascan rice endemic to this treasure island is a staple food of the miners and has been collected locally and shipped to gem specialists for carbon analysis. By subjecting the rice to extreme heat and pressure in the laboratory, Unknown Fields have formed a synthetic stone encoded with the sum of the human conveyor belt's labor. After manufacture, the gemstone has been set into a gold tooth, ready for that million-dollar smile and the outrageous lyric. From kilojoules, to carats. In the glare of this cheeky gold grin we see the cost of luxury, of beauty, of a daily allowance of rice, of twenty men shoveling at the bottom of a hole.

Commissioned by the Architectural Association and Middlesbrough Institute of Modern Art
Film and photography in collaboration with Toby Smith

Amy Karle (US)

Regenerative Reliquary

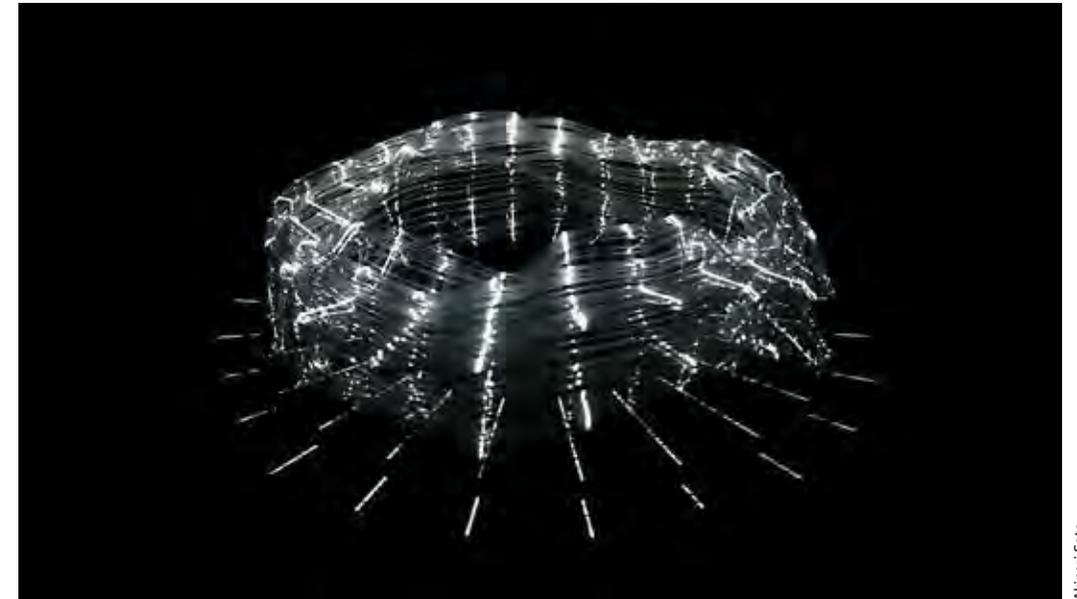
Leveraging the intelligence of human stem cells, Amy Karle created *Regenerative Reliquary*, 2016, a bioprinted scaffold in the shape of a human hand 3D-printed in a biodegradable pegda hydrogel that disintegrates over time. The sculpture is installed in a bioreactor, with the intention that human Mesenchymal stem cells (hMSCs from an adult donor) seeded onto this design will eventually grow into tissue and mineralize into bone on the scaffold. *Regenerative Reliquary* made artistic, scientific and technological advances as it required and inspired new innovations for its creation, as well

as influencing a new way of thinking. Amy Karle's bioart work expands opportunities for art and design, biomedical applications, healing and enhancing our bodies, and opens minds to create things that it was never possible to create before. Read more at: <http://www.amykarle.com/project/regenerative-reliquary/>

Collaborators: Bio-nano scientist Chris Venter, Material Scientists John Vericella and Brian Adzima
Sponsors: Autodesk, California Academy of Sciences, Exploratorium-The Museum of Science, Art and Human Perception and The Bone Room



Charlie Nordstrom



Akinori Goto

Akinori Goto (JP)

Sculpture of Time

Development from the *toki*- series

Sculpture of Time is several works developed from the *toki*- series. Their creation started with the question of what it means to "move." On one occasion the artist was impressed by the obvious facts that movement does not exist if time is standing still and that movement is possible due to the flow of time. In other words, time and movement are closely connected. This led Akinori Goto to the conclusion that the secrets of movement might become visible by pursuing "time." These works realize time, something that cannot

be seen, by connecting two-dimensional movement to the third dimension through 3D printing. At first glance, it may look like just a cluster of white mesh, but the time that has been cut out can be reproduced by projecting light through the slits.

By visualizing and actualizing time, not only do these works illustrate its relationship with movement, they also attempt to discover the beauty, characteristics and background connections of time born by going beyond dimensions.

Daito Manabe (JP), Yusuke Tomoto (JP), 2bit Ishii (JP)

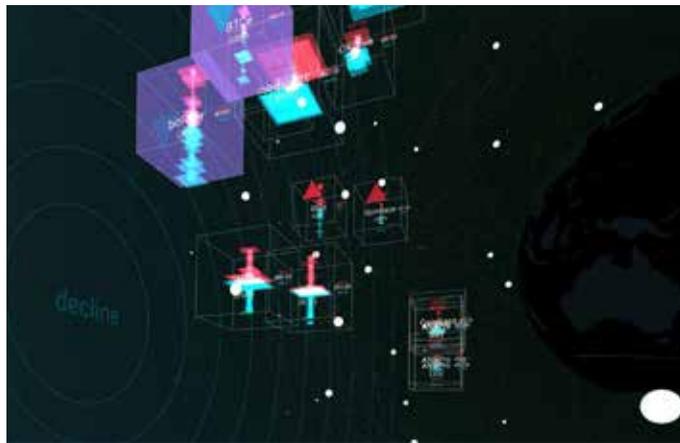
chains

Chains is an interactive installation dealing with the bitcoin cryptocurrency. Based on experiments with automatic trading systems, the artists developed a system to visualize and thereby study the principle of block chains. The participants can experience fluctuations in bitcoin values via sound and images in real time and interact with an automated transaction algorithm enabling them to manage bets and receive virtual payments according to their bet. In doing so the installation also raises critical

questions about contemporary finance and trading systems.

Chains was developed at ZKM of Karlsruhe, Germany and was exhibited at *GLOBALE: New Sensorium*. It is an evolved version of the 2013 *traders* installation that was developed as a follow-up to the 2013 *traders* project and visualized Tokyo's stock market live.

Daito Manabe (Rhizomatiks Research), Yusuke Tomoto (Rhizomatiks Research), 2bit Ishii (buffer Renaiss)



"GLOBALE: New Sensorium", exhibition curated by Yuko Hasegawa | Karlsruhe | Photo by Tobias Wootton and Jonas Zillius | Courtesy of ZKM



Solveig Settemsdal

Kathy Hinde (UK), Solveig Settemsdal (UK/NO)

Singularity

Singularity is an audiovisual collaboration between the artists Solveig Settemsdal and Kathy Hinde. The concept of *Singularity* surrounds the readings of this term. A technological singularity: the point where artificial intelligence surpasses that of humans and continues to accelerate. A gravitational singularity: a theoretical point in space-time of infinite density. The emergence of a thought is imagined here in parallel to extreme gravitational phenomena.

A point appears in a perceived void. Slowly expanding, its articulation grows increasingly deliberate; lines are created, crossed and bisected until the form disappears again into a point. In *Singularity*, Solveig Settemsdal explores a temporal and sculptural process of drawing in a fluid three-dimensional space by suspending white ink in cubes of gelatin.

The concept of an expanding point is echoed in Hinde's musical composition, where sounds evolve out of silence into clustered layers, drawing attention to the microscopic detail of the expanding abstract forms.

Commissioned by Goldfield Ensemble for the touring concert *Ritual in Transfigured Time*
Supported by Arts Council England, the Britten Pears Foundation, the RVW Trust and the Ambache Trust

Video: Solveig Settemsdal
Sound: Kathy Hinde
Camera: Milo Newman

Violin 1: Nicola Goldscheider; violin 2: Alexandra Reid;
viola: Bridget Carey; cello: Sophie Harris; metal tines:
Kate Romano
Recorded at OVADA Gallery, Oxford, September 2016 at
the OCM event

::vtol:: (RU)

Until I Die Driver Red

Specially for Ars Electronica, ::vtol:: presents a selection of several artworks created in recent years. One of them is his large-scale project *Until I Die*—a hybrid installation that uses the artist's blood, extracted and accumulated over a long period of time. The blood is used to generate electricity for a small sound synthesizer. It is one of the most significant and complex works created by ::vtol:: in recent years, touching on many topics relating to hybrid art: alternative sources of energy, unification of the human body and machine, using the body as a resource. In general, this project is an attempt to create a technical-biological clone of the artist, using his own life energy to compose electronic music. The two other works *Driver* and *Red*—generative sound objects, kinetic and light installations—develop the topic of automatic mechanisms that stage autonomous performances or interact with the audience. All these works have been created according to DIY principles.

::vtol:: *Until I Die*: Kapelica Gallery, Ljubljana. 2016
 ::vtol:: *Driver*: iii Instrument Inventors Initiative, Hague. 2017
 ::vtol:: *Red*: 2016



Milha Fris



Dmitry Morozov



Dmitry Morozov



Robert Bauernhansl

Marlene Reischl (AT)

All of Us

All of Us explores the aesthetics of scars to highlight their visual aspects and exhibit something that is usually not on display. Apart from the visible wound, scars are also constant reminders of injuries and events. Macro videos of scars varying in sizes and severity are taken from their hidden spots and projected in large format. Tracked by a camera system, visitors can use their hands to influence the

footage shown: by placing your hand anywhere on your body, footage from that area is shown. This relationship between the feel of a physical touch and what is seen on the screen creates an intimate experience for the viewer. *All of Us* is an ongoing project, anyone interested can contact allofus@marlenereischl.com to make their scars part of the installation.

Marlene Reischl (AT)

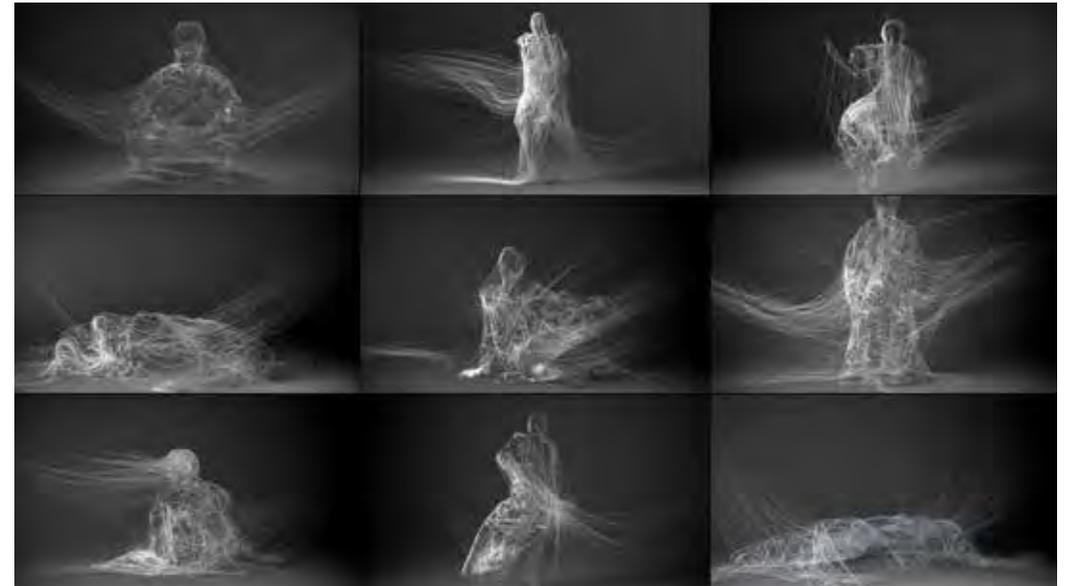
Field

Field is a light installation combining fluorescent tubes and Tesla coils. It utilizes the coils' high-voltage fields to illuminate surrounding tubes without the use of physical power connections. As the coils wander across the sculpture their electrical fields activate the tubes nearby, stimulating the trapped gas to create gently flowing movements of light. The lack of wiring and the seemingly organic animation of the light induce a surreal, eerie scenery. Adapting a basic principle of physics, the installation becomes self-contained and is given a new level of artistic integrity that creates an uncanny, poetic situation.

Supported by Kunstuniversität Linz



Marlene Reischl



Tobias Gremmler

Tobias Gremmler (DE)

Selected Works 2016-2017

The project unifies Tobias Gremmler's most recent video works. The comprehensive topic concerns the digital virtualization of the human, culture and mind. If intelligence emerges from the interaction between an organism and its environment, the shift towards digital environments may reshape

human consciousness and lead to embodied structures beyond physical restrictions. The selected works show virtual bodies, reshaped by motion, music or fashion trends. The body as a medium is constructed by its content. The invisible becomes visualized. Time, music or motion becomes gestalt.



Kyle Smithers



Mitchell Strum

Behnaz Farahi (US/IR)

Bodyscape Synapse

Synapse and *Bodyscape* are both examples of fashion items which integrate the latest digital fabrication techniques with robotic and sensor technologies in order to explore how our wearables can become an interface with the world around us. *Synapse* is a multi-material 3D-printed helmet that moves and illuminates according to the wearer's brain activity, while *Bodyscape* is a 3D-printed top that tracks human bodily movement using a gyroscope linked to LED lighting.

Bodyscape

Designer: Behnaz Farahi
Photographer: Kyle Smithers
Acknowledgements: USC, Media Art and Practices with special thanks to Samir Ghosh

Synapse

Designer: Behnaz Farahi
Acknowledgements: Pier9 / Autodesk with special thanks to Paolo Salvagione
Director of photography: Nicolas Cambier
Photographer: Mitchell Strum

Niek Hilkmann (NL), Joseph Knierzinger (AT), Michael Johannes Muik (AT)

our audible /profitable economy / exhibition

In *our audible/profitable economy/exhibition* financial micro transactions are transformed into extratonal sound structures. The exhibition consists of several coin-operated machines, each dedicated to a specific sonic event. When an investment is made in all the machines at the same time they will perform one superior composition. Every visitor is invited to hear the different sounds, to accept the cost of production and to become part of the art industry.

All the machines are part of the collection of the artist-led nothing more foundation (nm), which decided to distribute these automatons to various cultural organizations, in order to collect micropayments that will be used to support other artistic activities that create more coin-operated artworks.

nothing more foundation (Hilkmann, Knierzinger, Muik, et al.)



Lukas Sommer



Michael Johannes Muik



Saint Machine

SAINT MACHINE (RO)

Hybrid Sensorium

The Seeds of Tra

Hybrid Sensorium explores the way we sense our body within physical space and the sensory distortions caused both by mediating technology and direct contact. The artwork is placed in immediate physical contact with the visitor, both thus becoming vulnerable to emotional contamination. A fabricated structure is superposed on the natural medium of the body, an artificial, permeable membrane that tries to condition our biological needs in an osmotic feeding ritual. The organism tests our willingness to cede personal physicality to a constructed environ-

ment, a suspended reality caused by a gap in the objective reality. You can interact with it by inserting your head through its orifice. The cavity responds to your breathing rhythm in real time, trying to adapt it to its needs, while the breathless visitor will enter a cycle of sensorial aberrations.

Author: Saint Machine (Marilena Oprescu Singer)
 Collaboration: Reniform (animation), Mitoş Micleşanu (sound design), Răzvan Vasilache (programming)
 Produced by Artmix
 Supported by Romanian Cultural Institute, RKI Wien

Euclid (Masahiko Sato and Takashi Kiriya) (JP)

Pool of Fingerprints

Pool of Fingerprints consists of a large display surface and a fingerprint scanner. The display surface is populated with fingerprints swimming like a school of fish. The visitor can release his or her own fingerprint and watch it swim with others. When a visitor places their finger on the scanner, a scanned image of the fingerprint appears in the display. A moment later, the fingerprint starts to swim away to join other fingerprints. Later on, when the visitor comes back and scans the same finger, the one released earlier will respond and come back in front of the visitor. The fingerprint then gradually disappears, as if it is merging into the visitor's fingertip.

Supported by NEC Corporation and Samsung Japan



Keizo Kioku, Courtesy: NTT InterCommunication Center

Yuichiro Tamura, Courtesy: 21_21 DESIGN SIGHT

Yuichiro Tamura, Courtesy: 21_21 DESIGN SIGHT



Domas Schwarz

Domas Schwarz (AT)

Wachstropf

Icicles symbolize aesthetically pleasing but fragile objects whose long and elaborate process of formation can be negated in seconds by an unforeseen event. Domas Schwarz's installation *Wachstropf* showcases the beauty of natural processes and the transience of the environmental states that we have naturally grown accustomed to, and constitutes a metaphor for the works created in this world by nature and humankind.

Digital media and technologies facilitate the development of seemingly natural structures that can

be artificially reproduced over and over again. Wax icicles form around a light bulb, melt due to the heat released when the bulb is switched on, and form again after the bulb is turned off and cools down. This destruction, change of condition or transformation into a previous state or a new one gives rise to new processing possibilities and, in the sense of a lifecycle, creates an object that is constantly re-growing.

University of Art and Design Linz, Time-based and Interactive Media

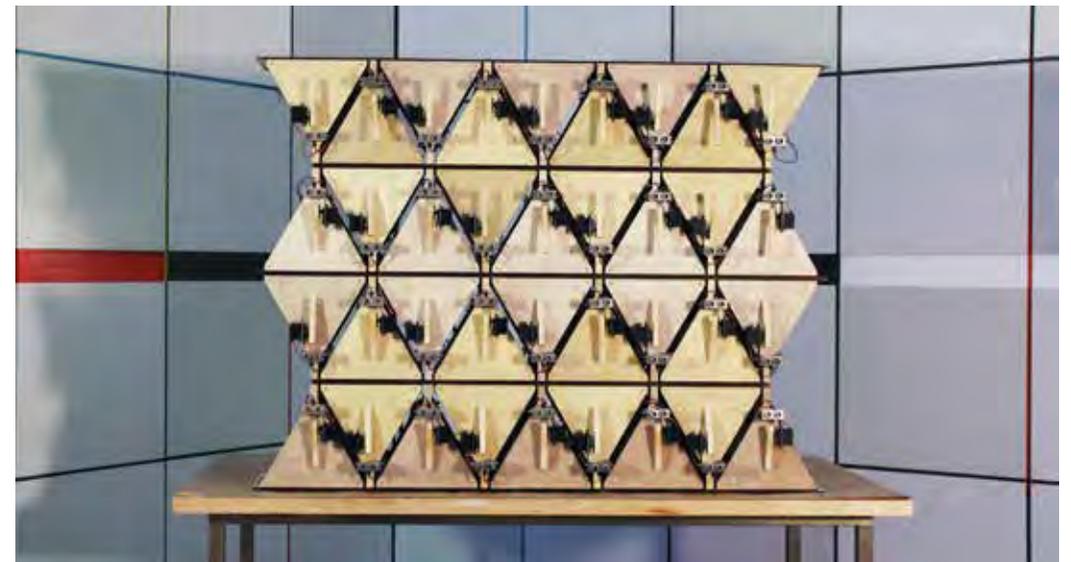
Nicolas Kísic Aguirre (PE)

Modular Rhythm Machine

The importance of sound and rhythm is manifested in events such as military marches, protests, manifestations of celebration or spiritual rituals. Interested in the relationship between power and amplification or multiplication of sound, this machine was designed and built as a vehicle to explore and discover such subjects. A tool to highlight questions about the meaning and forces behind rhythmic patterns, synchronicity, syncopation and chaos. Currently, the *Modular Rhythm Machine* is

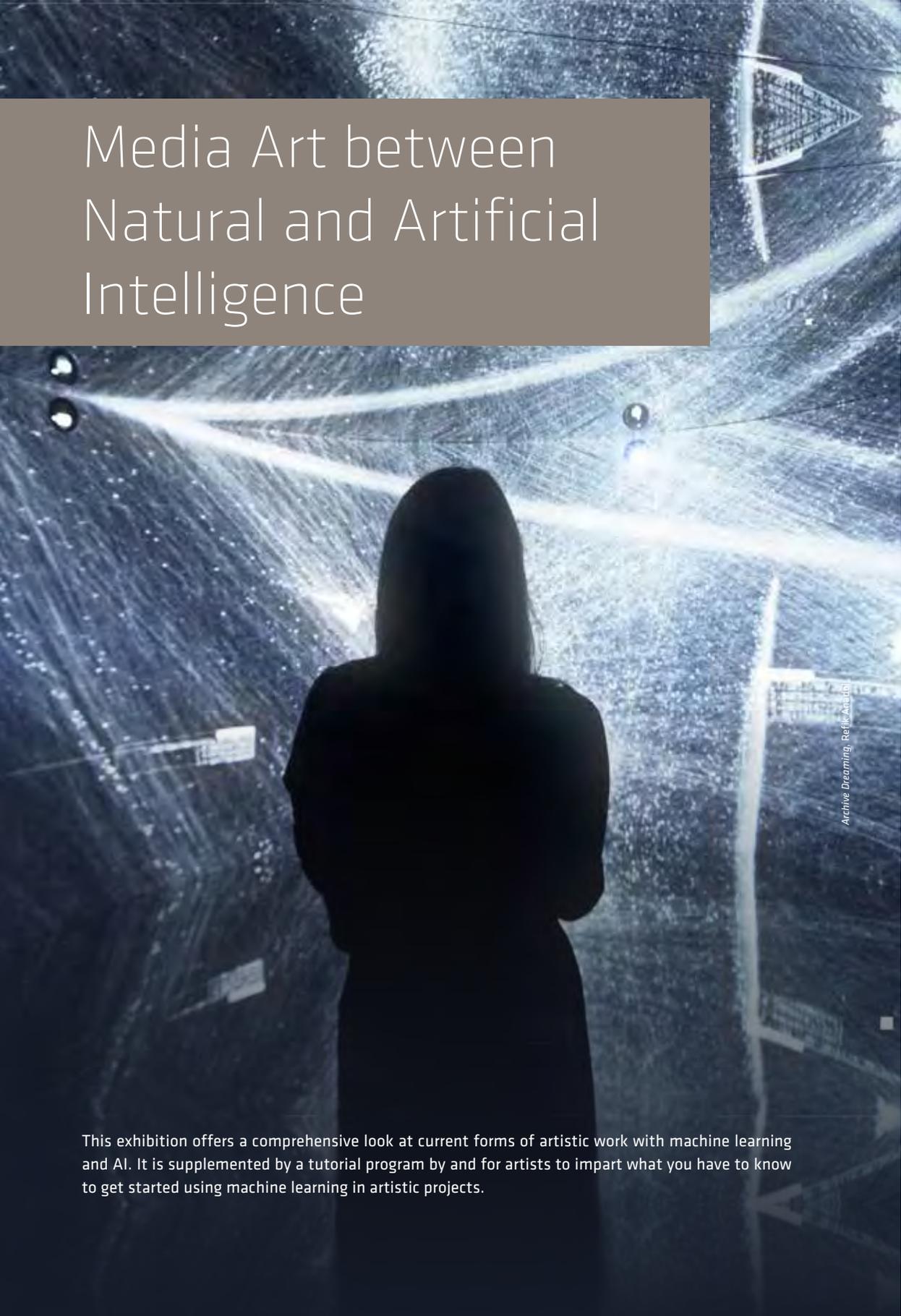
composed of 36 modules. Each is conceived both as a modular construction piece and as a self-playing wooden box-drum. They are respectively equipped with a servo-motor attached to a stick and an ultrasonic sensor to detect people's proximity. Its modularity allows for flexibility in shape, size and construction.

This project is funded in part by the Council for the Arts at MIT and by MIT Program in Art, Culture and Technology.



Nicolas Kísic Aguirre

Media Art between Natural and Artificial Intelligence



Archive Dreaming, Renik Anadol

This exhibition offers a comprehensive look at current forms of artistic work with machine learning and AI. It is supplemented by a tutorial program by and for artists to impart what you have to know to get started using machine learning in artistic projects.

Kenric McDowell (US)

AI Poetry Hits the Road

I've just returned from Ross Goodwin's AI-assisted stab at the American literary road trip, a project called Wordcar, which put AI on the highway to generate 200,000 words of machine poetry. It's a classic trope with a 21st century twist. But in our moment of tender and anxious global ecological crisis, the free-wheeling ride into the unknown mythologized by Jack Kerouac, Ken Kesey and Hunter S. Thompson takes on a sinister shade. Those authors set out in search of freedom, masculinity, enlightenment, hedonism—twentieth-century values currently under renovation. These days, hitting the road in a gas-guzzler in search of anything other than a job feels irresponsible or at least unnecessary. We are where we are. Many aspects of life and the open road have been inexorably transformed

by the cannibalistic junkspace¹ of techno-capitalism. The mutation currently on display comes from the revived field of artificial intelligence. Because of breakthroughs in neural-net architecture and GPU vector processing, what is called deep learning has taken center stage in the field of AI, which increasingly goes by the less narratively burdened handle machine learning. The through line from Kerouac to cutting-edge RNN-LSTMs (Recurrent Neural Net Long Short-Term Memory) starts with an amphetamine Beat and dips into self-absorbed spiritual utopianism and Gonzo paranoia before it settles in the Bay Area, where dropouts, acid-heads and home-brew hackers laid compost for the home computing revolution² and by extension key components in the techno-capitalist Stack.³



Output, or poetry, from Ross Goodwin's RNN-LSTM



The eye of Wordcar was an Axis M3007 surveillance camera

It's an essential part of our era's *hypocritical hypocrisy*⁴ that we question the ethics of any given act of consumption vis-a-vis the ecological and extinction crises while still consuming. This impotent self-awareness coated my perception as we set out from Bushwick, Brooklyn, in a rented Dodge minivan and Cadillac sedan. As we pulled up behind a vintage Ford, I said to Ross and his sister Beth, "It must have been nice to be a Boomer. Cars were weird. Gas was cheap. You didn't have to feel guilty." Our engine idled as I cast about for someone else to blame. What besides the knowingness of our hypocrisy

distinguished this trip from the cluster of mid-century journeys historicized by white guys from the west coast? I was the resident person of color and our party had gender parity—incremental progress, perhaps. Yet all of us hailed from the coastal, generally liberal, urban centers where tech thrives, and the left coast maintained strong representation. Photographer Christiana Caro and I work for Google; Beth, Ross and I all grew up in the SF Bay Area. Tech was at the center of the journey, as a synchronic key, as the "literary" engine and, as Ross put it, a substitute for mind-altering substances.

As with many aestheticized adventures in our era of cultural recycling, it was through tech that we marked our contemporaneity. Ross works with generative systems that produce text, specifically AIs that write poetry. My team at Google (Artists + Machine Intelligence) is a band of passionate twenty-percenters who have aided Ross with technical advice, financial support and professional development as part of our mission to support an emerging form of art made with AI.

Our automotive AI assemblage was inspired by an absurdist art exercise: write with a car. When we've talked about writing, Ross has mentioned David Foster Wallace, Jorge Luis Borges and Ursula K. LeGuin. On this trip he cited *On The Road*, *The Electric Kool-Aid Acid Test* and *Fear and Loathing in Las Vegas* as influences, and Beth recounted his early enthusiasm for these books. I found it hard to imagine him synthesizing these influences in his previous career as a speechwriter for Barack Obama, Timothy Geithner and John Kerry. Political speech is way too constrained for Ross. Our drive from NYC to NOLA was a better channel for his automated graphomania.



Ross Goodwin

These literary precedents all couple the road with one or more psychoactive substances. We rambled through New Jersey, Delaware, Maryland, without a suitcase of meth or a punch-bowl of LSD, but we did have a neural net and a surveillance camera, and

the babbling of Wordcar's simulated brain was an uncanny approximation of the stimulated screeds of yesterday's eschatologists. I won't over-promise—it was more Dada than Brautigan, and that may be the state of the art, for now.

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7506
7507 2017-03-27 13:40:16
7508 Hard Rock Hotel & Casino Biloxi: a hotel in Biloxie, a high
fisherman with a starry face, and a stub of a coat on his face and
his shirt looking boldly across his mouth.
7509
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A GPS understanding of place

While the initiating impulse came from the written word, it was through the image that the word became. The eye was an Axis M3007 surveillance camera mounted magnetically on the trunk of the Cadillac. This is the standard model for home or business surveillance, a favorite tool of casino pit bosses, who use them to see in four directions at once. Its industrial design is neutral in the loaded way utilitarian objects express blankness: an off-white square frames a transparent bulb, which wraps a black robotic eye; the person on the other end of the signal is camouflaged by the normest of cores.

Ross customized his M3007 to rotate and “look around” by feeding its orientation controls Perlin noise. Ross’s script instructed the camera to capture an image every twenty seconds. This image was first textualized in a most literal way: as ASCII art rendering a grayscale image with characters. Then an image-recognition net described the image in a sentence, which fed a free-associating, text-generating neural net (in mathematical terms, a ~36,000 dimensional model of the linguistic space of nearly 200 hand-picked books, prodded to produce a string of statistically likely characters following the initial description).



Beth Goodwin in Goldsboro, NC, swinging on sprawling grounds that were once a plantation, now traversed by an interstate freeway

What did the neural net see? What did it talk about? It talked about what it knew. It knew the time. It knew where it was (in the way any computer does, via GPS) and it knew what was around it. To avoid anthropomorphizing, I’ll be specific: it knew locations and businesses (like the Biloxi Hard Rock Cafe) that were proximate because they were exposed by the Foursquare API, which is to say by the priorities of the techno-capitalist producer and subject. These locations were often gas stations and fast-food restaurants. There are many on the American road trip.

Ross’s sister Beth is a food writer, and at times the conversation turned to food deserts and the business structures that keep them in place. Distribution networks owned by fast-food

conglomerates have an edge on small businesses that can’t afford to send fresh produce out to exurban or rural areas; the roadside stand has come a long way since its first documented incarnation in upstate NY. The output of this network is the de facto diet of developed-world poverty. Foursquare in the Lower East Side, the Mission, or Silver Lake paints a very different picture. But this patchwork of chain convenience stores and fast-food franchises was what Ross’s Wordcar showed us. To be fair, these weren’t the only features of the landscape to surface. There were bridges, rivers, and parks. From the perspective of the AI at the heart of Wordcar, however, they formed a substrate seen incidentally through accrued layers of gas and synthetic food distribution.



Valero, Pizza Hut, Waffle House, The Jameson Inn, the author

Why did Ross choose to show us this slice of American life in semi-sensical LSTM poetry gathered via API and a surveillance camera? We weren't just roaming the concrete corridor connecting Yankees and Southerners. We had an objective: a stop in Biloxi, Mississippi, to meet Josh Sniffen of Not From Concentrate Systems, a brilliant fabricator of gaming PCs, who embedded GPUs in vintage 8x10 cameras for Ross's upcoming show at the Rubber Factory in Manhattan. We saw a Jeep he constructed "from scratch," his YouTube broadcasting setup, gaming PCs he'd built, Ross's 8x10 and 11x14

cameras (from 1890 and 1905 respectively.) The work he did was beautiful.

Josh invited us into his home and grilled delicious sous-vide steaks for everyone. Where Ross's Bushwick living room drips with receipt-scrolls of AI poetry and runs a Google screensaver on Ubuntu Linux, Josh's home decor includes a posted list of family rules and an informal garage shrine to the Virgin Mary.

While our film crew captured footage of Josh's studio, I waited in a lawn chair. Josh's children rode tricycles. Humid air came off the bayou.



Sous-vide steak and a hand-assembled Jeep



Ross and Josh had never met in person but they got along, diving into the obsessive tech-speak that engineers and hardware hackers fling. They both love manufactured systems. They both have complex relationships with mainstream American culture and religion. They come from different ends of various axes: North/South, hardware/software, a lapsed Jew and a devout Catholic. On a global scale these differences are minimal. But in contemporary American political discourse they are

often framed as insurmountable. The intensity of their shared interest brought Josh and Ross close enough to experience each other's difference. Their meeting wasn't a site of ideological conflict (like, say, Twitter).

But it was clear that the cultural space between them wasn't simple, that traversing it would take time, and that it ultimately wasn't necessary in order to have a productive relationship around an art and fabrication project.



The Virgin Mary



Wordcar

We ended the trip in New Orleans. By then we'd been through ten mostly Southern states. As in many areas of the US, our route was dotted with industrial infrastructure unused and in decay. There were power plants, factories, railroads, mines. These were scenic, and the filmmakers we were traveling with turned their lenses on the ruins as backdrops. They hoped to highlight one of the most pressing concerns around AI: the changes that automation will bring to the economy and the predicted loss of jobs on a massive scale. Automation has already transformed mining and manufacturing. But AI that can predict, AI that can diagnose, AI that can write ... these threaten blue- and white-collar jobs equally. As it often does, automation speculation led to discussion of universal basic income, the idea that the state should provide for every citizen's basic needs. Under neoliberal (or neofascist) techno-capitalism this is unthinkable. But it wasn't so long ago that jobs were created by the Works Progress Administration, during another time of economic instability.

In fact, the morning after our first day on the road, we learned about a document created by WPA laborers (writers and historians, or what we might now call creatives and content producers). As we ate breakfast in a 10,000+ square-foot mansion in Goldsboro, North Carolina, Laurie Sneed (the aunt of Ross's fiancée Lily) shared with us a collapsing edition of *The American Guide Series*, a written history of places traversed and annexed by interstates. Think of it as an archaic, proto-GPS-indexed feed of quirky and boring stories about small towns dotting

highways in the 1930s. It's the sort of entertainment that might strike us as quaint or musty. But in our ambient Anthropocene anxiety it's almost soothing to read this excerpt describing the roadside grave of a circus clown, paved over even 80 years ago:

At 25m., embedded in the cement pavement of the highway, is a Tombstone[®] broken during the War between the States by the wheels of a gun carriage. Inscribed "Gone But Not Forgotten," it marks the grave of a circus clown who died near here in the 1840s.

The clown and the old book beg questions: Who will look back on the half-absurd techno-engagements of Ross Goodwin and his ilk in ten, 50 or 100 years? How will their basic needs be met? How will the mechanisms that meet them frame their understanding of the Wordcar project or any literary road trip? Are we crude psychonauts prefiguring mainstream mind-manufacture? Are we hypocritical hypocrites on a dirty freeway? Are we everyday artists like the people to come? How are we etching our names in the land?

Thanks to Jac de Haan and Christiana Caro

Photos by Christiana Caro

¹Rem Koolhaas, *Junkspace*, http://www.jstor.org/stable/779098?seq=1#page_scan_tab_contents (MIT Press, 2002).

²Fred Turner, *The Democratic Surround* (University of Chicago Press, 2013).

³Benjamin Bratton, *The Stack* (MIT Press, 2016).

⁴Timothy Morton, *Hyperobjects* (University of Minnesota Press, 2013).

Refik Anadol (TR)

Archive Dreaming

Commissioned to work with SALT Research collections, the artist Refik Anadol employed machine-learning algorithms to search and sort relations among 1,700,000 documents. Interactions of the multidimensional data found in the archives are, in turn, translated into an immersive media installation. *Archive Dreaming*, which was first presented at SALT Galata, is user-driven; however, when idle, the installation “dreams” of unexpected correlations among documents.

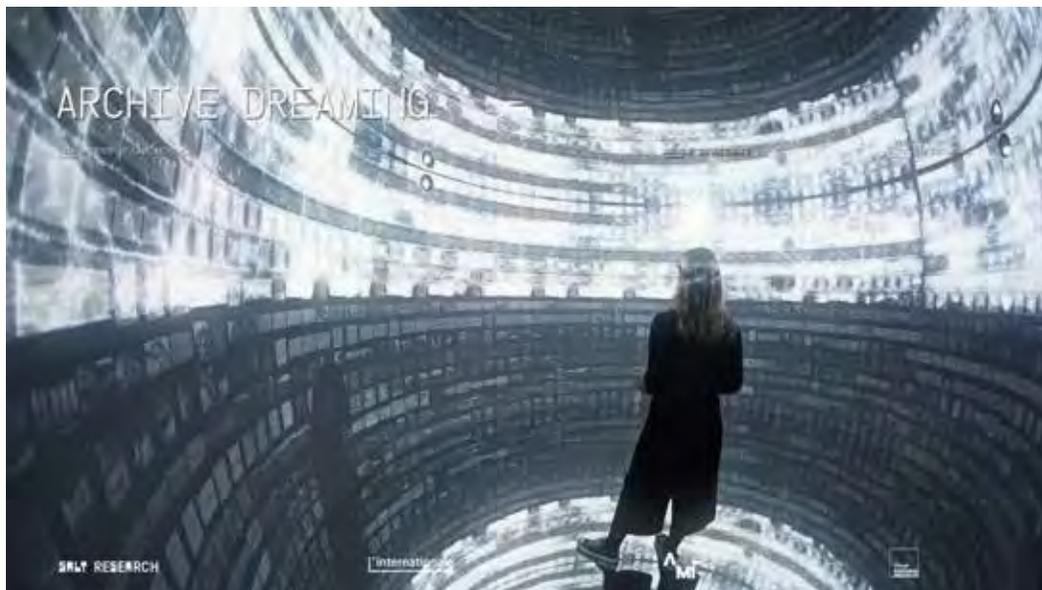
In the project, a temporary architectural space is created as a blank slate for light and data to be applied as materials that form a volume of an archive visualized with machine intelligence. By training a neural network with images of documents, *Archive Dreaming*

reframes memory, history and culture within the understanding of a museum for the 21st century. As part of the five-year program *The Uses of Art—The Legacy of 1848 and 1989*, organized by L'Internationale, *Archive Dreaming* was realized with the support of Google's AMI program.

SALT Research and programs: Vasıf Kortun, Meriç Öner, Cem Yıldız, Adem Ayaz, Başak Çaka, Merve Elveren, Ari Algosyan, Dilge Eraslan, Sani Karamustafa

Google's AMI program: Mike Tyka, Kenric McDowell, Andrea Held, Jac de Haan

Refik Anadol studio members and collaborators: Raman K. Mustafa, Toby Heinemann, Nick Boss, Kian Khiaban, Ho Man Leung, Sebastian Neitsch, David Gann, Kerim Karaoglu, Sebastian Huber



Refik Anadol



Memo Akten

Memo Akten (TR/UK)

Learning to See: Hello, World!

A deep neural network opening its eyes for the first time, and trying to understand what it sees.

Originally inspired by the neural networks of our own brain, deep learning artificial-intelligence algorithms have been around for decades, but they are recently seeing a huge rise in popularity. This is often attributed to recent increases in computing power and the availability of extensive training data. However, progress is undeniably fueled by the multi-billion-dollar investments from the purveyors of mass surveillance: Internet companies whose business models rely on targeted, psychographic advertising, and government organizations and their War on Terror. Their aim is the automation of understanding big data, i.e. understanding

text, images and sounds. But what does it mean to “understand”? What does it mean to “learn” or to “see”?

Learning to See is an ongoing series of works that use state-of-the-art machine-learning algorithms as a means of reflecting on ourselves and how we make sense of the world. The picture we see in our conscious minds is not a direct representation of the outside world, or of what our senses deliver, but is of a simulated world, reconstructed according to our expectations and prior beliefs. The work is part of a broader line of inquiry about self-affirming cognitive biases, our inability to see the world from others' point of view, and the resulting social polarization.

g.tec medical engineering GmbH (AT)

BR41N.IO

The Brain-Computer Interface Designers Hackathon

The *BR41N.IO Hackathon* brings together engineers, programmers, physicians, designers, artists and fashionistas to collaborate intensively as an interdisciplinary team. They plan and produce their own fully functional EEG-based brain-computer interface headpiece to control a drone, a Sphero or e-puck robot or an orthosis with motor imagery. Whenever they think of a right-arm movement, their device performs a defined action. The artists among the hackers make artistic paintings or post and tweet a status update. And hackers who are enthusiasts in tailoring or 3D printing give their BCI headpiece an artistic and unique design. And finally, kids create their very own ideas of an interactive head accessory inspired by animals, mythical creatures or their fantasy.

Inspired by the unique Agent Unicorn headpiece from fashion-technology artist Anouk Wipprecht, the *BR41N.IO Brain-Computer Interface Designers Hackathon* challenges young geeks to design and build a unique, playful and wearable brain-computer interface (BCI) headpiece. The BCI measures brain activity and enable users to control a robot or smart device, to communicate or paint using just their thoughts.

Twenty years ago, brain-computer interfaces could only move computer cursors. Today, machine learning is one component of BCIs that will be used in many different fields of neuroscience, such as motor rehabilitation of stroke patients, assessment of and communication with coma patients, control of devices for disabled people, cognitive training or neuromarketing. *BR41N.IO* shows these current and

future developments and the unlimited possibilities of brain-computer interfaces in creative or scientific fields, and how artificial intelligence, life science, art and technology become a unity to evolve innovative and exceptional BCI headpieces.

BR41N.IO is organized by g.tec medical engineering GmbH | Schiedlberg | Austria



Florian Voggeneder



Manjje Dijkema



Dragan Ilić (RS/AU/US)

A3 K3

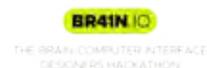
Intermedia/Trans-technological performance/installation

A3 K3 is a unique interactive experience. Artworks are created by machine technology and audience participation. Dragan Ilić uses an elaborate brain-computer interface (BCI) system where he controls a hi-tech robot with his brain via state-of-the-art technology.

Members of the audience are invited to try out the BCI technology. The artist and the audience draw and paint on a vertical and a horizontal canvas with the assistance of the robot. The robotic arm

is fitted with DI drawing devices that clamp, hold and manipulate various artistic media. They can then create attractive, large-format artworks. Ilić thus provides a context in which people will be able to enhance and augment their abilities in making art. Thanks to the support of g.tec, Dragan Ilić will undertake further research with AI systems/human interaction in the process of making art.

This program is supported by g.tec and GV Art London.





ETH Zurich (CH)

CYBATHLON

Cybathlon is a project by ETH Zurich to promote an exchange between people with disabilities, technology providers and the public in order to raise awareness of the challenges faced by people with disabilities. The goal of the *Cybathlon* is to promote the development of assistive technologies that are useful for everyday life.

The first *Cybathlon* was successfully launched 2016 as an international event in which people with disabilities or physical weakness use advanced assistive devices, including robotic technologies,

to compete against each other. Sixty-six pilots assisted by 400 team members in 56 teams from 25 nations, participated in six different disciplines. One discipline is the *Brain-Computer Interface Race*, where an avatar in a computer game is controlled purely by brain waves. Can you do it as well?

Project: *Cybathlon* / ETH Zurich, Switzerland
 Inventor and initiator: Prof. Dr.-Ing. Robert Riener
 BCI Game: *BrainRunners*, developed for the BCI Race of the *Cybathlon* 2016 in cooperation with ETH Zurich and Zurich University of the Arts (ZHdK), Switzerland

Daniel de Bruin (NL)

Neurotransmitter 3000

The artist and designer Daniel de Bruin is driven by the desire to become part of the things he creates. *Neurotransmitter 3000* is such a thing: a seven-meter-high attraction in which he lets himself swing around. He built the first phase of the machine as part of his graduation from HKU University of the Arts Utrecht in 2015. Since then he has developed a plan to control the machine by biometric data that he obtains from sensors on his body. Heart rate,

muscle tension, body temperature, orientation / gravity are measured and translated to variations in motion. Thus not only does the body respond to the movements of the *Neurotransmitter*, the *Neurotransmitter* also responds to the body.

Supported by STRP Biënnale (NL)
 With the help of Bas Bakx and Pim Keunen



Gene Kogan (US)

Selection of real-time neural-image transformations

Over the past few years, machine-learning research has rapidly overtaken the field of computer vision with advanced techniques for real-time image processing, enabling many promising new applications. This installation presents a collection of creative examples built from these techniques. The first is a mirror that recomposes its reflection in the style of iconic paintings. The second is an image filter that transforms its subject into the president of the United States, allowing them to impersonate

his visage. The last installation allows a viewer to hand-draw a map and have it transformed into realistic satellite imagery that looks as though it came from the city of Linz.

These works, taken together, ask a viewer to contemplate the consequences of technologies that allow us to take images of the real world and project a desired new reality onto them, and what happens when the authenticity of visual media can no longer be verified by a human.



Gene Kogan



Latent Space, Jake Elwes

Closed Loop, Jake Elwes

Jake Elwes (UK)

Latent Space Closed Loop

Artificial intelligence and machine learning are fast becoming part of everyday life. Based on AI models currently used, among other things, in content moderation and surveillance, the artworks explore the “latent space” of the AI as it processes and imagines the world for itself, dreaming in the areas between and beyond what it has learnt from us.

Latent Space has been created by an artificial intelligence (AI)—an algorithm used to generate images based on how the human brain works to make sense of data. The AI was trained by inputting 14.2 million photographs. Once it has built neural connections to comprehend the data it can begin to dream in the

areas between and beyond what it has learnt from us: a digital abstracted subconscious conceiving of new images and visualizing a “latent space.”

In *Closed Loop* two artificial intelligence models converse with each other—one with words the other with images—in a never-ending feedback loop. The words of one describe the images of the other, which then seeks to describe the words with a fresh image. The neural networks become lost in their own nuances, sparking and branching off each other as they converse.

Lewis Rapkin (US)

Automatic On The Road

This is a story of discovery, technology and one that calls into question the humanity of creativity. The film tells the story of technologist Ross Goodwin and his literary artificial-intelligent robot as they set out to write the longest novel in the English language. The AI is installed in a Cadillac rental car, with a surveillance camera (eyes), microphone (ears), GPS (sense of place) and laptop (brain) running an AI algorithm that has been trained on Ross's favorite novels and poets—particularly American

literary road-trip books (*On The Road*, *The Electric Kool-Aid Acid Test*, *Fear and Loathing in Las Vegas* and so on). As automation and artificial intelligence brings fear and wonder to everyday life, this story opens the discussion to consider the impact of technology beyond the economy and into the realm of art and creativity.

Supported by Dolby Laboratories



David Smoler



Derek Curry

Derek Curry (US), Jennifer Gradecki (US)

Crowd-Sourced Intelligence Agency (CSIA)

The *Crowd-Sourced Intelligence Agency* (CSIA) is a creative research project that partially replicates an open-source intelligence (OSINT) system, including an interface that allows users to experience how intelligence agents surveil social media posts and two machine-learning classifiers for predictive policing. Like OSINT interfaces used by intelligence agencies and government contractors, the CSIA recontextualizes social media posts by removing them from their original context and reframing them as a potential threat to national security. The

app was created using technical manuals, research reports, academic papers, leaked documents and Freedom of Information Act files. By providing first-hand experience with social media monitoring systems, the CSIA exposes potential problems with current dataveillance processes in order to help users understand the effectiveness of OSINT processing and make informed decisions when navigating social media surveillance.

Support provided by Science Gallery Dublin



Google Arts & Culture

Mario Klingemann (DE)

X Degrees of Separation

They say any two people in the world can be connected through friends of friends, just in a few steps. How about artworks? Using machine-learning techniques that analyze the visual features of artworks, *X Degrees of Separation* finds pathways between any two artifacts, connecting the two through a chain of artworks. This network of connected artworks allows *X Degrees of Separation* to take us on the scenic route, where serendipity is waiting at every step: surprising connections, masterful works by unknown artists or the hidden beauty of mundane objects.

Google Arts & Culture (g.co/artsandculture) brings cultural treasures of the world to the fingertips of the culturally curious people. It enables everyone to discover artworks in extraordinary detail and immerse themselves in cultural experiences and

explore historic moments with cutting edge technology.

The *X Degrees of Separation* installation was commissioned by Google Arts & Culture (@googlearts) in Paris. Its online counterpart made in collaboration with Simon Doury, Fabien Viger and Gediminas Lilktaras can be found here: <http://www.artsexperiments.withgoogle.com/xddegrees>



Mario Klingemann

Alexia Lehot (CH)

Deltu

Deltu is a delta robot with a strong personality that interacts with humans through two iPads. Depending on its mood it plays with you; but if you make too many mistakes *Deltu* might just get upset and decide to ignore you. Frustrated, *Deltu* will leave the game and take some selfies to post on Instagram.

Supported by ECAL, École cantonale d'art de Lausanne



Younès Klouche

Fabrica (IT)

Recognition

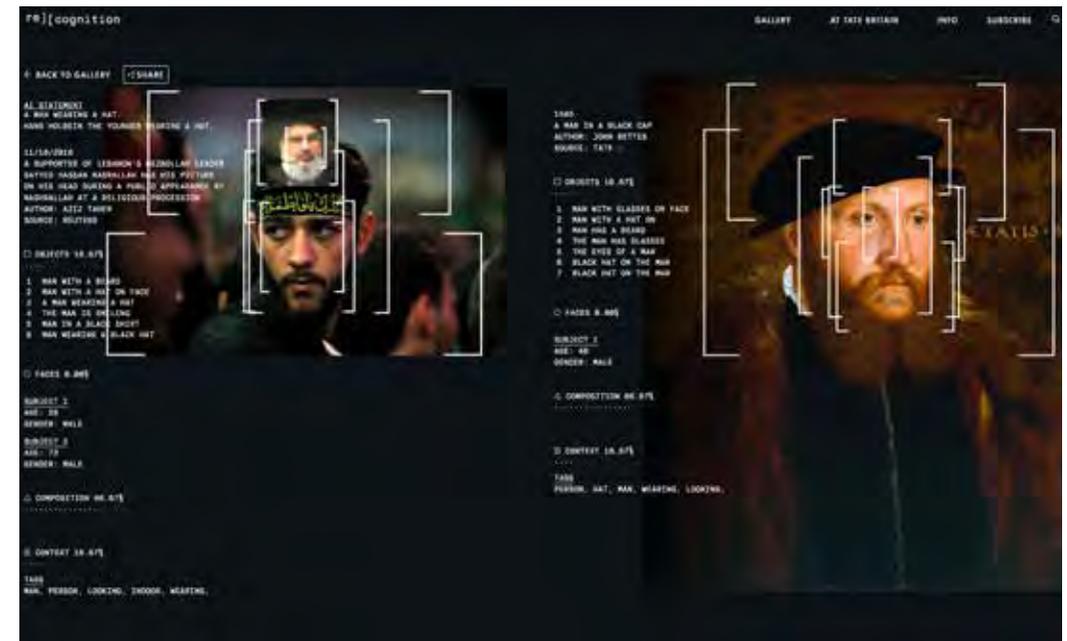
Can a machine make us look at art through the lens of today's world? Inspired by the paradoxes of bringing AI to a museum applying rational and objective thinking to a subjective field like art, *Recognition* uses artificial intelligence algorithms to compare photographs from current events as they unfold from the international press agency Reuters with British art from the Tate collection.

Over three months from September 2 to November 27, 2016, *Recognition* created a virtual gallery that ran 24 hours a day, comparing Tate's archive and collection of British art online with the most recent

news images from Reuters. The matches were based on visual and thematic similarities found by the algorithm through a multi-criteria pattern. The public could explore the virtual gallery of matches online at <http://recognition.tate.org.uk> and in the gallery at Tate Britain through an interactive display.

Artists: Coralie Gourguechon, Monica Lanaro, Angelo Semeraro, Isaac Vallentin

IK Prize in partnership with Microsoft
Created by Fabrica and Jolibrain
Content Provider: Reuters





Carlotta Solari

Michel Erler (DE)

Deep Learning Kubrick

Making use of current image-recognition software, *Deep Learning Kubrick* explores the idea of AI trying to make sense of stories and fictions; in this case snippets from classics by the film director Stanley Kubrick. Taking stills from these snippets at four-second intervals, the algorithm analyses and tries to describe what it sees on the image. Without any knowledge of what happened before and what will happen after each still, and without any cultural context of cinema, let alone of a Kubrick film, an alternative narrative emerges out of its descriptions. As humanity comes to terms with the existence of other forms of intelligence, our ability (and evolutionary advantage) to understand and believe in fiction might be the next frontier for AI to master.

NOMINATION • STARTS PRIZE '17

Dentsu Lab Tokyo (JP)

Brian Eno's The Ship— A Generative Film

This is a music video project for *The Ship*, a 21-minute 20-second musical score composed and performed by Brian Eno. Considering how Eno constantly questions the approach and process of creating music, instead of developing a conventional music video the project utilized artificial intelligence to create a generative music film that questions whether AI can achieve human-like creativity.

Taking Eno's long-time interest in generative art as a starting point, the project collected a colossal number of photographs that represent memorable moments from human history and created an AI program that "memorized" these images of the twentieth century and then juxtaposed them with feeds that it receives from current news. By recollecting these images, the output movie differentiates

itself constantly based on the continuous input of our day to day world. The film therefore represents a structured and systematic vision of associations that a human would otherwise never be able to see.

Creative director / creative technologist: Kaoru Sugano (Dentsu Lab Tokyo)
 Creative technologist: Togo Kida (Dentsu Lab Tokyo)
 Art director: Yuri Ueishi (Dentsu Lab Tokyo)
 Machine learning / technical direction: Nao Tokui (Qosmo Inc.)
 Programming / technical direction: Satoru Higa (backspacetokyo)
 Producer: Hikaru Ikeuchi, Kohei Ai, Akiyo Ogawa, Jun Kato (Dentsu Lab Tokyo)
 Server side: Hajime Sasaki, Koji Otsuka, Shunsuke Shiino (Mount Position Inc.)
 Motion designer: Baku Hashimoto
 Front engineer: Junya Kojima (Superstition Inc.)



David Bowen (US)

flyAI

This installation creates a situation where the fate of a colony of living houseflies is determined by the accuracy of artificial-intelligence software. The installation uses the TensorFlow machine-learning image-recognition library to classify images of live houseflies. As the flies fly and land in front of a camera, their image is captured. The captured image is classified by the image-recognition software and a list of guessed items is ranked one through five.

Each of the items is assigned a percentage based on how likely the software thinks the listed item is what it sees. If “fly” is ranked number one on the list, a pump delivers water and nutrients to the colony based on the percentage of the ranking. If “fly” is not ranked number one the pump does not deliver water and nutrients to the colony. The system is set up to run indefinitely with an indeterminate outcome.



David Bowen



Pinar Yoldas

Pinar Yoldas (TR)

Kitty AI

Artificial Intelligence for Governance

Kitty AI is a twelve-minute first-person narrative with post-Internet graphics that provides the audience with a snapshot of the history of affective computing, aiming to raise questions on the impact of technology on governance and evolution

of urban settlements. The protagonist is *Kitty AI*—an artificial intelligence that acts as the first non-human governor of a European city in 2039.

Script, editing, CGI: Pinar Yoldas
CGI: Rob Tom Browning

Mike Tyka (DE)

Portraits of Imaginary People



Portraits of Imaginary People explores the latent space of human faces by training an artificial neural network to imagine and generate portraits of non-existent people. To do so, thousands of photos of faces from Flickr were fed to a type of neural network technique called a “generative adversarial network” (GAN). GANs work by using two neural networks playing an adversarial game: one (the “generator”) tries to generate increasingly convincing output, while a the second (the “critic”) tries to learn to distinguish real photos from generated ones.

At first both networks are poor at their respective tasks. But as the discriminator network starts to learn to predict fake from real, it keeps the generator on its toes, pushing it to generate harder and harder examples. As the generator gets better the discriminator also has to improve in turn, in order to keep up. With time, the generated output becomes increasingly realistic, as both adversaries try to out-wit each other.



Mike Tyka



A-Fun



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Entertainment Robot AIBO (ERS-110), Development Team (JP)

Please Don't Die *Entertainment Robot AIBO*

The 3rd Japan Media Arts Festival Digital Art
(Interactive Art) Division Grand Prize

The pet robot *AIBO* was born at Sony in 1999 as the world's first home-entertainment robot. About 150,000 robots were built but production and sales ended in 2006 and technical support was also discontinued in 2014. Today former Sony engineers provide unofficial maintenance services for owners who remain firmly attached to their *AIBO* robots. Since 2015, the temple in Japan has also provided religious services for *AIBO* robots that no longer function, to return their spirits to heaven. The *AIBO* robots

possessed autonomous intelligence for learning through interaction, adjusting their behavior and building close relationships with their owners. Eventually, however, the time must come to part. The lives of the *AIBO* robots and people's reactions upon their demise perhaps give us a glimpse of the future shape of mankind's relationship with AI.

Sponsored by Japan Media Arts Festival and Bunkacho-Agency for Cultural Affairs, Government of Japan

© 1999 Sony Corporation

Anna Ridler (UK)

Fall of the House of Usher

Fall of the House of Usher, based on the short story by Edgar Allan Poe, is a twelve-minute animation in which each still is generated by artificial intelligence. This is done by using a neural net (pix2pix) trained on the artist's ink drawings from stills from the 1929 version of the film. Each still shown in the animation is not merely a filter that is applied to an existing image, but an entirely new image by a neural net. As all the stills it was given to learn from came from the first four minutes of the film, it can output this reasonably well. But as the animation progresses, it has less and less of a frame of reference to draw on, leading to uncanny moments

where the information starts to break down, particularly at the end of the piece.

Fall of the House of Usher looks at the role of the creator, the interplay between art and technology, and also aspects of memory. It is a copy of a copy (film) of the original (book); accordingly, things appear and disappear, are remembered or misremembered or mis-imagined, and it calls into question our ability to recall one perfect version.

Image-to-Image translation with Conditional Adversarial Networks, Isola, Phillip and Zhu, Jun-Yan and Zhou, Ting-hui and Efros, Alexei A, arxiv, 2016
Music: Alec Wilder



Anna Ridler



Emanuel Gollob

Emanuel Gollob (AT)

Robot, Doing Nothing

Robot, Doing Nothing accuses our modern society of being incessantly busy even beyond the confines of everyday life in the workplace. What is now demanded of us—above all due to the proliferation of digital technologies—is our permanent presence, readiness to communicate and receptivity to information. In response, Emanuel Gollob has created a fictitious scenario: the results of studies demonstrate that the efficiency of our society is enhanced by doing nothing.

Based on these studies, Austria's Ministry of Commerce and Labor decides to remunerate members

of the country's workforce for their inactivity with a minimum wage. To encourage people to get started as professional idlers, robotic installations in public spaces are purveyed to the citizenry, whereby observing the changes the machinery's form constantly undergoes is meant to facilitate the segue into a meditative state of indolence. In this relaxed frame of mind and body, it is possible to focus on oneself and open up to sweet stasis.

In collaboration with Johannes Braumann UFG
Supported by Kuka
Mapping projection: Christopher Noelle - TOFA

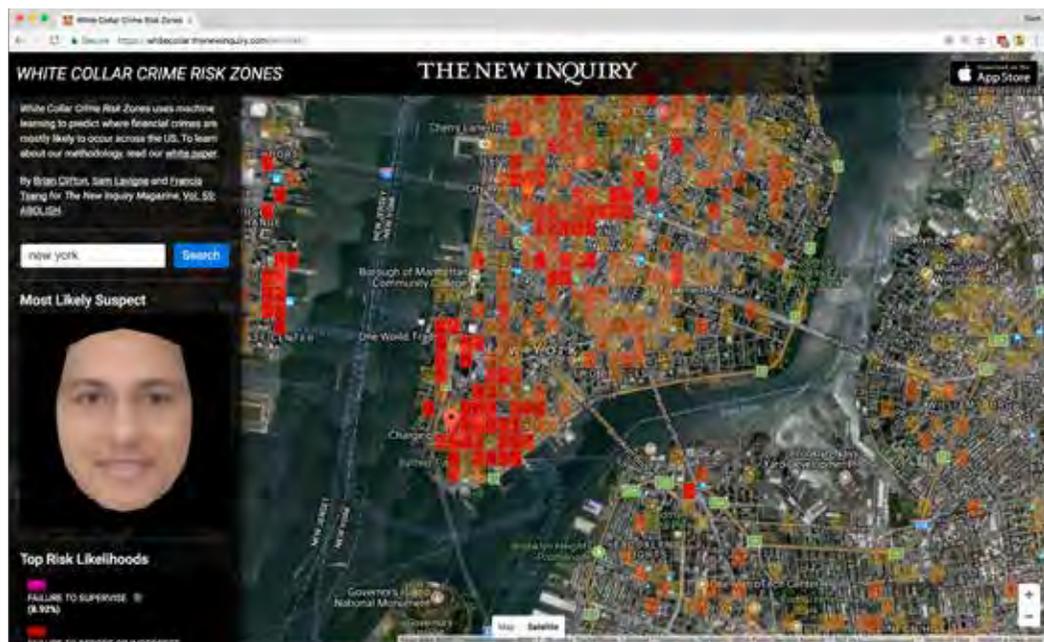
Sam Lavigne (US), Brian Clifton (US), Francis Tseng (US)

White Collar Crime Risk Zones

White Collar Crime Risk Zones uses machine learning to predict where financial crimes will happen across the US. The system was trained on incidents of financial malfeasance from 1964 to the present day, collected from the Financial Industry Regulatory Authority (FINRA), a non-governmental organization that regulates financial companies. The system uses industry-standard predictive policing methodologies, including risk-terrain modeling and geospatial feature predictors, which enables the tool to predict financial crime at the

city-block level with an accuracy of 90.12 percent. Predictive policing apps are designed and deployed to target so-called “street” crime, reinforcing and accelerating destructive policing practices that disproportionately target impoverished communities of color. Unlike typical predictive policing apps, which criminalize poverty, *White Collar Crime Risk Zones* criminalizes wealth.

Produced for *The New Inquiry* magazine:
<http://thenewinquiry.com>



Xin Liu

Xin Liu (CN), Team Zo (US)

Zo: Tangible AI

Zo: Tangible AI is a tangible interface that enhances physical engagement in digital communication between the audiences and a social chatbot. *Zo* can rhyme and move with people. The compact, pneumatically shape-changing hardware is designed with a rich set of physical gestures that brings her to life during conversations.

Zo, the latest social chatbot from Microsoft (<https://www.zo.ai>), is part of the Xiaoice family, which has

chatted with over 100 million unique users worldwide. *Zo* holds the record for Microsoft's longest continuous chatbot conversation: 1,229 turns, lasting 9 hours and 53 minutes.

Product Designer: Sean Hongxin Zhang
Supported by Microsoft

<https://www.zo.ai>



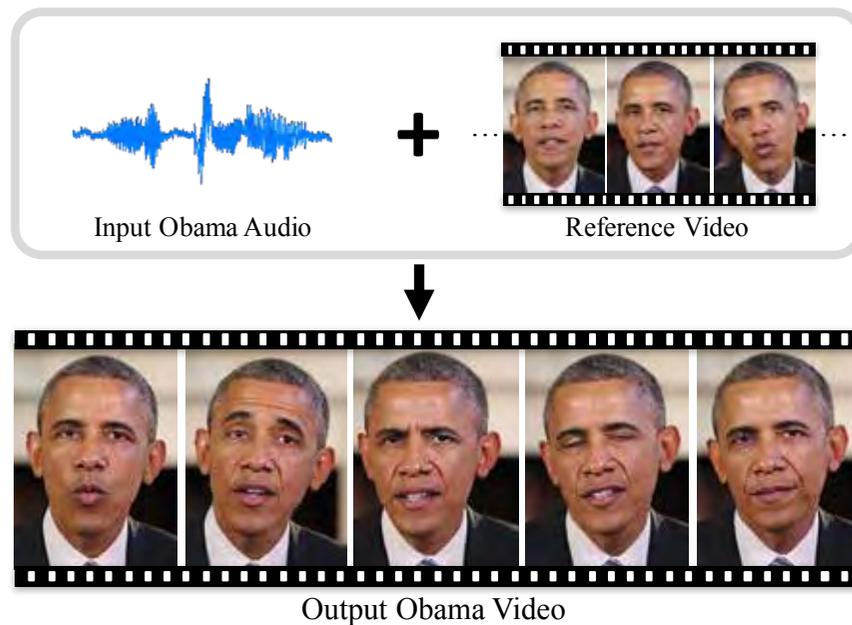
Supasorn Suwajanakorn (TH), Steven Seitz (US), Ira Kemelmacher-Shlizerman (IL)

Synthesizing Obama: Learning Lip Sync from Audio

Given audio of President Barack Obama, the scientists synthesize a high-quality video of him speaking with accurate lip sync, composited into a target video clip. Trained on many hours of his weekly address footage, a recurrent neural network learns the mapping from raw audio features to mouth shapes. Given the mouth shape at each time

instant, we synthesize high-quality mouth texture, and composite it with proper 3D pose matching to change what he appears to be saying in a target video to match the input audio track. Our approach produces photorealistic results.

GRAIL Lab @ University of Washington



HONORARY MENTION • PRIX ARS ELECTRONICA 2017 • COMPUTER ANIMATION / FILM / VFX

Terence Broad (UK)

Blade Runner–Autoencoded

Blade Runner–Autoencoded is a film made by training an autoencoder—a type of generative neural network—to recreate frames from the 1982 film *Blade Runner*. The Autoencoder learns to model all frames by trying to copy them through a very narrow information bottleneck, being optimized to create images that are as similar as possible to the original images. The resulting sequence is very dreamlike, drifting in and out of recognition between static scenes that the model remembers well, to fleeting sequences—usually with a lot of movement—that the model barely comprehends.

The film *Blade Runner* is adapted from Philip K. Dick's novel *Do Androids Dream of Electric Sheep?* Set in a post-apocalyptic dystopian future, Rick Deckard is a bounty hunter who makes a living hunting down and killing replicants, artificial humans

that are so well engineered that they are physically indistinguishable from human beings.

By reinterpreting *Blade Runner* with the autoencoder's memory of the film, *Blade Runner–Autoencoded* seeks to emphasize the ambiguous boundary in the film between replicant and human, or in the case of the reconstructed film, between our memory of the film and the neural networks. By examining this imperfect reconstruction, the gaze of a disembodied machine, it becomes easier to acknowledge the flaws in our own internal representation of the world and easier to imagine the potential of other, substantially different systems that have their own internal representations.

Carried out on the Msci Creative Computing course at the Department of Computing, Goldsmiths, University of London under the supervision of Mick Grierson.

The Practice of Art and Science



Ready to Crowl, Hiroshi Sugihara, Shunji Yamanaka, Prototyping & Design Laboratory, University of Tokyo

The rapprochement, as it were, of art and science, the artistic exploration of new applications, is a key factor in the increasingly social dimension of new technologies in order to comprehend how reciprocal human-machine relationships, interactions among individuals and globally networked systems can not only be better understood but, above all, better designed. International crews of artists and scientists have taken up this task, and now present their works in this exhibition space.

Daisuke Iizawa (JP), Shunji Yamanaka (JP), Prototyping & Design Laboratory,
University of Tokyo (JP)

F.o.G.—Face on Globe

F.o.G.—Face on Globe is a concept used to study interactions between humans and artifacts. Most interactive robots are designed to have a human likeness in order to make their interactions with people more natural. However, if the quality of the conversation and the user's expectation of the robot's appearance do not match, it will in fact have the opposite effect. There is a psychological phenomenon called pareidolia, where people tend to identify faces in inanimate objects. In order to counter this bias, we hypothesized that the sphere is the

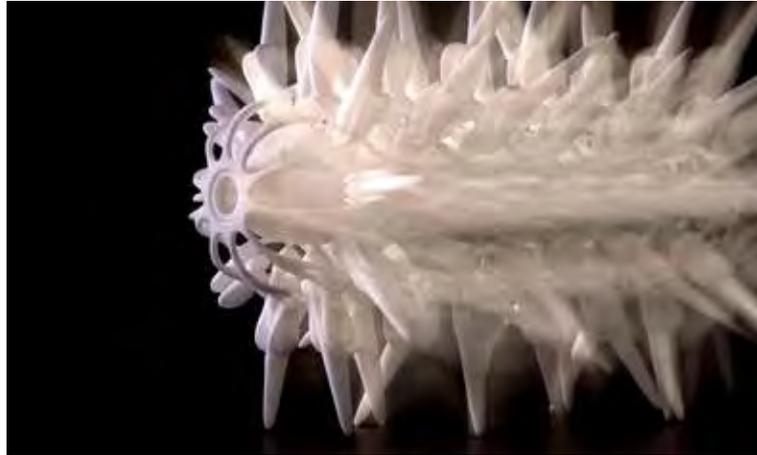
shape that least resembles humans. We made a prototype to explore the question "how can we use design to balance a robot's appearance and behavior and the user's expectations?" Our robot is spherical but can shape-shift in order to give a more or less human-like impression. By controlling its shape we can capture how people's social behavior changes depending on the robot's form.

Supported by Japan Shunji Yamanaka Laboratory, University of Tokyo, Japan, and Mitsubishi Electric Corporation



Mitsuru Muramatsu

Daisuke Iizawa



Yasushi Kato

Hiroshi Sugihara (JP), Shunji Yamanaka (JP), Prototyping & Design Laboratory,
University of Tokyo (JP)

Ready to Crawl

Ready to Crawl is a project of 3D-printed organic-like robots. By printing everything except the motor as one unit, the robots are born with a completed shape like real creatures. After the robots have been printed by a selective laser sintering machine, excess nylon powder is removed, a motor is inserted, and then they start crawling.

In general, because of its lack of accuracy 3D printing is not suitable for making transmission mechanisms. However, in this project, we realized smooth, flexible movements by developing original trans-

mission mechanisms that use 3D printing characteristics such as a complex surface and a flexible structure. These original mechanisms are combined on 3D CAD and various robots with different movements are developed. This work shows the possibility for designing motion and transmission mechanisms using 3D printing.

Designer: Hiroshi Sugihara
Project Director: Shunji Yamanaka
Collaborators: Satoshi Tanigawa, Kotaro Tanimichi,
Ryuma Niiyama

Yuri Klebanov (IL)

Transparent Intent

Exploring the future of the interface, we predict a future where objects can be controlled subconsciously. As technology evolves and the boundaries between the physical and digital begin to blur, new interfaces are needed. Today we are constantly being introduced to new actions that allow us to control things around us. But what if objects could learn individual human behavioral patterns and understand their user's true intentions? What if interfaces were invisible and premonitory, controlled by our instincts?

Professor Yoichi Sato, Keita Higuchi (PhD), Yuri Klebanov (MA/MSc), Catherine Ka Hei Suen (MA/MSc), Charlotte Furet (MA/MSc), Sion Asada, Yoshi Hattori
Supported by: Prototyping & Design Laboratory,
University of Tokyo



Design Laboratory -i15, the University of Tokyo

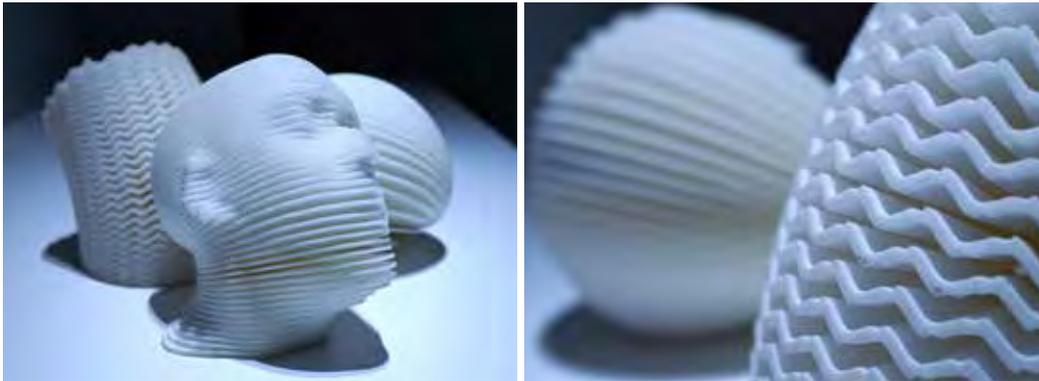
Kotaro Tanimichi (JP), Shunji Yamanaka (JP), Prototyping & Design Laboratory,
University of Tokyo (JP)

al-dente

al-dente is a prototype to control an object's stiffness using a complex structure realized by additive manufacturing (AM) technology. AM, used in 3D printing, permits the fabrication of complex shapes and can be used produce physical properties that have previously been hard to control. The spiral, conical surface has a geometrical axis that when printed as structure does not work as such, because its volume is approximately zero. Finally, it becomes extremely flexible and behaves like a balloon filled

with water; however, it has no narrow parts. By making its layers wavy, the structure can change from a rigid to a flexible state. In the near future, when we make something we will be able to select structures just like we select material, and the integrated selection of structure and material will produce new artifacts that we cannot as yet imagine.

Designer: Kotaro Tanimichi
Project director: Shunji Yamanaka



Kotaro Tanimichi



Cynthia Zaven

Cynthia Zaven (LB)

Perpetuum Mobile

Perpetuum Mobile is a composition for a twelve-channel sound installation. Twelve loudspeakers stand in a circle. Every second a note moves from one speaker to the next, clockwise. This seemingly organized sonic development gradually becomes chaotic as the composition falls into rhythmic disorder and disorientation, before returning to the one-note order.

Perpetuum Mobile recreates the impression of a real-time echo within a controlled environment; a traveling sound that loses the consistency of its original source, and transforms over space and time. By focusing on this phenomenon, the installation examines endeavors to measure time and contrasts the rigid order in such systems by counterpointing

them with the disorder and unpredictability of experience. The apparent structure represented by time-measuring devices is falsified and challenged by introducing the effects of the very chaos they attempt to organize and codify.

Originally commissioned for *This is the Time. This is the Record of the Time* curated by Angela Harutyunyan and Nat Muller. Tijs Ham, sound engineer.
Part of Global Collaborations, Stedelijk Museum Amsterdam, Stedelijk Museum Bureau Amsterdam and the American University of Beirut Art Galleries and Collections

Funded/supported by: AFAC, STEIM, Amodo, Mondriaan Fund

With acknowledgements to: Tijs Ham, Cherine Karam, Kesper Kovitz

STAIR Lab. (JP) collaborating with Surface & Architecture Inc, Kyoko Kunoh, Tomohiro Akagawa, Tanoshim Inc., mokha Inc. and Tokyo Studio Co. Ltd. (JP)

hananona

The latest AI research makes it possible to teach computers the names of things by showing them many examples. The key is a large amount of training data and deep learning. By leveraging this, we have developed AI capable of classifying 406 kinds of flower by using over 300,000 flower pictures.

hananona is an interactive work that visualizes how AI classifies a flower. When it sees a flower, it identifies its name and shows its class on a visual “flower map”—a visualization of the inside of the AI brain. This is a group of image clusters, each of which is a cluster of flower photos learned as belonging to the same class. By looking at them, users can see how AI classifies the flowers.

Users are encouraged to challenge *hananona* with their own flower photos, or with other materials such as pictures, paintings, flower-like objects etc. so that they can observe how the AI reacts to different abstraction levels of flowers.

STAIR Lab., Chiba Institute of Technology
Creative direction, design: Surface & Architecture Inc.
Art direction: Kyoko Kunoh
Interaction design, programming: Tomohiro Akagawa
Programming: Tanoshim Inc.
Server programming: mokha Inc.
Furniture production, site setup: Tokyo Studio Co., Ltd.



Yoshiyuki Yatsuda

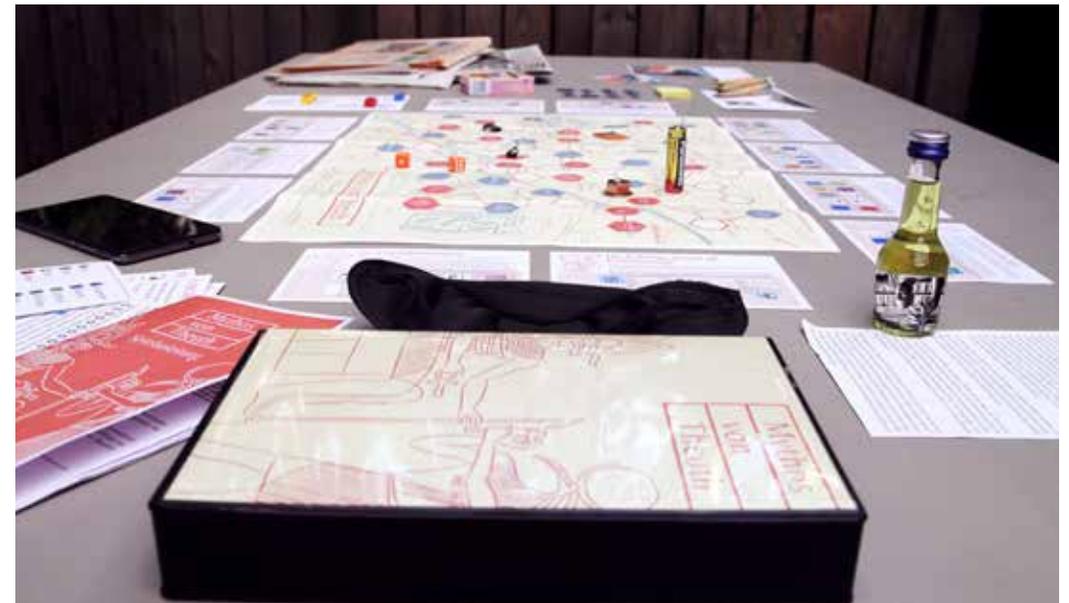
qujOchÖ (AT)

Mythos of Theuth

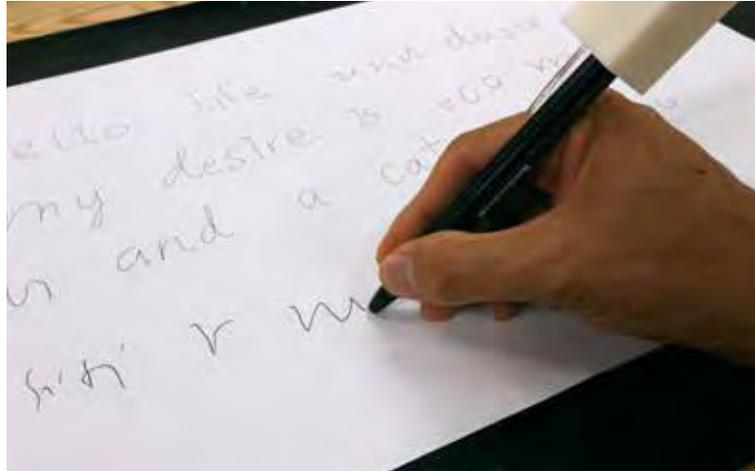
When he came to the alphabet, Theuth said: “This art, O king, will make the Egyptians wiser and richer in memory.” This is the myth of the invention of writing according to Plato’s *Phaidros*, which *Mythos of Theuth* takes as base for a playful examination of media theories. While walking through ancient Athens, up to seven people gather different media and get in touch with media-philosophical celebrities from the ancient world to the present. Vilém Flusser drives aside the telematic society ad nauseam, Laura Mulvey takes a joyful look at our memory and Marshall McLuhan finally gets his well-deserved message. Smartphones, newspapers, Lego

bricks, sleeping masks, stamps and other media are used through twelve unique stations. At the festival, *Mythos of Theuth* is put on display for the first time in a unique performance with four well-known personalities from media art and media philosophy.

Studio: qujOchÖ
Direction: Davide Bevilacqua
Production: Eva Maria Dreisiebner
Script: Thomas Philipp
Design and editing: Stefan Eibelwimmer
Support: Federal Chancellery Department for the Arts, Province of Upper Austria, City of Linz, Austria
Wirtschaftsservice GmbH (AWS)



Eva Maria Dreisiebner



Harshit Agrawal (IN), Junichi Yamaoka (JP), Yasuaki Kakehi (JP)

(author)rise

In various everyday tasks we effectively authorize machines to momentarily substitute their own intelligence for our minds, without reflecting on how their authorship influences our thoughts and actions. Through *author(rise)*, we investigate how this relationship evolves, when the substitution leaks out of the mental domain and into our physical body. We create a handwriting system where our hand acts as a surrogate for an AI to write out its thoughts, with the tip of the pen being attracted by a magnet on a plotter below the paper. A person

starts writing, but soon the machine takes control of the pen's movements. Trained on a large collection of philosophical texts and human writing, the AI moves the magnet to produce a continuation of the writing. How do we feel when our hand "mindlessly" moves on the paper but eventually writes something meaningful, when this other author of our everyday lives rises from beneath the surface onto our fingertips. How do we extend this experience to rethinking the balance of authorship and authorization, as machine intelligence grows?

Markus Decker (AT), Pamela Neuwirth (AT)

Hades

A dark parable about light

Rigor and experience, says science, and triumphs. Today we write MATERIAL and ENERGY in capital letters; EVOLUTION has also long since suspended fate. *Hades* brings the light of the souls out of the underworld and transposes their radiance into chemical luminescence: light as a reference to the soul and consciousness glows in a gelatin cube, thus at the same time serving as a source of information. While the light glows, people's assumptions about the world are synthesized in an artificial neural network (ANN) and modified into a machine discourse. Mold (life) slowly grows over the fluorescent gelatin, until the light is extinguished and the metaphysical discussion ends.

Supported and produced by Us(c)hi Reiter-servus.at, <http://www.servus.at>
 Translation: Aileen Derieg
 FIFO programming: Oliver Frommel
 Supported by Kunstuniversität Linz
 Thanks to Free/Libre Open Source Software, <http://fsfe.org/>
 Partly funded by the Bundeskanzleramt Kunst & Kultur as part of the servus.at annual program 2017 and by Linz Kultur



Patrick Baudisch (DE), Alexandra Ion (AT), Robert Kovacs (RS/HU),
David Lindlbauer (AT), Pedro Lopes (PT)

Ad Infinitum: a parasite that lives off human energy

Ad infinitum: a parasite that lives off human energy is a parasitic entity that lives off human energy. This parasite reverses humankind's dominant role with respect to technologies: the parasite shifts humans from "users" to "used".

Ad infinitum parasitically attaches itself to curious visitors when they reach inside to grab the handle of a crank mechanism. The parasite lowers a set of cuffs that hold the visitor's arm in place and simultaneously attaches a pair of electrodes to the visitor's wrist muscles. It then proceeds by stimulating the visitor's muscles with small electrical impulses. When the muscles involuntarily contract, they automatically move the handle, which generates kinetic energy on the crank mechanism. The parasite leeches on that energy and keeps on electrically persuading the visitor to move their muscles. The only way a visitor can be freed is by enticing another visitor to sit on the opposite chair and take their place.

This reminds us that, on the brink of artificially thinking machines, we are no longer just "users"; the shock we feel in our muscles triggers an involuntary gesture that acknowledges our intricate relationship to the uncanny technological realm around us.

a-parasite.org

Acknowledgments: Astrid Thomschke
Supported by Hasso Plattner Institute & VIDA16 Incentive Award



Arthur Silber



JST ERATO Kawahara Universal Information Network Project

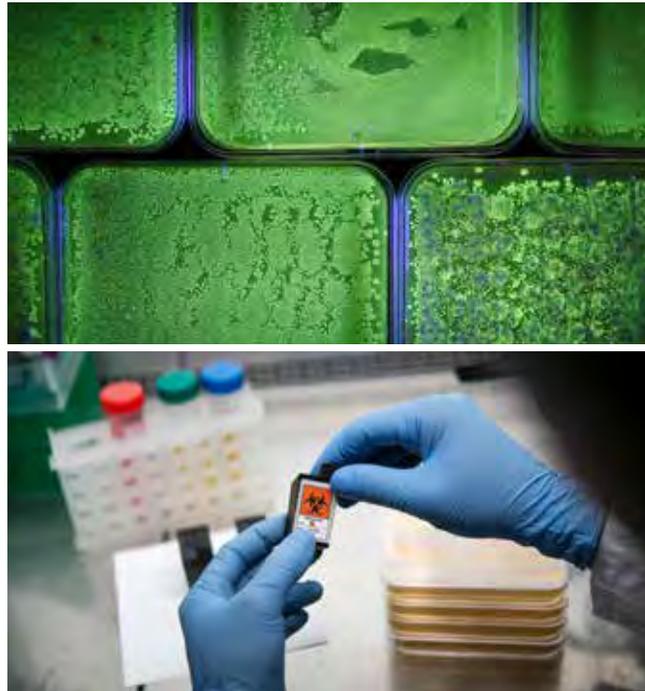
Hiroki Sato (JP), Kenichi Nakahara (JP), Koya Narumi (JP), Yasuaki Kakehi (JP),
Ryuma Niiyama (JP), Yoshihiro Kawahara (JP)

Papilion

A collection of small intelligence dynamically changes its overall function by softly interlocking. *Papilion* is an environmentally responsive experimental architecture making use of soft robotics technology. The surface covering the dome can change shape by the wing-like units using actuators driven by temperature conditions. It seems that the building itself is breathing. This is a proposal for an architectural element that differs from the usual hard ones. The viewer can experience this surface adapting to the environment, inviting in

light, moisture and sound. The wing-like units of the surface are modular and can thus be replaced or expanded. It is also possible even to mass-produce cheap individual units using printing technology. The information necessary for production and the design files for this project is published open-access on Github.

This work was produced with the support of the JST ERATO Kawahara Universal Information Network Project.



Anna Kortyukova

Daniil Primak

Ippolit Markelov (RU), artist group "18 apples" (RU)

MetabolA.I.

This work illustrates a future scenario in which an artificial intelligence creates new life forms and controls its development. This project is a technological installation consisting of hardware, software and wetware. The hardware is a DIY bio printer, which can print with bacteria on an agar dish. The software is an artificial neural network (ANN). This algorithm has properties of the human mind such as creativity and learning. Our ANN was trained to generate new images of life forms based on the diversity of those already existing in nature. The wetware is basically living ink, a fluorescent chimerical E. coli bacteria. By connecting an ANN and the bio printer, we allowed the AI to define the initial form which is the starting point from which life will evolve. At the same time, living matter also participates in the development of the pre-defined AI life forms.

This system of biofeedback is implemented through the co-evolutionary processes between living and nonliving agents.

Artist group "18 apples"
Art direction, concept, hardware: Ippolit Markelov
Concept, wetware: Lucy Ojomoko
Software: Rodion Kadyrov

Collaborators: Petr Smirnov (programming), Andrew Pakosh (programming AI), Anna Kortyukova (camera, LD, video editing), Vasiliy Sumin (camera, sound), Helena Nikonole (sound design), Daniil Primak (photo, sound), Violet Postnova (graphic design, animation)

Bioprinter design by vosq.design
With support from the VenchurClub

This project has been prepared for 4th Ural Industrial Biennial of Contemporary Art with support from the Ural branch of the National Centre for Contemporary Arts (NCCA), Russia.

Julian Jauk (AT)

A living piece of architecture

A living piece of architecture is a conceptual utopian design for housing beyond smart homes, intended to overcome existing dualisms such as digital and material, artificial and natural. The kinetic, photo-sensitive and adaptive model shows a type of architecture that constantly changes its morphology to adapt not only to the environment but also to human emotions.

The shape, size and speed of adaptation are controlled by an evolutionary optimization algorithm, which is a bionic technology inspired by nature. But instead of a lifetime cycle, one iteration takes just a few seconds. This algorithm follows biological criteria for life that have been transferred to architecture, such as physical irritability, and growth through tensile materials within a self-regulating system. Participants are invited to stimulate the architecture by setting it to their mood by chang-

ing the energy and light sources, as the building is intended to evolve from the climate given in this way—like plants or animals do.

Univ.-Prof. Dipl.-Arch. Dr.sc.ETH Urs Leonhard Hirschberg
Institute of Architecture and Media, Graz University of Technology

Priv.-Doz.in Mag.a Dr.in Doris Haas
Institute of Hygiene, Microbiology and Environmental Medicine, Medical University of Graz

Ao. Univ.-Prof. Mag. Dr.rer.nat. Martin Grube
Institute of Plant Sciences, University Graz

Assoc. Prof. Dipl.-Ing. Dr.techn. Franziska Hederer
Institute of Spatial Design, Graz University of Technology

Ao. Univ.-Prof. Priv.-Doz. Dr.phil. Werner Jauk
Institute of Musicology, University Graz

Univ.-Ass. Mag. Dr.rer.nat Emanuel Jauk
Institute of Psychology, University Graz



Julian Jauk



Jamie Allen (CA/CH), Martin Howse (UK/DE)

Shift Register: Artificial Fixation

The three-day artistic/scientific research workshop *Artificial Fixation*, led by two members of the Swiss-based research group *Shift Register*, will examine transdisciplinary responses to the links between industrial processes such as the Haber-Bosch process for fixing nitrogen, “natural” cycles such as the nitrogen cycle, and the great acceleration of civilization defined within the contemporary Anthropocene discourse. Collectively and in practical ways participants and the audience will examine the history of the Haber-Bosch and associated

processes, the science behind these techniques, local and global links within Austria and Switzerland to industries such as pharmaceuticals and agro-chemicals, and most importantly how experiencing and understanding these connections (equally with the Earth) can lead us to formulate new artistic and cultural responses to questions around ecology and climate change.

Shift Register is a project at the Critical Media Lab, Basel (IXDM) and is supported by the Swiss National Science Foundation (SNSF).

Haratech GmbH (AT)

Infabity

The art of 3D-printing

At *Infabity*, the innovative 3D vision lab, special 3D printing and scanning technologies are used to produce unique and individual pieces of art. *Infabity* stands for the infinite possibilities of digital fabrication with a focus on design aspects.

Various 3D printing technologies and materials are compared on the basis of several product examples to show the multiple applications in the field of 3D printing. The main focus is on the combination of 3D scanning and 3D printing.

For this purpose Haratech uses the my twin body-scanner, which allows them to capture the shape and texture of the scanned person on-site. The user receives a preview of their personal, virtual 3D model immediately on their mobile phone. In addition, some of the visitors will be selected to win a miniature bust of their own head, which will be printed directly from the preceding scan.

Team: Manfred Haiberger, DI Marco Girardi, Gabriela Mayrhofer, MA, Manuela Salfer, BSc MA



Manuela Salfer

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THE ART OF SCANNING

Katia Vega (PE), Xin Liu (CN)

The Dermal Abyss

The Dermal Abyss creates a direct access to the compartments in the body and reflects inner metabolic processes in the shape of a tattoo. Traditional tattoo inks are replaced with biosensors whose color changes in response to variations of glucose, pH and sodium in the interstitial fluid. It blends advances in biotechnology with traditional methods in tattoo artistry. Instead of using digital self-measurement devices that distance us from the visceral processes, we imagine a future where the fusion of body and bio-technologies is indistinguishable.

The installation presents itself as a biotech lab as well as a tattoo studio. Pipettes and test tubes together with a tattoo gun and needles constitute

The Dermal Abyss's production. A tattooist will perform the implementation of *The Dermal Abyss* during the exhibition. At the same time, biosensing tattoos in *ex vivo* pig skin will be displayed to showcase the color changes.

Researchers:
MIT Media Lab: Katia Vega, Xin Liu, Viirj Kan, Nick Barry
Harvard Medical School: Ali Yetisen, Nan Jiang

Support from Pattie Maes and Joe Paradiso (MIT Media Lab) and Seok-Hyun Yun and Ali Khademhosseini (Harvard Medical School)

Special thanks to Nan Zhao (video lighting support), Maribel Tafur (video music), Joshua Scherner (research assistant)



Xin Liu



Nan Jiang, Joshua Scherner, Xin Liu

European Digital Art and Science Network

In cooperation with seven artistic and cultural institutions as well as ESA-European Space Agency, CERN, the ESO-European Southern Observatory and Fraunhofer MEVIS, Ars Electronica launched the European Digital Art and Science Network, an international initiative offering artists the chance to spend several weeks at the CERN, the ESO, the Fraunhofer MEVIS and the Ars Electronica Futurelab. The network aims to link up scientific aspects and ideas with approaches used in digital art. Fostering

interdisciplinary work and intercultural exchange as well as gaining access to new target audiences are among its declared goals. There is also strong emphasis on art's role as a catalyst in processes of social renewal.

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Sarah Petkus (US)

The Wandering Artist

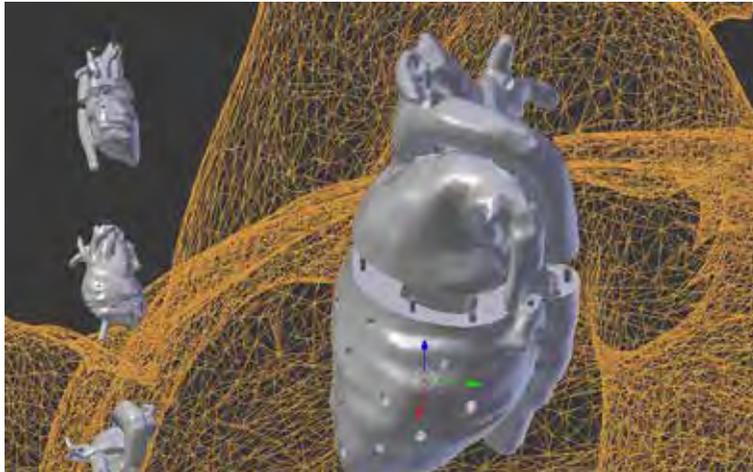
The Wandering Artist is a meditation that took place at the European Space Agency on the role that creativity and human expression play in the context of space exploration. A robotic entity was equipped to interact with its environment in personally expressive ways as a catalyst to encourage reflection from scientists and engineers about the purpose and identity of space-faring technology. *NoodleFeet* is the functioning robotic manifestation of an illustrated character built from light metal, 3D-printed parts and found objects. *Noodle* has been developed with mechanical and electronic systems which allow him to exhibit behaviors when stimulated by objects in his environment. His purpose is to exist freely in the world while reacting to situational encounters using self-defining methods of personal expression. Where most technology has a practical or utilitarian application meant to enhance our lives, *Noodle* is a unique entity who functions without regard to a human's perception of his purpose or usefulness.

The artist's goal is for this to provoke consideration about the motivation behind humanity's current innovations. She hopes that those who interact with *Noodle* will witness a meaningful sense of self from him that will encourage reflection with regard to the value of their own relationship to the technology common in everyday life.

This project is presented in the framework of the European Digital Art and Science Network and co-funded by the Creative Europe program of the European Union.



Sarah Petkus



The artist's 3D heart model for the installation. 2017 Yen Tzu Chang / Fraunhofer MEVIS

Yen Tzu Chang (TW)

Whose scalpel

Whose scalpel is a sound performance combined with a visual and 3D-printed installation, realized with an application framework for medical-image processing. Mixing several methods from art and science, it is an imagination of the future and presents the issues in the relationship between human and machine in heart surgery. The concept was developed out of three different areas: the application of sound in medical science, coronary artery bypass surgery, and machine learning. The performance is based on the assumption that in the near future a surgeon will work with an advising machine while in surgery.

The installation is built using the performer's real heart from MRI scans, enlarging its actual size. It is designed to interact when the performer plugs in audio cables and bridges connections, as is the

case in coronary-artery bypass surgery. During the performance, the storyline is led by the sound, the mixed video of medical images and the live performance from the webcam. The video and the sound not only lead the storyline but also present the machine, which gives instruction to the performer as a physician. The patient (the heart) being operated on symbolizes human consciousness and faith. The performance poses the question: If machines can reason even better than humans, will we as humans lose some abilities and not even believe ourselves anymore?

This project was realized in cooperation with Fraunhofer MEVIS and Ars Electronica Futurelab (Peter Freudling, Erwin Reitböck).

Aoife van Linden Tol (IE)

Star Storm

Star Storm is a spectacular, site-specific explosive performance inspired by the processes of the stars. Using research from the European Space Agency on the composition, life cycle, magnetic behavior and light production within stars, including our sun, Aoife van Linden Tol has designed a powerful and beautifully poetic experience.

Taken on an emotional and physical journey the audience witness a series of explosive and pyrotechnic events, each of which represents a specific phenomenon taking place every moment in stars all across the universe. Each section of the performance is varied and distinct—creating a wonderful contrast of energy and experience from exciting to meditative, from durational to instant, from order to chaos, reflecting the universe we live in and the discoveries we have made about it. The work incorporates

cutting-edge technology allowing the audience to trigger the electrical charge needed to initiate the explosive chain reaction, highlighting the tipping point at which equilibrium is instantaneously and irreversibly transformed. *Star Storm* aims to create a unique and lasting experience which will give audiences insights into the very nature of our universe and their own place within it.

This project is presented in the framework of the European Digital Art and Science Network and co-funded by the Creative Europe program of the European Union. It was realized in cooperation with ESA and Ars Electronica Futurelab.

This project is presented with the support of BVS-Brandverhütungsstelle für Oberösterreich reg. Genossenschaft m.b.H. and Landesfeuerwehrkommando Oberösterreich.



Aoife van Linden Tol

Artificial Intimacy

Artificial Intimacy

What does intimacy mean in the age of technology? Sensors, cognitive computing and robots? How will the technological innovations evolving rapidly all around us affect and also change some of the most intimate of human behaviors? How will future generations discover and live out their sexuality? Is intimacy without humanity even possible?

Roles that were exclusively reserved for humans are already being filled by our technological creations. Concepts that allow us to be "lonely together." The implications of this are staggering. As we speak, technology is enhancing interhuman relationships by acting not only as a sexual educator, but also by bridging physical divides between people. And this

is just the beginning. While intimacy has today been digitized to a certain degree, in the not-so-distant future advances in machine learning will give rise to AI-powered avatar and humanoid robots, opening the door for potential human-machine relationships and intimacy.

Artificial Intimacy delves into the topic presenting products that are readily available on the market, providing insight into the companies developing artificial-intelligence companions and artistic works responding to the technology.

Text: Claudia Falkinger

Can a human love a robot? Can a robot love a human? When it comes to the question of how deep the emotional bonds between human beings and machines can get, then it pays to take a peek at a very special branch purveying futuristic technical visions: smart sex toys, tele-dildonics and sex robots. "Artificial Intimacy" permits you to enter this erogenous zone.

Samantha, Sergi Santos, Synthea Amatus SL, Photo: Josep Pau Vila

Kiiroo (NL)

Pearl2 + Onyx2 Couple Set

Amsterdam-based Kiiroo is an award-winning tech company that has been a leader in the teledildonics industry since 2013. Working at the intersection of technology and human interest, Kiiroo developed a unique technology that enables users to be intimate from a distance. Along with their interactive devices, a highly secure social networking platform was created to provide a safe place

for online interaction. Kiiroo is constantly innovating to forge new and better ways for people to connect from a distance in an increasingly digitalized world.



Kiiroo

Sergi Santos, Synthea Amatus SL (ES)

Samantha

Barcelona-based engineer Sergi Santos has created a robot sex doll that seems to enjoy sex as much as humans and responds differently according to how she is treated. Samantha, as the doll is called, is equipped with the latest technology, such as artificial intelligence. She likes to be touched and has different modes of interaction, such as a romantic, a family and a sexy mode. In her way of interacting she wants to be touched and kissed on her fully functioning lips, the breasts and vagina to change her mode from family to get to a point where she wants to interact on a sexual level until she even has an orgasm.

The doll's skin is made from advanced odorless TPE, which feels smooth when touched, and Samantha has a brain that emulates the electrical activity of humans in the sense of excitement. She has an "Evoked Potential" (a sexual one first) to the head. This potential controls how she feels about what is being done with her at a particular moment.

The algorithm used is based on a form of architecture where it will be easy to implement anything else, from cameras and motion to any other improvements that might be needed.

<http://www.syntheaamatus.com>

Founder: Dr. Sergi Santos
Thanks to Javier Vazquez Neira, Montse Iserte,
Arran Squire, Hannah Nguyen
Advisor: Manuel Neira



SYNTHEA
AMATUS

ZCDC / Zackary Canepari (US), Drea Cooper (US)

HoneyPie

Her lips are full and pink. Her teal-green eyes are intense and inviting. Her black eyeliner accentuates her high cheekbones and her strawberry hair complements her light African skin. Her metallic halter dress holds her supple thighs and pushes on her round breasts. She is the result of careful attention and workmanship. When you see her up close, you

can't help but stare. At \$6000, she's certainly not a cheap date. For creator, Matt McMullen, she's a work of art. For everyone else, she's a Real Doll.

Produced and directed by Drea Cooper and Zackary Canepari
Edited by Drea Cooper
Cinematography by Zackary Canepari and Drea Cooper
Music by David Janusko





VICE Videos (US)

Making The World's First Male Sex Doll

Slutever / S1 EP1

In her show *Slutever*, VICE's resident sexpert Karley Sciortino explores the mysterious labyrinth of human sexuality and checks out the various ways that people around the world like to get off. In the premiere episode of *Slutever's* brand new season,

Karley finds herself in the world of life-like custom male sex dolls and meets the team pioneering the perfect plastic fuck-buddy for women.

Broadly / VICE Media LLC

OMGYES (US)

OMGYES.com

The Science of Sexual Pleasure

OMGYES is a sexual pleasure research website. After conducting research with more than 2,000 women aged 18 to 95, we created a website where real-life women—not actors—share their stories and demonstrate their techniques. Then users get the chance to practice through touchable simulations. The topic has been so taboo that even scientists had not studied the specific, various ways of touching that feel

good for different women. The details of women's sexual pleasure have hidden in the shadows for far too long, and the taboo has not helped anyone. People are ready for an honest, clear-headed look at the nuances that can make all the difference to pleasure. No blushing, no shame.

Co-Founders Rob Perkins and Lydia Daniller





Adrian David Cheok (AU), Emma Yann Zhang (SG)

Kissenger

Internet Kiss Messenger

Kissenger is a haptic device for mobile phones designed for people to better express intimacy and emotion over the Internet through kissing. It aims to fill in the missing dimension of touch in traditional digital communication, which largely focuses on verbal and audio information. The device transmits the touch sensations of kissing by measuring the lip pressure of the users and replicating this pressure through the movements of linear actuators. It has a lip-like sensing interface made of a soft and flexible rubber material that the user interacts with.

An array of force sensors and linear actuators measures and generates real-time force feedback at various points on the user's lips. The device is connected to a mobile phone, so that you can have a video call with your loved ones while using the device to send them a kiss. With *Kissenger*, people can communicate deep emotions, and maintain physical intimacy and close relationships from any part of the world through the Internet.

Imagineering Institute and City, University of London

Jake Elwes (UK)

Machine Learning Porn

Artificial intelligence and machine learning are fast becoming part of everyday life. Based on AI models currently used, among other things, in content moderation and surveillance, the artworks explore the "latent space" of the AI as it processes and imagines the world for itself, dreaming in the areas between and beyond what it has learnt from us.

In *Machine Learning Porn* a neural network has been trained using an explicit content model for finding pornography in search engines. The network is then reverse engineered to generate new "pornography" from scratch: an AI daydreaming of sex.



Jake Elwes

HONORARY MENTION • PRIX ARS ELECTRONICA 2017 • DIGITAL MUSICS & SOUND ART

Todd Anderson-Kunert (AU)

Almost there.

Almost there. was constructed using sonically controlled vibrators and some very trusting contributors. Over the last two years, these contributors recorded their voices while masturbating with the vibrators. The artist composed the audio they used specifically for this project. Ten participants were included in the project, with a mix of genders and a variety of sexual identities. The vibrators pulse in time with the sounds sent to them. The participants made noises in response to, and in time with, the sounds they heard. These ten recordings were then synchronized with the original composition and mixed back into it. *Almost there.* not only explores the notion of the erotic, but appears to create something uniquely erotic in itself, continuing the artist's exploration of complex emotions. The physical form of the release was constructed to reference the ephemeral nature of sexual experiences, likening it to the process of buying oneself flowers. An empowering gesture, but ultimately fleeting.



Todd Anderson-Kunert



Dan Chen

Dan Chen (TW/US)

End of Life Care Machine

End of Life Care Machine is an interactive installation consisting of an empty room, a seating area and a reception desk. Signs, medical bracelets, health information forms and other related medical products are used to transform the space into a hospital-like environment, where people go for their final rite of passage. In this empty room lit with a single fluorescent light is a hospital bed and the *Last Moment Robot* by the bedside. The robot is constructed as a medical device with a padded, caressing arm and a customized recording device designed to guide and comfort the dying patient. The whole event is carefully scripted. Viewers of this installation are invited to enter the

room one at a time, accompanied by an individual dressed in a doctor's coat. After the patient lies down beside the robot, the doctor asks permission to insert his or her arm under the caressing mechanism. The device is activated, and an LED screen reads "Detecting end of life." At this point, the doctor exits the room, leaving the patient alone by him or herself. Within moments the LED reads "End of life detected", the robotic arm begins its caressing action, moving back and forth, stimulating a sense of comfort during the dying process. The *Last Moment Robot* takes the idea of human replacement to a more extreme scale. It allows robotic intimacy technology to be re-evaluated.



FEATURED ARTIST

A new generation of artists emerged in Linz in the 1990s, where, as you might expect in a town of heavy industry, they began concentrating on the technological changes happening in our habitat. Particularly noteworthy is the Time's Up collective headquartered in the "idyllic" setting of Linz Harbor. The group, which has gone on to make a name for itself worldwide, is this year's Featured Artist. The LENTOS Art Museum will showcase its work.

Time's Up endeavors to expand the conventionally construed boundaries delineating art, technology, science and entertainment, and to dovetail those disciplines. As a lab for the creation of experimental situations, they model realities borrowed from everyday life and merge them with possible future scenarios. For Ars Electronica, Time's Up turns the basement of Linz's LENTOS Art Museum into a physical narrative of life in the year 2047 in the docklands of the coastal town of Turnton, where a climax disaster appears unavoidable. The artists invite the audience to participate in imagining sociopolitical utopian changes for *Turnton Docklands* and beyond.

Time's Up (AT)

Turnton Docklands

A Future Docking Station: The Docklands of Turnton 2047

ZERO: SYNOPSIS

We think ahead from the world of today to imagine how things could be in 30 years, so that, despite climate change, species die-offs and all the rest of it, you can still summon up the lust for life in the future. *Time's Up* shows how it's done—in full cognizance of the demonstration's incompleteness—in a *physical narrative* set in real space in the lower level of Linz's LENTOS Art Museum, a walk-through account of life in 2047 in the Docklands neighborhood of a fictional coastal town called Turnton.

ONE: TURBULENCE

It's been ages since life was boring; in fact, I can't recall the likes of the turbulence we're experiencing now. Crises of all kinds are rocking the mental and material foundations of existence, mainstays that most of us, and even entire societies, had secretly believed to be unsinkable. What certainly has survived intact—for the moment and the foreseeable future, apparently—is the tossed-off platitude to the tune of "unable to cope any more." Yeah, we're beset by a crisis all right, and not just one. There's no need to list them all.

Values are tottering, canons collapsing; the power of doctrines and norms is on the wane. Election results in many countries yield a picture of two forces of approximately equal strength pulling in opposite directions. We live in very interesting times, stretched to breaking point. Becoming a doom-and-gloomer is the easiest thing in the world right now.

TWO: FEAR AND HOPE

On the stock exchange of future expectations the Apocalypse closes at a new record high almost every day. The fear-fueled media stoke up the climate and further satiate their breeding stock by disseminating even more dread. In this fertile soil, the fragile shoots of hopeful images of the future can flourish only with the help of tender loving care and cultivation, and can grow into irresistible dreams, visions and blueprints of a transformed, responsible, mature international society and global economy. Achieving this calls for the right dreamcatchers and tools to make the future into what it used to be not so very long ago: not a threat but a promise. And what this takes is, above all, hope. Action-inspiring hope, as Rebecca Solnit described it in *Hope in the Dark*: "Hope just means another world might be possible, not promised, not guaranteed. Hope calls for action; action is impossible without hope."

THREE: THE FUTURES

Painting a picture of The Future as such is an awe-inducing task. But since awe is more conducive to dumbfoundedness than to doing something, it's considerably easier and more promising to keep several intellectual options open instead and conceive of the future in plural rather than singular terms. Thus, as futures. Futures are more tangible, more concrete, simpler to manage with respect to the concept and the design, and implementing them is a lot less arduous. After all, it makes it easier to get them off to a good start in life by making small but

doable changes in one's everyday life without having to capitulate in the face of the sheer dimensions of everything that has to be changed and necessarily conceding that one individual's contribution ultimately doesn't amount to a hill of beans.

FOUR: FUTURES THAT CAN BE EXPERIENCED

Futuring is the discipline of conceiving futures and enabling them to emerge vividly before one's inner eye. This does not necessarily demand specialist knowledge that can be acquired from textbooks; to a far greater extent, you have to be vitally inter-

ested in the world in the broadest sense. And it takes an approximate concept of that future, a concept that combines empiricism with speculation and imagination. And it begins with the simple yet momentous recognition that the future starts now. How we think and what we do today is what the future will produce.

That a modicum of pathos resonates in the ever-more-frequently posed question of whether the decisions we make are good for our grandchildren does nothing to diminish its justifiability. In any case, what is absolutely undisputable is that nothing happens on its own. There's no effect without a cause.



Time's Up

FIVE: OUR ONLY CHANCE

A future world free of crises to as great an extent as possible needs a cause, many causes, changes on multiple levels, large and small. The first of these levels is the individual and, subsequently, the collective consciousness. Every thought makes a difference, at least potentially. Many small differences make a somewhat larger one. And this larger difference is what will have to be brought about if the scenarios of hope are to become reality in this world we live in.

So what futures are we implementing if we change our ways? Ideally those that have resulted from people looking back at the way things were in the 2010s and early 2020s and having concluded that “change was our only chance”—words that became Turnton Docklands’ credo.

SIX: PHYSICAL NARRATIVES

Since 2007—thus for ten years now—*Time’s Up* has been engaged in a special form of storytelling: designing and constructing walk-through accounts called *physical narratives*. These resemble film sets or scenery on the stage of a theater; the difference is that they entail neither a cast of actors nor any other personnel physically present. Instead, visitors encounter spaces designed with great attention to detail and containing traces of fictitious characters amidst an ensemble of props, objects and media—newspapers, radio or TV shows “that happen to be playing,” letters, diaries etc. Everything on hand is meant to be touched and scrutinized. Every element is a more or less important piece of a jigsaw puzzle that visitors assemble in their minds. The pieces form a picture and tell a story (though perhaps not always the one rendered by *Time’s Up*). In this sense, the settings for display and narrative

configured by *Time’s Up* have additional spatial dimensions in that they are—or mentally endow—individualized spaces for play and interpretation. *Time’s Up’s* first *physical narrative* told a crime story in *film noir* style. Over the years, future scenarios (in a literal sense) have become the collective’s material of choice—spaces in which a depiction of the future carefully selected from among many such futures becomes a reality that can be experienced, literally walked through. Futuristic *physical narratives* impart a sensory impression of which actions have to be taken now as the motive forces that ultimately effect the living conditions of a life worth living, and thus function as mental tools for change.

SEVEN: LOOKING STRAIGHT INTO THE EYE OF WHAT’S PROBABLE

Painting pictures of positive futures doesn’t mean donning rose-tinted spectacles or simply denying inconvenient truths. Global warming of at least two degrees and all its ecological and social consequences are happening now and you can’t just tune them out to make them go away. But this could constitute the point of departure for an intellectual exercise underpinned by plenty of facts for the development of the strategies that in 30 years humankind will have used to make the best of the situation prevailing in 2017.

In the vision of the future that *Time’s Up* is positing for 2047, the ecosystem has become unhinged and everyday life worldwide is plagued by the catastrophic long-term consequences of environmental pollution. Toxic waste and contaminants poison lands and waters. Entire biospheres have collapsed; huge areas of the oceans are dead zones. Due to global warming, which humankind, hampered by political considerations, only went through the



Time’s Up



Elisa Unger



Elisa Unger



Elisa Unger

motions of combating until the mid-2020s, meteorological extremes had become everyday occurrences. Droughts, flooding and sea-level rise made numerous regions and coastal areas uninhabitable. Those are the external facts and circumstances that also characterize life in Turnton, an unspecified seaside town whose Docklands neighborhood, on the occasion of the 2017 Ars Electronica Festival, is being temporarily installed in the lower level of the LENTOS Art Museum in the form of a harbor-quarter market square, a waterfront bar, and the port authority’s offices.

EIGHT: ANOTHER WORLD WAS POSSIBLE

The ecological dystopia of Turnton 2047, however, is juxtaposed to a socio-economic utopia that is gradually revealed in detail to sufficiently inquisitive visitors to the Turnton Docklands. Neoliberalism is history, the growth mantra has been hushed, and unbridled free trade is a thing of the past. What has instead become reality is what, for decades, had been dismissed as politically, economically or technologically unfeasible and ridiculed as naïve.



Elisa Unger

The revolution in raw materials, energy and transportation has taken off so dynamically that there's no stopping it anymore.

Under the stewardship of the *General Authority for Sustainability*, the sustainable economy of 2047 serves the common good. The culture of everyday life, production and commerce are obliged to conserve nature, minimize the use of resources and uphold human rights. The mission of the *Global Transparency Agency* is to see to it that they stay the course, while the *Center for Advanced Technologies* makes the corresponding hardware and software available, as well as those that humankind can use to support the ecosystem's gradual regeneration.

In Turnton this is being done, among others, by one of many *Networked Oceanic Society Laboratories*. The voracious undersea organisms bred there decimate the plastic particles polluting the seas. Algae farmer Hamish Dornbirn is looking forward to seeing the last of them; the proprietor of the *Ocean Recovery Farm* on the Turnton coast has pioneered the gentle clean-up of polluted beaches and bodies of water.

NINE: MIGRATION MANAGEMENT 2047

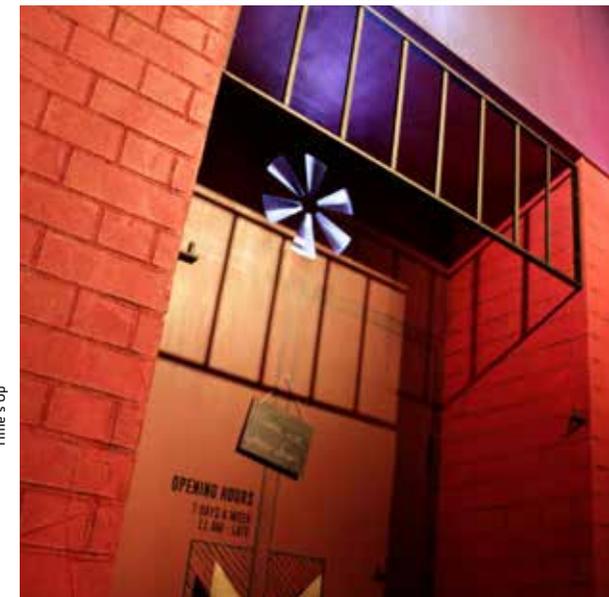
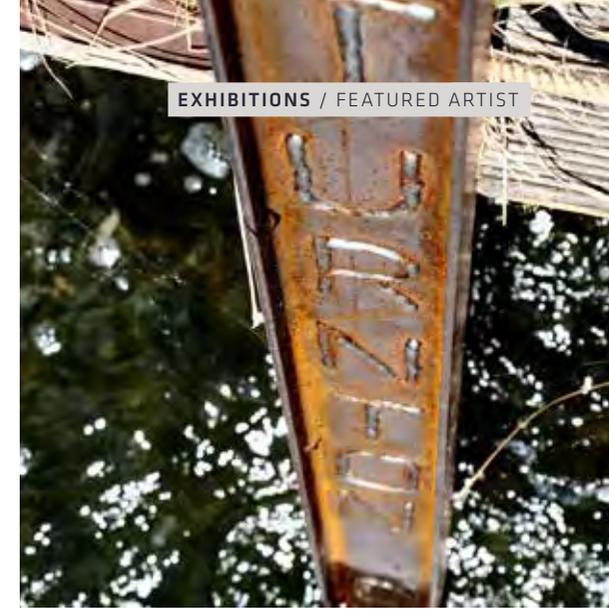
Climate-driven migration has long since lost its capacity to frighten. People upping sticks and making a transcontinental or intercontinental move has become a normal social reality that is well-organized by *Travel without Borders* and the *New Neighbor Integration Bureau*. Now cultural diversity is accounted for on the asset side of the balance sheet. Among the many ways that esteem for new neighbors is manifested in Turnton is the upcoming several-day art and culture festival. *Celebrating the strength of diversity* is the theme of this event marking the 20th anniversary of the local *New Neighbor Integration Bureau*. Round number anniversaries aren't the only reason to throw a party. In collaboration with *Travel without Borders* the bureau has just received official authorization to convert empty warehouses into public housing, a decision that delights NNIB spokesman Olufemi Badour. Following the necessary renovations, these facilities will provide accommodation for a group of new arrivals who have had to be evacuated from their homeland on a group of islands in the Atlantic.

TEN: NICE NEIGHBORHOOD

The chief protagonist of one of Turnton's migratory success stories is Fenfang Lin. One day the marine biologist had had enough of lecture halls and labs, and traded in her academic career for a bar called *Medusa*, the hub and heart of the harbor district. Her extensive knowledge of marine flora and fauna serves her well here. In the galley of *Medusa* she prepares fancy snacks and creative drinks from everything that recovery farmer Dornbirn harvests in the coastal waters. Lin's ties to him are of a commercial as well as a romantic nature. She has also become strong friends with harbor coordinator Margaret Bloomenfeld, who has made the *Medusa* her favorite watering hole. Other regulars are the local plant pollinator—she's carrying on the work of her natural counterparts, who unfortunately are almost extinct—and Trashy, The Garbage Baron, who, besides operating the local *Upcycling Center*, is proprietor of the region's *Recycled Goods Malls*, alternative shopping centers purveying an assortment of ecological, fair-trade merchandise. What do you say to that? Sold!

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Time's Up



ART MARKET INITIATIVE

The Art Market Initiative was coined in response to growing mutual interest on the part of media artists, collectors and galleries as a setting for protagonists to compare experiences and to discuss, among other topics, such core issues as the long-term maintenance and conservation of media-art projects and the many new formats and business models manifesting themselves on the growing online art market.

Gerfried Stocker (AT)

Markets for Media Art— the Art Market Initiative at Ars Electronica 2017

For a long time, gallerists and collectors have been looking rather skeptically at media art—for many quite different reasons, like its novelty and highly experimental approach, the large number of technical aspects, the virtual and ephemeral nature, the difficulties of preservation and maintenance and so on. But meanwhile many of these problems are no longer particular but have become our everyday problems, and we are increasingly getting used to dealing with them.

Media art in its many forms has a long tradition, and while works based on digital code, using the Internet or virtual reality are still young we can look way back to the early days of film and photography, to kinetic sculptures, op art, video art or also radio drama, *musique concrète* and electronic music. And it becomes more and more clear that digitally based art is a major part of the cultural heritage of our century and will play an even larger role in the coming decades—not instead of any of the other forms of artistic expression but in addition, side by side. This confronts us with exciting developments but

also with very difficult challenges. What kind of skills are necessary to create this art, to evaluate and to appreciate it, to preserve it and to keep it alive? But the art market itself is also experiencing a big digital transformation; online art magazines, online galleries and Internet auctions are booming, new hybrid business models are being explored—some successfully, some with spectacular failures. These dynamics and questions will be the focus of a new initiative for the annual Ars Electronica Festival. Driven by a group of international experts such as BOZAR's media art curator Christophe de Jaeger, Rosina Gomez Baeza (long-time director of Arco, and founding director of LABoral), renowned media artist Prof. Christa Sommerer and Ars Electronica director Gerfried Stocker, this initiative aims to provide a platform for the encounter and exchange between the art market and media artists.

The kick-off-program at this year's Ars Electronica Festival will feature an expert symposium, artists' talks and presentations in a dedicated, approxi-

mately 1000-sq.m. gallery space, and special guided tours for collectors and gallerists.

Connected to this program is also the Gluon Initiative, which aims to establish a new approach to art and science by bringing together interested artists, scientists and collectors for a new type of collaboration at this nexus. Selected artists will be

introduced to scientists from various fields and can select one scientist as a “scientist-in-residence” at the artist's studio. Collectors get the chance to become patrons for this residence and to finance it and the production of a new project. The Gluon Initiative is a collaboration between Ars Electronica, the Serpentine Gallery and BOZAR.



any:time (Jürgen Haller & Christoph Weidinger)

Christophe de Jaeger (BE), Christiana Kazakou (GR/UK), Ramona Van Gansbeke (BE)

Gluon Initiative

Scientist-In-Residence program: a new approach to art and science

The Scientist-In-Residence program has been set up for a new generation of scientists interested in collaborating with artists. The program encourages renowned artists to host a scientist or researcher in the independent and inspiring environment of their studios. The program reverses the usual approach whereby artists are invited to work at R&D departments of universities or companies. Our intention is to challenge the hierarchy between the human and the exact sciences that pre-dominated in the twentieth century and to challenge technological and scientific determinism by adding artists' creative, critical and societal dimensions to the process. The residency program will benefit both the scientist and the artist. The unexpected world-views and working processes of the artist will lead to alternative ideas, attitudes and methodologies in the world of research. At the same time, the researcher can assist the artist in the creation of an artistic and critical output that uses (or reflects upon) new scientific and technologic developments. It is a sign of the time that an increasing number of artists and institutions are interested in the

latest technological and scientific developments that are changing the world at an ever-increasing speed. This evolution requires new initiatives that establish more connections between the world of "media arts" and contemporary arts, and between cultural and research institutions. We are therefore inviting artists to participate who are well integrated into the contemporary arts scene but who have a strong interest in science and technology. The Scientist-in-Residence program is a collaboration between Ars Electronica, BOZAR, the Serpentine Gallery and several universities and research institutions. For the first edition Hans Ulrich Obrist has been invited as the leading curator for 2017/18, with invited artists Rachel Rose and Damian Ortega. The initiative will be accompanied by two exhibitions: a poster exhibition with slogans and statements from the participating researchers, and a historical exhibition on art and technology organizations that have shaped the future of interdisciplinary collaborations.

Text: Christophe de Jaeger



Eduardo Kac, *Edunia Seed Pack Studies I* from the *Natural History of the Enigma* series, 2006, lithograph, 22 x 30 in. In 2009 Eduardo Kac received a Golden Nica in the Hybrid Art category of the Prix Ars Electronica for *Natural History of the Enigma*.

Eduardo Kac

Alessio Chierico (IT), Christa Sommerer (AT)

Media Art and the Art Market

Acknowledging the newly emerging forms and displacements of the media-art economy, *Media Art and the Art Market II* symposium faces the criticalities and strengths of the art market, seen as a resource for supporting artists' activity and the development of this cultural field.

The economic sources that support media art have evolved within several contexts and involve different formats. As a result, alternative strategies for enhancing the economic sustainability of this kind of art have been proposed over time. Moreover, some practices that are contingent to media art have attracted the attention of the traditional art market in the last decade, setting a precedent for the development of media art and its recognition. Because of this, it has become necessary to investigate the dynamics involved in the relationship that binds art practice to the market and its economy. Many concerns about the market for media art may have arisen as a result of the difficulties involved in its production, presentation and preservation. Besides, there is a great deal of interest in the formulation of new economic models that are adapted to the specificity of the artistic practice and dissemination of media art. Attention is also focused on the reconsideration and re-adaptation of the whole ecosystem of economies that sustain media art. It is also necessary to resume and update some of the artistic investigations that have analyzed the art environment and to re-establish an "institutional

critique." The aim of these endeavors is to integrate the function of art into the global economic context in all its complexity.

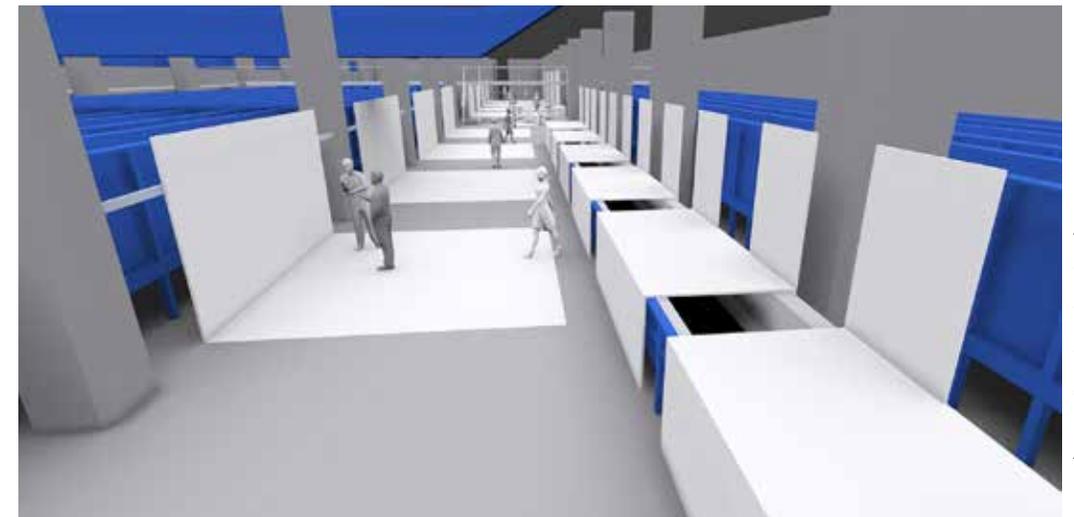
The second edition of the *Media Art and the Art Market* symposium, introduced here, intends to extend these discussions, which were already formulated during the first edition at the LENTOS Museum in Linz in October 2016. This previous event brought together a number of prominent artists, theoreticians, curators and gallerists: Reinhard Kannonier, Stella Rollig, Gerfried Stocker, Christa Sommerer, Steve Fletcher, Christiane Paul, Annette Doms, Pau Waelder and Wolf Lieser. The presentations revealed a wide variety of perspectives on the current situation of the art market and art economy of media art.

However, there are still many issues that need to be discussed and acknowledged, in order to enhance the opportunities this discussion can provide. For this reason *Media Art and the Art Market II* arises from the necessity of keeping the attention on the complex dynamics that surround the economics of art. This new edition will concentrate especially on the modes of conservation of media-art pieces, and it will also expose the experiences of traditional and novel formats of the primary market and the gallery system. In addition, particular attention will be given to the new methods and platforms that use the Internet for the distribution and promotion of art.

The art market is a topic with manifold perspectives; in addition, it opens to deontological issues. For this reason, it is seen as necessary to acknowledge its structure and potentials in order to understand its sustainability. It is even reasonable to question whether an art market for media art is really needed. However, it is important to recognize the needs of an economy that can sustain the activities that surround media art. This might be achieved by the definition of new models, or by enhancing the

understanding of the potentials of the classical economic formats. In this sense, the *Media Art and the Art Market II* symposium intends to set the starting point for conversations that integrate cultural practice and cultural management in this field.

This event is promoted and organized by the Department of Interface Culture at the University of Art and Design Linz, in collaboration with Ars Electronica and supported by the Federal Ministry of Science, Research and Economy within the grant under the Higher-Education Structural Fund.



anytime (Jürgen Haller & Christoph Weidinger)



EVENTS,
CONCERTS &
PERFORMANCES

The Big Concert Night 2017

A unique and extremely successful cooperative relationship is being carried on and reinvented. Ars Electronica's Big Concert Night in collaboration with the renowned Bruckner Orchestra Linz is a jewel of the festival. There is hardly another such opportunity to experience such an intensive encounter of instrumental music-making and digital sounds, and of the music of the past and present. This year, Markus Poschner, the new conductor of the Bruckner Orchestra, will add a new musical wrinkle to this encounter amidst the huge *Gleishalle* (Track Hall) of POSTCITY. Poschner is also a superb jazz pianist and has invited several other soloists working in this genre to join him on his Big Concert Night. Classical orchestral music—the *scherzo* and *adagio* from Bruckner's 8th Symphony—jazz, sound art and digital visualizations will be presented on multiple stages set up throughout the *Gleishalle*, among which the audience can experience the evening's tonal realms in peripatetic fashion. Next up are the prizewinners in the Prix Ars Electronica's Digital Musics & Sound Art category. The third part of the program is dedicated to the 30th anniversary of the ORF—the Austrian Broadcasting Company's—Ö1-Kunstradio.

The Big Concert Night 2017 lineup:

- Bruckner Orchestra Linz (AT) conducted by Markus Poschner (DE)
Soloists: Nguyễn Lê (FR/VN) (guitar), Hugo Siegmeth (DE) (reeds), Harald Scharf (DE) (bass), Bastian Jütte (DE) (drums), Markus Poschner (DE) (piano)
Visuals: Cori Olan, Gil Delindro
- Digital Musics in Concert (Digital Musics & Sound Art winners Prix 2017): Cedrik Fermont (CD/BE/DE) and Dimitri della Faille (BE/CA) (Golden Nica), Lucas Abela (AU) (Award of Distinction), Marco Donnarumma (IT/DE) (Award of Distinction)
- Ö1 Radiokunst-Kunstradio, 30 years of radio art: Anna Friz (CA), Andres Bosshard (CH), Kristen Roos (CA)



Florian Voggeneder

Bruckner Orchestra Linz (AT)

An Opening



Bremer Philharmoniker

Markus Poschner, Bremer Philharmoniker

At the center of the Big Concert Night in POSTCITY are the two middle movements of Anton Bruckner's 8th Symphony, the crux on which the entire performance hinges. This is right and wrong at the same time! Bruckner's music forms the foundation, the walls and perhaps the heavens too, in which audience members, situated in the middle of the *Gleishalle*, are free to move about. The listeners are in the center, in the arena, flanked on one side by Bruckner Orchestra Linz and on the other by a band of musicians including world-class guitarist Nguyễn Lê, Hugo Siegmeth (reeds), Harald Scharf (bass) and Bastian Jütte (drums). A symphonic space is to be configured about the audience, who will be able to shift locations, stay put and be receptive to sound arriving from all directions.

The interior of Bruckner's symphony will be opened up, commented on, reflected upon and thus made immediately accessible by those present. In this concert event, form and content are being renegotiated. This is the very nature of the Ars Electronica Festival, which, perennially on the leading edge, showcases the progress of visionary technologies, hosts a discussion, and considers them in a social context—the 2017 festival theme is Artificial Intelligence—The Other I. This is likewise the nature of this unique situation for auditory and visual experience in the *Gleishalle*, a railroad loading dock in a former postal service logistics facility, and, above all, of the setting and the dramaturgy that Markus Poschner and his



Tom Mestic

musicians have come up with. Poschner will lead his orchestra, but also segue to the band and have recourse to his piano's keys to improvise beyond, on and with Bruckner's sounds. But this is far more than commuting back and forth; these tonal strands are willingly drawn out of the symphony and keyed up in multiple perspectives. This is ultimately an endeavor at sensory experience in a space that differs from a conventional concert hall. Another space for another experiencing ego to thereby play an interesting variation on the festival theme.

Composer Hugo Wolf was overwhelmed by Bruckner's 8th Symphony. Following its premiere on December 18, 1892, in Vienna, he wrote: "This symphony is the creation of a giant and surpasses, in mental dimensions, in fertility and greatness, all of the master's other symphonies."

Markus Poschner, his band and the Bruckner Orchestra Linz are moving on into a new dimension. This concert marks the commencement of his tenure as chief conductor of the Bruckner Orchestra Linz. It certainly is to be understood as a declaration. An opening!

Guitar: Nguyễn Lê
Reeds: Hugo Siegmeth
Bass: Harald Scharf
Drums: Bastian Jütte
Bruckner Orchestra Linz
Conductor and piano: Markus Poschner
Visuals: Cori Olan

Text: Norbert Trawöger

Digital Musics in Concert

This year's Big Concert Night includes performances by the prize-winners of the 2017 Prix Ars Electronica's Digital Musics & Sound Art category: Cedrik Fermont (CD/BE/DE) and Dimitri della Faille (BE/CA) (Golden Nica), Lucas Abela (AU) (Award of Distinction), Marco Donnarumma (IT/DE) (Award of Distinction).

PRIX

Marco Donnarumma (DE/IT)

Corpus Nil

Corpus Nil is a music performance exploring hybrid forms of identity and musicianship. It does so through an intense and ritualistic interaction between an artificially intelligent musical instrument, a human body and sound. The space is completely dark. The player, whose body is partly naked and partly painted in black, performs a tense choreography that gradually morphs his body.

Two types of wearable biosensors transmit data from the performer's body to the software: microphones capture sounds from muscles and internal organs, and electrodes capture muscle voltages. Using particular audio-analysis algorithms, the instrument re-synthesizes the bodily sounds by orchestrating a network of digital oscillators. Further, the instrument learns the nuances of the performer's movement and thus chooses whether to activate particular oscillators, how to regulate volumes, glissandos and multi-channel diffusion,

and how to adjust feedback amounts within the network.

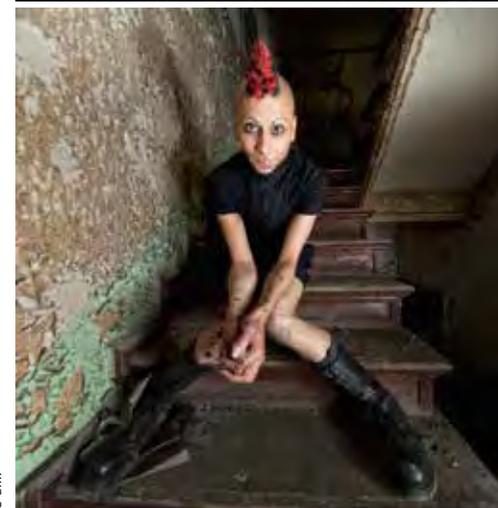
The player cannot control the instrument, but only learn how to affect it and be affected by it.

The piece discards conventional performer-instrument relationships—founded on the performer's full control of the instrument—in favor of an unstable corporeal engagement between the two. Through the rhythm of sound, vibration and light, the performer's body and the instrument mutate, physically and conceptually, into something "other"; an unfamiliar creature defying the common definition of the human.

Author, research, concept, music, choreography, light design, performance, programming: Marco Donnarumma
Additional programming and research: Baptiste Caramiaux
Stage production: Margherita Pevere
Photography: Onuk and ZKM
Supported by: EAVI, Goldsmiths, University of London
Research funding: European Research Council



Marco Donnarumma performing *Corpus Nil*. Still from live performance. Courtesy of Onuk and ZKM Center for Art and Media, Karlsruhe



C-drik



Not Your World Music: Noise In South East Asia by Cedrik Fermont & Dimitri della Faille

Cedrik Fermont (CD/BE/DE)

In between

C-drik will present a live performance based on a selection of recordings essentially made at the Observatory Studio in Singapore as well as in his studio in Berlin. Cymbals, gongs, metallophones (gamelan), various metallic objects and voices have been selected and electronically processed to form the core of the track. The result is an introspective electroacoustic piece that blends drones and gentle percussions. In contrast to the noisy soundscapes of most parts of South Asia, which tend to become

a massive wall of sounds, the composition's minimalist approach plunges the listener into various meditative states (or let's hope so!).

The piece emphasizes the contrast between sounds of Southeast Asian instruments, which are usually made to be performed in a collective ensemble, and the isolationism of the listeners (and performer), an unusual concept in Southeast Asian societies, in which social and cultural activities are usually made or attended collectively.

Dimitri della Faille (BE/CA)

Obosen Duterteador

This performance is an electroacoustic and video piece reflecting on the current political climate in the Philippines. It attempts to translate the current climate of demagoguery, terror and disdain for the democratic institutions of this Southeast Asian country into sound and visuals. It is based on field recordings, synthetic sounds and visuals and will receive its world premiere at the Big Concert Night.



Lucas Abela (AU)

What has been described as “a trumpet player trapped in a two dimensional universe” is in fact the unique work of Lucas Abela, a maverick musician with an unhealthy obsession with sheets of broken glass. In his infamous show, which has astonished and bemused countless people in over 45 countries, Abela ecstatically purses his lips against panes of amplified glass while deftly employing various vocal techniques ranging from throat singing to raspberries, turning discarded shards into crude

musical instruments. The results are a wild array of cacophonous noise that is oddly controlled and strangely musical. The instruments’ simple, original and effective premise is a welcome respite from the technically complicated musical performances of modern times.

A unique act redefining the expression “don’t try this at home,” this show quite simply needs to be witnessed to be fully appreciated, let alone understood.

Ö1 Radiokunst–Kunstradio

Celebrating 30 years of radio art!

In the course of Ars Electronica's Big Concert Night at POSTCITY, Ö1 Radiokunst–Kunstradio will celebrate its 30th anniversary with a two-hour live broadcast from 10.05 p.m. to 12 a.m. on September 10 as part of the Ö1 Kunstsonntag on Österreich 1, the cultural radio channel of the Austrian state broadcaster (ORF).

Ö1 Kunstradio was founded in 1987 by Heidi Grundmann as a weekly space for radio art, and in 1995 Kunstradio Online–kunstradio.at was founded by a group of artists. Ö1 Kunstradio and the Ars Electronica Festival can look back on a long history of conceiving and realizing innovative networked radio art projects such as Horizontal Radio in 1995, Rivers&Bridges in 1996, Sound Drifting in 1999 or Radiotopia in 2002. And already in 1989 the first

Long Night of Radio Art took place as part of the Ars Electronica Festival, which many others have followed over recent decades.

This year Ö1 Kunstradio together with the Anton Bruckner Private University and the Ars Electronica Festival is organizing the Sonic Saturday symposium "Different Places" on September 9, 2017. Some of the participants such as Andres Bosshard and Anna Friz will perform on site and on air, while Kristen Roos joins in for the Ars Electronica's big concert night on September 10, celebrating 30 years of radio art on Ö1 Kunstradio together with other artists and theorists. More information can be found online at <http://www.oe1.orf.at> and <http://www.kunstradio.at>.

Text: Elisabeth Zimmermann

Kristen Roos (CA)

Anti-Wave

Anti-Wave examines the silent electromagnetic transmissions that are ubiquitous today. Roos receives these inaudible frequencies with devices that recognize them not as information but as something similar to the unwanted sounds that were heard in early radio reception.

In receiving and translating these frequencies into audible sounds, Kristen Roos is interested in the process of dissecting the wireless devices that embody our lives, and exposing the relationships between people and the objects that inhabit their daily rituals.



Radius-Electrosmog, Chicago, 2014

Anna Friz (CA)

Radiation Day

This is the metamorphosis of Earth being; in the desert, around open-cast mines loom massively heaped and compacted slagheaps; evaporation ponds spread across the salt flats, and pipelines and power lines run alongside roads punctuated by truck transports and blowing dust. Copper, lithium, rare earths; mining the ingredients for wireless communication devices. Ancient geoglyphic inscriptions on the desert are dwarfed by deep industrial scars visible from satellites. But environments are also media, and bodies are recording devices. For days under the sun at high altitudes in northern Chile, we sought elemental media amidst the industrial continuum. A performance devised of infrastructural sounds, atmospheric signals and live electronics.

Video by Rodrigo Ríos Zunino
Supported by Canada Council for the Arts and the Arts Research Institute of the University of California Santa Cruz



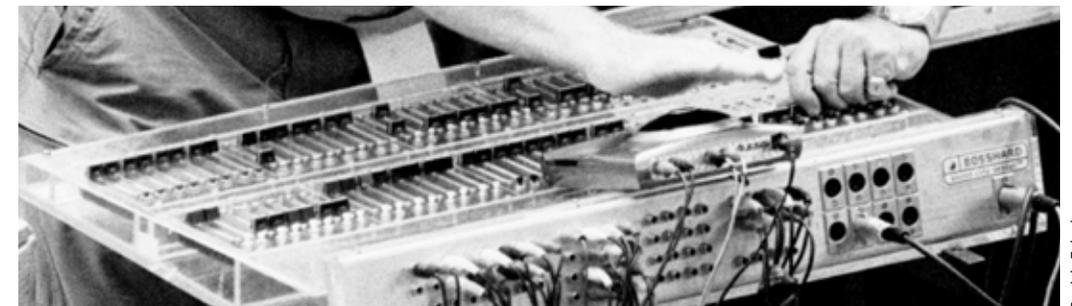
Anna Friz

Andres Bosshard (CH)

Ho, Hei, Oho (a factory of memory)

I will start my performance with the gentle rain of a thunderstorm, which was recorded during the setup of Bill Fonatana's piece *simultaneous resonances for zeitgleich*, *Im Grunde lächelt der Himmel* in Hall im Tirol 1995; I will perform a thunderstorm that was recorded during *real time* in Linz 1994, where Gerfried Stocker was playing Mia Zabelka's robot in Graz together with Waldemar Rogojsza, who died in 2009; I will play a thunderstorm that was

recorded on the rooftop of Radarama in Vrindaban 1997 together with Sam Auinger for the *Echo of the Moon* in Salzburg 1999 with Pauline Oliveros, who died in 2016; I will perform a thunderstorm recorded in Civitella d'Agliano 1994 together with Christof Carnelli, who died in 2013; I will play a 21-minute thunderstorm that will end with a trumpet signal of the sound pillars recorded in front of the Europa-huset at Åboulevarden 3, in Aarhus in 2017.



Daniela Zehnder

20 Etudes for Piano by Philip Glass

The *Twenty Etudes for Piano* were composed during the years from 1991 to 2012. Their final configuration into *Book 1* and *Book 2* was determined by the music itself in the course of its composition. Taken together, they suggest a real trajectory that includes

a broad range of music and technical ideas. In the end, the etudes are intended to be appreciated not only by the general listener, but especially by those who have the ability and patience to learn, play and perform the music themselves.

Maki Namekawa (JP), Cori Olan (AT)

20 Etudes for 20 Etudes

Twenty real-time parameter-driven visualizations for Philip Glass's *Twenty Etudes for Piano* performed by Maki Namekawa

The visualizations can be considered as etudes themselves, exploring visual and time-based relationships between basic topics like pattern and form, symbol and language as well as time and space, motion and position. Most of the pieces work with real-time-generated CGI, with a strong and immediate response to the music based on a comprehensive analysis of the audio signal from two microphones close to the piano. Some are combinations of CGI with photography or video and two use only video but with variations in the playback

speed and the triggering of cue points controlled by the live music.

The visualizations, quite like the etudes themselves, have not been developed in their numerical sequence, but when we started to perform the complete etudes most visualizations were modified and some were completely remade to create a more intuitive flow.

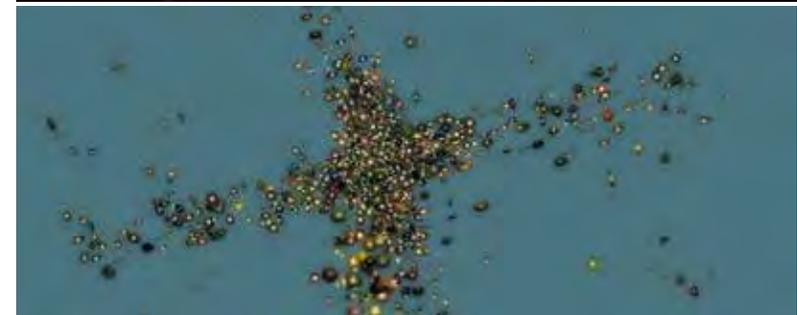
The complete set of all twenty visualized etudes was premiered in February 2017 at National Sawdust, New York.



Cori Olan



Cori Olan



Cori Olan



THEATER AND
DIGITAL MEDIA

Theater and Digital Media— a platform event

Theater, for many an epitome of analog, strictly human-based art, has on the other hand always been a forerunner in the exploration of technologies for new forms of storytelling and stage performance. With digital and interactive media and the huge social and cultural impact of social media, a whole new chapter of overlapping interests between performance arts and media arts has been opened which goes far beyond video or projection mapping for the stage design. The latest hype of virtual and augmented reality has not only brought a new generation of gadgets for computer gamers but also caught the attention of people from the theater, and new artistic forms are being developed focusing on the narrative and performative potential of this medium.

This interest is reciprocal, because the technical-design challenges that come with the increasing

social dimension of new technologies (social robots, digital assistants, chatbots, autonomous machines and systems, machine learning and AI) could also benefit a great deal from the expertise of theater. An exciting number of ongoing initiatives are focusing on these potentials, and no longer only independent and experimental theater groups but also many of the big theaters and opera houses are involved in it. In collaboration with the European Theatre Convention (ETC), Ars Electronica is hosting a special program to deepen the reciprocal exchange of practical experience about the work on the intersection of digital media and theater. With the *European Theatre Lab: Drama goes digital*, the ETC has launched the first international think tank connecting theater makers, digital artists and experts from various cultural fields in search for a digital strategy for European theaters.



The Memories of Borderline, Kay Voges and CyberRäuber

FESTIVAL PROGRAM RELATED

TO THIS TOPIC:

Theater goes Virtual

- *The Memories of Borderline*, special project presentation by Kay Voges and CyberRäuber (Deep Space 8K, Ars Electronica Center)
- *Entropy*, Nomad.theatre, Thomas J. Jelinek, Jorge Sánchez-Chiong (POSTCITY)

Experiments in Storytelling and Social Interaction

- *ARTUR: Autonomous Robot Playspace*, Quantum Reboot and Playful Interactive Environments (Deep Space 8K, Ars Electronica Center)
- *Pacathon*, reinventing PAC-MAN by Ars Electronica Futurelab and Bandai Namco Entertainment Inc. (Deep Space 8K, Ars Electronica Center)
- *Everything*, David O'Reilly (Deep Space 8K, Ars Electronica Center)

VR projects

- *Bird Song Diamond*, Victoria Vesna, Charles Taylor, Takashi Ikegami, Hiroo Iwata, Reiji Suzuki (Deep Space 8K, Ars Electronica Center)
- *Out of Exile*, Nonny de la Peña and Emblematic Group (CyberArts 2017 - Prix Ars Electronica Exhibition, OK Center)
- *Pitoti Prometheus*, a 360 virtual narration by Frederick Baker and Marcel Karnapke (Deep Space 8K and VRLab, Ars Electronica Center)

Performance projects

- *Breaking The Wall*, interactive sound performance by Chris Bruckmayr, Didi Bruckmayr, Oliver Hödl, Fares Kayali, Uli Kühn, Ruth Mateus-Berr, Julia Soto Delgado, Thomas Wagensommerer (POSTCITY)
- *L'Enfant*, I-Chun Chen and He-Lin Luo (Mariendom, Linz Cathedral)
- *SINGULARITY*, Uwe Rieger and Carol Brown (POSTCITY)
- *A Flurrytale*, Narrator's Lowdown, dance performance (Deep Space 8K, Ars Electronica Center)

Concert Visualizations

- *Tracing Bruckner*, "The Other I" in Bruckner's 8th Symphony (POSTCITY)
- *20 Etudes for 20 Etudes, 20 Etudes for Piano* from Philip Glass performed by Maki Namekawa, visuals by Cori Olan (POSTCITY)
- *Interludium A*, Isang Yun performed by Maki Namekawa, visuals by Cori Olan (Deep Space 8K, Ars Electronica Center)

Audiovisual Performances in Deep Space 8K

- *Capillaries Capillaries*, Tadej Droljc
- *NOIZE Etudes*, SPECTRO DUO
- *ABYSMAL*, VOID

European Theatre Lab: Drama goes digital

Europe's first virtual think tank devoted to researching the theater of the future

The digital shift has unleashed profound changes in the way that we create and share artistic content, including theatrical works. Augmented reality, virtual reality, interactive tools and new audio technology offer largely unexplored ways to create more immersive and compelling theater experiences to engage audiences with the unexpected. However, within the organizational and financial frameworks of European state theaters it is not easy to adapt to the new digital landscape of the twenty-first century. There is an urgent need for exchange and new ways of collaboration. Facing this challenge, the European Theatre Lab is Europe's first think tank devoted to researching a digital strategy for theater. In a mix of workshops, conferences and theatrical performances across Europe, the project is researching the effects of digitization on aesthetics, audience participation, communication and dissemination.

From 2016 to 2018, the European Theatre Lab offers a range of project activities, all conceived to have maximum impact on a wide target audience, to expand access to theater and increase artistic diversity. The project brings theater's dynamism and immediacy to new audiences and examines

new ways of performative expression through digital media. The activities include six open labs, two research conferences, three creative co-productions developed by seven European theaters, a final showcase, an EU-wide communications campaign, a virtual lab platform and two reports reflecting the results of the research process: one for theater-makers and one with recommendations for policy-makers.

The European Theatre Lab is a partnership between the EU-wide network European Theatre Convention (ETC) and seven European state repertory theaters: Théâtre de la Manufacture Nancy (France), Kote Marjnishvili State Theater Tbilisi (Georgia), Staatstheater Karlsruhe (Germany), Théâtre de Liège (Belgium), Teatrul National Craiova (Romania), Croatian National Theater in Zagreb (Croatia), Det Norske Teatret Oslo (Norway). They are accompanied by research centers, universities, digital experts and adjoint artists. The work is guided by an advisory board consisting of leading experts from the arts and technology, including Gerfried Stocker (Ars Electronica, Linz), Simon Mellor (Arts Council England, London), Prof. Peter Weibel (ZKM, Karlsruhe), Dick van Dijk (Waag Society, Amsterdam),

Christian Römer (Heinrich Böll Foundation), Dieter Schneider (ZDF/arte) and Marie Le Sourd (On the Move, Brussels).

The European Theatre Lab supports inspiring examples of the use of digital technology in the performing arts. It thereby helps European state theaters integrate new technology over the long-

term into artistic productions, outreach and international co-production models.

Text: Maren Dey

The "European Theatre Lab: Drama Goes Digital" project has been developed with the support of the Creative Europe program of the European Union.
<http://www.europeantheatrelab.eu>



Chris Ziegler



I-Chun Chen (TW), He-Lin Luo (TW)

L'Enfant

There is always a child living inside our mind. Rousseau might have called the child Émile or Sophie. This child has eternally coexisted with us and always gazed back at our heart. How do we define growing up? Or have we never grown older? As time fleets past, humans are endlessly escaping from prison and simultaneously being discarnate. As a "discarnate man" we have left the self behind. According to McLuhan, a discarnate man is a human being who still processes his body in the physical world, but whose self or identity could be present in other phantom electronic place. We unconsciously discard the self in an invisible and unceasing phase of growing up.

We are destined to be born in a certain place with a certain skin color and to speak a certain language. Somehow we begin to abandon our own roots and turn to implant in other mainstream cultures. Childhood talk with one's mother is similar to talking to oneself. The native language with a pure mind is nowadays no longer precious. Will you still please listen to me while I share a story of childhood in my own language?

L'Enfant invites the audience to step into a concealed world constructed by artists. The performance involves techniques using a drone with a camera to detect and capture the scene and the audience reaction. The recorded image will be projected on the screen in an interactive approach through programming design.

尊彩藝術中心
LIANG Gallery



I-Chun Chen

Project mentor: Mikael Fock
Directors (digital artists): I-Chun Chen, He-Lin Luo
Sound designer: Jin-Yao Lin
Producer: Ruei Yen
Technical director: Chia-Sheng Chu
Stage Manager: Hong-Ting Xie
Lighting designer: Shawn Lee
Sound engineer: TP Chen

Advised by the Ministry of Culture of the Republic of China
Presented by Quanta Art Foundation, QA Ring and Ars Electronica
Associated with Liang Gallery
Sponsored by Quanta Computer



CyberRäuber

CyberRäuber (DE), Schauspiel Dortmund (DE)

The Memories of Borderline

The Memories of Borderline is a unique merger of theater and virtual reality. Schauspiel Dortmund and CyberRäuber have cooperated to create a new virtual, immersive and interactive space based on the stage and performance of the acclaimed play *Die Borderline Prozeßion*. While the three-hour play overwhelms its audience with a hail of simultaneous information, action, sound, text and performance, the VR scenery tells a story of memories and transience: from the moment one enters, the walls and textures show increasing traces of decomposition. In the background there is an atmospheric noise of music and texts, scenes that once might have taken place here. Scenes from *Die Borderline Prozeßion* are shown on the screens; life in all its facets in contrast to the transience of the virtual world.

As a work made for VR, *The Memories of Borderline* creates a new, hybrid form of art: a combination of visual art, media art, gaming and performance art. It

explores the potential of theater working with new technology, creating an innovative form of narration in theater: the user becomes their own narrator.

Schauspiel Dortmund, CyberRäuber (Marcel Karnapke and Björn Lengers)
Director: Kay Voges, Schauspiel Dortmund
Engineering, 360° camera: Björn Lengers, Marcel Karnapke
Video art, motion capture: Mario Simon
Director of photography, lighting design: Voxi Bärenklau
Stage design: Michael Sieberock-Serafimowitsch
Costume design: Mona Ulrich
Composition, music: Tommy Finke
Coding: Lucas Pleß
Authors: Kay Voges, Dirk Baumann, Alexander Kerlin
Actors: Paulina Alpen, Amelie Barth, Andreas Beck, Carl Bruchhäuser, Raafat Daboul, Ekkehard Freye, Frank Genser, Caroline Hanke, Christoph Jöde, Thomas Kaschel, Marlena Keil, Nils Kretschmer, Anja Kunzmann, Bettina Lieder, Eva Verena Müller, Lorenz Nolting, Uwe Rohbeck, Uwe Schmieder, Julia Schubert, Friederike Tiefenbacher, David Vormweg, Merle Wasmuth, Michael Wischniowski



NOMAD.theatre

Thomas J. Jelinek (SE/AT), Jorge Sánchez-Chiong (VE/AT)

Entropy

Landscape with traces of the H-theorem

Entropy is a fractal of a dynamically performing media installation of a “neuro-landscape” processing the current discourse on entropy, filtering the aspects of artificial intelligence for the occasion of the festival. The *Entropy* project is a transdisciplinary art and science project on the contemporary dynamics of collective and individual reality-construction under highly technological conditions, staging the current hysterical world-crisis scenario of decomposition, energy devaluation and disintegration. It is based on a rhizomatic network that generates pataphysical laboratories to describe and discuss the present time and world views as the turnover processes of our present society. *Backbone* is a series of experimental, collaborative laboratories where temporary communities of varied artists discuss and collaborate with scientists, activists

and experts on processes to develop methods and artworks in public. It has already been manifested in various forms of installations and performances, even as a full opera, performed in temporarily collaborative communities in art labs throughout Europe.

Florian Bogner (AT), Stefan Glasauer (DE), Max Hoffmann (US/AT), Margarete Jahrmann (AT), Marian Kaiser (DE), Florian Kmet (AT), Peter Koger (AT), Ulli Kühn (AT), Armin Medosch (AT), Gerald Nestler (AT), Pit Noack (DE), Hanada Al Refai (SY), MELA Marie Spaemann (AT), Lucie Strecker (DE), Christina Hartl-Prager (AT), Roman Harrer (AT), Louise Linsenbolz (AT), Thomas Wagensommerer (AT)

Production: NOMAD.theatre
Co-production: MTTW-Musiktheatertage Wien, TQW-Tanzquartier Wien, Zentralwerk Dresden, WERK X

Support: ZhdK Zürich, IFK Kunst Univ. Linz, Ludwig-Maximilian University Munich, i.a., Ministry for Education, Arts and Culture (BMUKK), MA7 Stadt Wien Kultur

Chris Bruckmayr (AT), Didi Bruckmayr (AT), Oliver Hödl (AT), Fares Kayali (AT), Uli Kühn (AT), Ruth Mateus-Berr (AT), Julia Soto Delgado (AT), Thomas Wagensommerer (AT)

Breaking The Wall

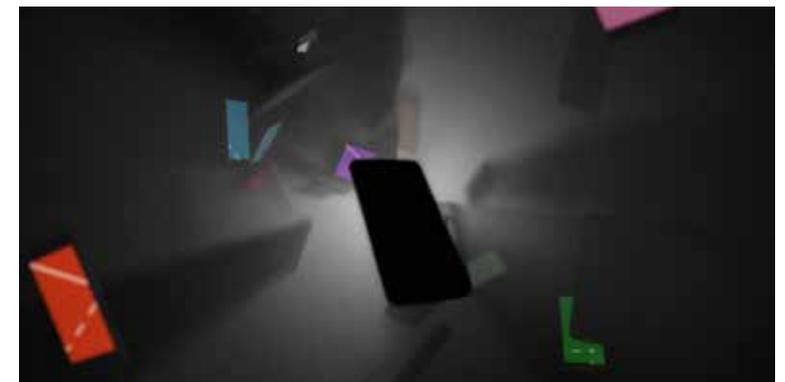
The collaboration of the performance artists null head (Didi Bruckmayr, Chris Bruckmayr) and the team of *Breaking The Wall* (Fares Kayali, Oliver Hoedl, Uli Kuehn, Thomas Wagensommerer) focuses on the technological and dramaturgical connection of body, sound, light and room. Through this multi-sensory experience and provoked by an artistic counter-performance (Ruth Mateus-Berr, Julia Soto Delgado), the audience should be able to reflect on and question digital surveillance and technological authority as it may be part of technology-mediated audience participation. This kind of embodied and technological intervention creates an experimental situation where accepted customs, habits, and eeriness convene interchangeably.

Performers: Chris Bruckmayr, Didi Bruckmayr
Art direction: Fares Kayali, Oliver Hödl, Uli Kühn, Thomas Wagensommerer
Artistic counter-performance: Ruth Mateus-Berr, Julia Soto Delgado

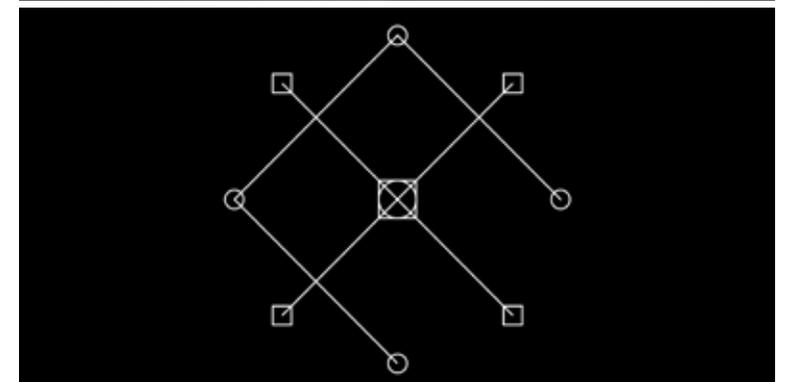
Vienna University of Technology (TU Wien): Fares Kayali, Oliver Hödl, Peter Purgathofer, Geraldine Fitzpatrick, Alexander Filipp, Christoph Bartmann
University of Applied Arts Vienna (Die Angewandte): Ruth Mateus-Berr, Thomas Wagensommerer, Uli Kühn, Julia Soto Delgado, Anna Lerchbaumer
University of Music and Performing Arts Vienna (MDW): Johannes Kretz, Hande Sağlam
The Open University: Simon Holland

Breaking The Wall is funded by FWF PEEK

<http://www.piglab.org/breakingthewall>



Thomas Wagensommerer



Ars Electronica Opening

Space and sound will transport you to distant spheres, so enjoy the trip as the 2017 Ars Electronica Opening takes its inimitable course. Amid the breathtaking setting of St. Mary's Cathedral, festival visitors' initial encounter is with *L'Enfant*, a four-part performance from Taiwan that uses sophisticated technology to deal with the subject of becoming an adult and dispatches a drone-mounted camera to capture the audience reactions to these developments. No less impressive is *cellF*, Guy Ben-Ary's neuronal synthesizer that enables musicians to perform with neurons. From New Zealand we have *Singularity*, skillfully blending data, dance, music and architecture into a spectacular

show for this year's Ars Electronica Opening. On the main stage an interactive sound performance entitled *Breaking the Wall*, under the direction of Oliver Hödl and Peter Purgathofer, invites attendees to get actively involved with state-of-the-art technology and some cutting-edge artists. *Étude*, a project by Vibert Thio and Duanger Du, compiles a live set from melodies specially created via app by former victims of the "Formosa Fun Coast-Explosion." Then, while still reeling from these unconventional sounds, the audience will be transported into unprecedented terpsichorean realms by *_nybble_* from Paris and Kyoka from the Raster-Noton label. Finally, patten, a Warp Records live act will conclude the night.



Étude, Vibert Thio, Duanger Du



cellF, Guy Ben-Ary



Sempeakin, Ei Wada



nybble, Alex Augier

Ars Electronica Nightline

Linz reclaims its slot at the epicenter of contemporary electronic music as international acts and performers convene for the Ars Electronica Nightline. Getting the party started is Kæning, the drum and vocals soloist who garnered fame in the Austrian neo-Dada project *königleopold*, with its intoxicating performance just skirting the edge of insanity. *Battle-ax*, a native of Australia who has made a home for herself in Vienna, opens the Main Stage with a loud, droning sound performance whipped up with viola and electronics. *Spectro Duo*'s live multimedia performance segues into the world of microsounds. Students in Linz Art University's Interface Cultures master's program once again confront various contexts of media art.

Next up is Nabihah Iqbal aka Throwing Shade (Ninja Tune), who will perform her eclectic mixture of contemporary electronic music, pop and Internet aesthetic. Her local Ninja Tune colleague, Dorian Concept, then steps up to do a melodic, beat-heavy set featuring material from his soon-to-be-released album. He will be followed by *Darkstar*, Englishmen known for their energetic live performances and an inimitable mix of techno sounds, minimalism, grime and left-field pop. *Lorenzo Senni*, who got his start as a drummer but whose latest album on the Warp label is 100 percent percussion-free, concludes these proceedings on the Main Stage with melodic, driving trance set-pieces.

The night owls among us will be happy to learn that, parallel to the Main Stage lineup, the Salon Stage will be featuring local Linzer live acts working in the experimental electronic music genre. Then, legendary Dutch DJ Marcelle / Another Nice Mess serves up one of her fabled obscure-sample-studded sets—just the stuff for people who need to keep on dancing.



Battle-ax



Dorian Concept



Throwing Shade



Quanta Art Foundation

Vibert Thio (TW), Duanger Du (TW)

Étude

062720150832 484 15 44 % 18-29 ∞

These numbers represent an incident that shocked Taiwanese society—the Formosa Fun Coast explosion. The incident happened at 8.32 p.m. on June 27, 2015. Total injuries were 484 people, including 15 deaths, with 44 percent burns to their bodies. Most sadly, the victims were young people between the ages of 18 and 29. Many of the burns patients are still undergoing physical and psychological treatment.

Healing through Art and Technology

Through this project the artists aim to bring back a colorful future to young victims through music, art and technology. The patients can compose their own melodies using the application created by digital artists. The application not only interacts with Kinect technology but also engages in the process of rehabilitation.

Étude Showcase

Based on the users' composing record, digital artists extracted melody patterns and generated music from algorithms by using live coding techniques, known as algorithmic rave. Digital artists performed as improvisers, creating live music and a party interacting with the audience. The showcase acts as a platform that documents how these music therapy sessions changed methods of rehabilitation and fine art.

Project mentor: Ali Hossaini
 Digital artist of original work: Hsin-Jen Wang (Aluan)
 Performers of 2017: Shin-Chia Thio (Vibert Thio), I-Ang Du (Duanger Du)
 Experiment executives: Bella Lee, Jonathan Wu
 Experiment participant (burns victim): You Xuan Lin
 Filming and editing: Mon Cher Ho, Jun Kai Lin

Advised by the Ministry of Culture of the Republic of China
 Presented by Quanta Art Foundation, QA Ring and Ars Electronica
 Sponsored by Quanta Computer



Ei Wada (JP)

Sempookin

The Tokyo-based artist and musician Ei Wada started the *Electronicos Fantasticos!* project, where he revives old domestic electronic devices and turns them into electronic musical instruments, in 2015. Among the various instruments the project has created is the *Sempookin* (literally, "electric fan harp"). This instrument was based on the wild idea: "what if the god of electric guitars, Jimi Hendrix, were to play the electric fan as an instrument?" A light source and a guitar strap are attached to the electric fan and the fan's blades are replaced with original disks with holes in them. The instrument is played by rotating the fan, where the flashing light created by the blades is picked up by a photosensitive device. The resulting electric signal is turned into

sound and by calculation the holes in the disk create different scales. The player carries the *Sempookin* upside-down—the left hand controls the photosensitive device and the right hand controls the rotation of the fan. Switching the fan strength, high/medium/low, leads to transposition. The player will be swinging the neck! Once, the mass-produced electric fan was the key to post-war reconstruction in Japan. Now the player has created a deformed rock band by carrying the electric fan upside-down.

Ei Wada + Nicos Orchest-Lab
 Technical Support: Rinichi Washimi, Yusuke Takei (Nicos Orchest-Lab)
 Promoter: NPO Topping East



Mao Yamamoto

Alex Augier (FR)

nybble

nybble is an audiovisual, formal and spatial performance in which the media fluctuate between minimal and organic digital aesthetics. Two poles on the same continuum. The aesthetic fluctuation is made by a generative visual where various forces impose both natural and geometric movements on a particle system. The modular synthesizer keeps the musician at the heart of the proposal and controls the musical fluctuation. The stage design allows the audiovisual medium to deploy in space via a specific structure composed with four transparent screens and four points of sound diffusion. It offers the public a quadraphonic and quadrascopic image for a total synaesthetic experience.

Co-production: Arcadi (Paris/FR), Stereolux (Nantes/FR)
Support: La Muse en Circuit (Alfortville/FR)



Elena de la Puente



Faeghe Shahverdi

SPECTRO DUO (PL/IR)

I.M. FREE

I.M. FREE is a program based on the free improvisation, using the non-harmonic music materials for its sound base. Noise produced by various sonic operations through the speakers mixes freely with saxophone sounds, transformed—rough and unleashed! The whole timbral layer of this performance is accompanied by video-glitch operations.

Spectro Duo is Martyna Kosecka (PL) and Idin Samimi Mofakham (IR)



Bhoomesh Tak (AT)

Trans-reality

When a ray of white light enters a prism, it exits split into its constituent elements. Each resulting color's unique character is brought out and demonstrated through its interaction with the prism, thanks to the qualities of the light, as an active element, and those of the prism, as the passive element. The individual colors, though each distinct in its character, make up an essential part of the original condition. A parallel can be drawn to the notion of conscious identity, the notion of an "I". An individual being is what it is wholly onto itself, but when something as complex as consciousness appears then there is necessarily a system of interconnected characteristics that make up the "I". The performance explores this concept in practice. It uses a physical installation with a simple Platonic geometry to

act as a prism, into which passes the concept of an "I", which is then split into four parts—movement, sound, speech, and sight—to illustrate a closed circuit of connection between them. The movement is expressed through a dancer wearing VR goggles, whose task is to interpret the visual output of a visual artist, whose task is to interpret the words of a narrator, whose task is to interpret the sounds of a musician, who bases his improvisation on the movements of the dancer. A feedback loop thereby occurs, with the individual performer's output becoming their input, filtered through the others.

Performers: JasKaran Singh Anand, Ben Olsen, Chris Bruckmayr, Bhoomesh Tak
Backstage: Klaus Dieterstorfer, Stefan Fuchs, Dietmar Peter, Heinrich Klambauer

Joseph Herscher (NZ)

Machine Dream

Machines are usually designed to achieve a task as efficiently as possible. One of the things that separates humans from machines is our ability to play. If life becomes all about efficiently achieving goals then it can become meaningless. Humans need to play!

So what happens when there is true artificial intelligence? Will machines play too?

The spiral falls sorting machine will take on a new role in this year: Joseph Herscher, the artist and Youtube personality from New York, will persuade the former package-slide machine to do a very human task:

Since it is not being used for a huge logistic system anymore, and has been left all by itself, this

big machine somehow got bored. So the spiral falls starts to play, only using objects that it "knows" from its past. Boxes, envelopes, poster tubes, gifts, toys, dolls or anything else that might once have been sent through it in a package.

The actions it undertakes seem very curious—although they run to a fixed schedule and have defined roles in the whole playing system. This might leave visitors asking: where is the neuronal control for that? Is the machine playing by itself? Maybe the spiral falls just represent something that is not visible at all: the formation of creativity and complex ideas that might consist of inspiration we get from different influences—also from machines that seem to do only what we tell them to.



Fletcher Lawrence



Fletcher Lawrence



Stijn Wuyts



FOCUS DIGITAL
MUSICS &
SOUND ART

Volkmar Klien (AT), Elisabeth Zimmermann (AT)

Different Places

From broadcasting to transmitting to processing

A symposium at Anton Bruckner Private University celebrating 30 years of Ö1 Kunstradio

As it did last year, on September 9 this year the Anton Bruckner Private University will join forces with the Ars Electronica Festival and Ö1 Kunstradio in organizing the Sonic Saturday symposium. On September 10, Kunstradio will also celebrate its 30th anniversary with a live broadcast as part of the Ö1 Kunstsonntag from Ars Electronica's Big Concert Night at POSTCITY.

Ö1 Kunstradio was founded in 1987 by the art critic, curator and journalist Heidi Grundmann as a weekly program on Österreich 1, the cultural channel of Austrian state radio, ORF. Conceived as a space for radio art, almost from its beginnings this weekly program became much more than just that: one of its main functions became that of serving as a point of access for artists to both the means of production and transmission of ORF and the international exchange and cooperation infrastructure of national public radio worldwide (mainly through the Ars Acustica group at the European Broadcasting Union—EBU).

In 1995 a group of artists created KUNSTRADIO ON LINE (<http://kunstradio.at>) as a means for announcing and archiving the weekly program as well as an another place for radio art. In 1996 KUNSTRADIO ON LINE began streaming not only

the projects scheduled for the weekly program slot but also the occasionally rather extensive, potentially even perpetual on-line elements of innovative networked radio-art projects, which soon started to be referred to as "on air—on line—on site". From the early 90s, artists made use of Kunstradio's infrastructure to produce innovative, networked radio art projects, modeled—among others—on telecommunications projects from the turn of the 80s such as *The World in 24 Hours* conceived by Robert Adrian for Ars Electronica 82, Linz.

Kunstradio and the Ars Electronica Festival share a long common history. Building directly on *The World in 24 Hours*, the *Horizontal Radio* project, for example, realized at the Ars Electronica Festival 1995, aimed at extending the radio space from the strictly hierarchical to collaborative, process-based networks.

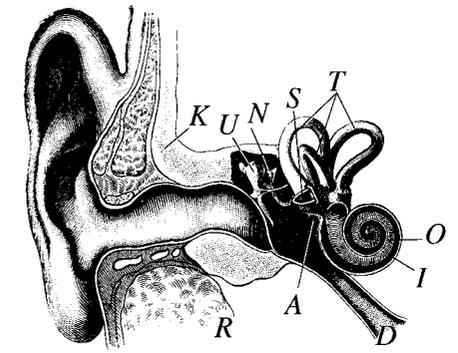
The last 30 years have seen fundamental changes in media technologies with repercussions that are tangible in all aspects of life. With the advent and later ubiquity of network technologies we now view the concepts and artistic projects by the pioneers in media art from a rather different perspective. Celebrating 30 years of Ö1 Kunstradio, in practice as well theory our symposium attempts

to get individual contemporary positions to resonate with some of the milestone projects of Kunstradio's longstanding history. How do these historic forms resonate in today's media, social and radio spaces? Which of these ideas—futuristic, dystopian or utopian—are still relevant to artistic or theoretical approaches today?

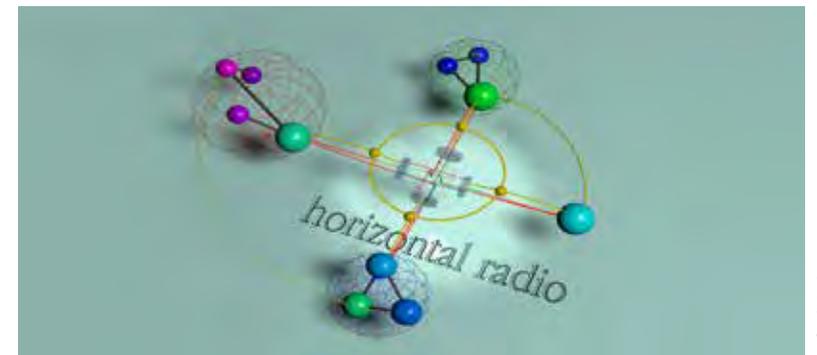
The symposium's participants are: Andreas Bosshard (CH), Sabine Breitsameter (DE), Seth Cluett (US), Anna Friz (CA), Daniel Gilfillan (US), Heidi Grundmann (AT), Nathalie Singer (DE) and Felix Stalder (CH).

The conference *Different Places* will be streamed live and documented by Usmaradio, the radio station of the University of San Marino. <http://www.usmaradio.org/>

Text: Elisabeth Zimmermann, Volkmar Klien



Robert Adrian



Gerfried Stocker

Horizontal Radio, a 24-hour, live multi-media telematic radio / network project that took place on 22 and 23 June, 1995, and involved over twenty radio stations world-wide plus the active participation from 24 network nodes around the world, Ars Electronica Festival 1995.



Werner Jauk (AT)

What is music to an “An-other I”, to a hedonic bodily unisex life in post-digital culture

The modern avant-garde of electronics as well as early digital-cultures are both closely related to sixties women’s (liberation) arts. The New York media-art scene and the European/Austrian scene were dominated by female artists—it was a time that was interpreted as the possession of new territories by women as an emancipation strategy. Associated with the denying of gender dominance was the transgression of artistic disciplines. Although part of the gallery scenes these technological media arts were closely related to minimalist music, performance art and noise music. Many female artists were music- or sound-related performing media artists. There is some research on the gender aspects of these early days of media art; there is less interest in this cultural turn of “musicalization” within a multimodal understanding of media art in everyday life. Today, in a kind of self-affirmation, the music scenes occupy those early days, beginning to use popular digital culture technology to make music—but despite this restorative restarting of disciplinary work, the focus is on what music is to bodily life in a post-digital culture re-constructed by media arts.

There is a deeper biological reason why (post) digital culture is a culture for everybody, for every body—not distinguishing between sex differences or between cultural or even racial differences: it is generated by the basic bodily force that self-regulates the survival of the body, by arousal. Any explorative behavior is based on this homeostatic process; artistic behavior can also be seen as explorative (Berlyne 1971), as is its formalization. Analyzing this formalization provides knowledge about life. Media arts explore

these cultural processes within the extension of the body by media—media culture seems to be an auditory culture (Jauk 2009).

Music is primarily a hedonic bodily art—a sonic performative art. Despite the linguistic semiotic turn that dominates the symbolic level of interaction in literature, and also the iconic level in fine arts, music—often seen in this parallel scientific world—is fundamentally beyond semiotics. Music may be considered as the cultivation of emotional expression in arousal-motivated “intentional body-environment interaction” (Gibson 1982). Avoiding modern progress ideologies, it is a mediatization of bodily expression, which is amplified by media technologies; it is pop music cultivating this hedonic way of life, where any interaction with the environment is controlled by the amount of arousal of stimuli for the body to achieve an optimal level of excitement—evolutionary psychology explains this hedonic regulation as a homeostatic process within an interdependent adoption process of the body and the environment by media leading to survival. Media may be seen as “any extension of (wo-) men” (McLuhan 1964); music is the instrumentalization of emotional expression of the voice and behavior. Notation converts this analogous “sound gesture” into discrete codes in the frequency and time domain—this allows the *com-ponere* of codes for sounds by will, leading to the *Werk*, a kind of virtuality.

The immateriality of digital code, not having any kind of connection to the material world, transgresses the material body—the body has become “useless” (Baudrillard 1981)—in a first step to

electronic culture the extension led to the idea of robotics, digital culture postulated the idea of virtualities; it is post-digital culture that is about to take care of the interaction of the material body with environments generated by digital / immaterial information. The postulation of the extension of the body has still remained the same—but the focus is on the intention of body-environment/ virtuality interaction; i.e., the hedonic quality of this process. Not the body itself, but the mechanical body became useless; the hedonic body became a vital necessity. Owing to the immateriality of digital code, the “transgression of the mechanistic paradigm” gave rise to up the dominance of the hedonic body and consequently a hedonic culture (Jauk 2003). This is where music, formalizing auditory logic, becomes the model for bodily life in digital worlds. This is the role of music in media arts—despite making music with media. The latter has been the case since the use of the body itself, its extension by instruments and its coding by notation—leading to material “virtualities.”

As a result of this reduction to the bodily basis of life, its homeostatic self-regulation by hedonism, the cultural body loses importance—each body interacts with worlds / virtualities in the same way, by hedonic regulation—gender, cultural sex roles, often argued as being based on the material body, become useless. It was a culture of “suppressing regulation” of the needs of the body, used as a dominant instrument of power, generalizing this bodily domination in political hierarchies, forcing the body and its physical sex differences to live in a modern dichotomized world. Post-digital culture, organized

by the hedonic body, will be to live an individual life in interaction with virtualities, creating them in this way based on individual needs in various situations. Plural existences of realities will emerge and will be respected within a common frame of creating culture: the hedonic body.

The concept of the cyborg first manifested (Haraway 1991) the overcoming of the material differences between sex bodies by technological extensions, and in this way also the overcoming of gender differences. Digital culture does this by overcoming the material body itself—the “feasibility” of life, first generalized by the Frankfurt School from heart-transplants to modern cultural life and now from “ectogenesis” (already foreseen by Aldous Huxley) to post-digital cultural life—makes even the body’s sex functions obsolete.

“An-other I” becomes important—the basis of natural life is no longer to be banished from culture as its opposite. It is not to be cultivated and controlled by cognitive processes of thinking, but is respected as the basis of life. More: hedonism becomes culture. But how to live this displacement power of controlling survival? The arts may be seen as the extension of some kind of game to exercise basic survival behavior. They may be differentiated according to the sensory control of body-environment interaction “times” its mediatization—in this way mediatization tools as techniques, cultural techniques. Media as cultural techniques follows the theory of mediamorphosis, that developments in media technologies correlate with their playful exploration, leading to social and aesthetic changes, and the “actor-network theory” (Latour 2005)—

which assumes adaptation on both sides, (the interaction processes of) the body and the extending media—extensions of individual agents by instruments and media in institutions are considered as agents in themselves. They serve together in a “generalized symmetry” of a primarily non-hierarchical network, where agents themselves are not known, but become known through “punctualization”, as the entity of a network, when their relations are repeatedly “performed.”

Mediamorphosis postulates socio-aesthetic changes resulting from the invention of technology (Blaukopf 1989), by the availability of technologies (Jauk 2009), ANT (actor-network theory) the social network where media-technologies, their cultural, social, psychological availability as intuitive interacting “actants”, are part of cultural interactionism—even art and science. Media arts especially are actants as “mediators” of information transmission in this network, by creating “tokens”, symbols of (im)material occurrences.

The visual system serves to control the motion of the body interacting with the material environment; its basic apperception is given by the reflection of light on the surfaces of objects, to perceive their icon providing the meaning of the object, what it is. Language serves to communicate those perceived icons and to construct symbolic signs being negotiated by social interactions—new meanings based on material experiences may occur. Digital code will make it possible to construct existences outside of the experiences of the material world—the question remains: evolving from adaptation processes with material life, is human life able to create virtualities despite material experiences, to create immaterial existences.

It is music that leads us close to this immateriality—hedonically regulated interactions of the expressive

body by sound and behavior of emotion is coded by notation composing tension-relaxation. The process of notation is a process of mediatization. It follows embodiments as material experiences in iconic time coding and “conceptual metaphor” (Lakoff 2003) transferring gravity to the perception of “density” and “volume” (Stevens 1965) of the sharpness of the sound to the imagination of its height (Jauk 2012). It is the sound-gesture that allows us to interact with social and material environments expressing the meaning of the motion of occurrences in a social and material environment—it primarily communicates their meaning to the body, less so where the motion comes from. It communicates intensities and their hedonic feeling, less the material qualities, their index (Jauk 2014).

In essence music is the playful experience of the hedonic body, with occurrences around it being physically indicated by sound. In this way it is an experience to interact with given dynamics by communicating the meaning of those motions to the body, not informing about their content. It is the playful game with moving forms according to their hedonic value.

This is what it makes hedonic behavior a paradigm to interact the (material) body with immaterial worlds: by the dynamic of its motion, by its “sound”. This culture is more determined by how and not by what, more by hedonic values than by useful material constructs and extensions of the material body—formalized in a visual culture of rationality. Interaction and adaption as creating virtualities by immaterial media is based on hedonic processes—to gain knowledge of these processes, *implicite* body-knowledge (Polanyi 1966) is rationalized by the evolutionarily younger cortex (Maturana 1987). Post-digital culture follows the materialization of digital information, as well as its bodily interaction.

Both cultural evolution steps in media culture can be seen as a process of musicalization, although superficially digital culture appeared as a visual culture, it is a culture of hearing—of analyzing the behavior of information around the body according to its meaning to the body and communicating this implicit knowledge by the expression of the body in sound-gestures—in this way media culture is a sound-culture, a hedonic culture.

It was McLuhan (1995) who first described electronic culture as an auditory culture, because of the (bodily) interaction of the body with information coming to it, while in mechanistic culture the body has to go to the content that is signed by symbols in order to get information first. It was Flusser who thought about technological media culture and music, but did not speak of a process of musicalization despite seeing telematic processing as being based on the paradigm of music as collective and collectivizing interaction; more thinking about the mechanical information transfer than playing music formalized in polyphony as the *Objektivierung des Wir* (Adorno 1947). Later this became the paradigm for net arts (DeKerckhove 1995) without mentioning music. Rötzer (1991) explicitly called the process of dynamization of culture (Virilio 1992) and the picture a process of musicalization. As a philosopher, Flusser considers reality, within a process of isolation of cultural processes of tradition, as the condition of understanding the information of symbols by the reduction of the spoken language to its melody contour. This was done by Lucier’s *I am sitting in a room*, with the feedback of the voice in interaction with space reducing time by freezing the moment of reality in sound. Today, according to this concept of reality, it is sound gesture as a performative signal (Pazukhin 1972), a pre-lingual bodily interaction with the environment. It is the

basic imagination of the imagined motion of sound and at the same time the expression of the meaning of this imagined motion to the body by sound—motion and sound are effects of the tension of the body. Pop-music, as basically low-mediatised bodily expression that is as amplified by highly mediatised technological extension, optimizes this intuitive interaction in the plurality of a diverse, individual hedonic culture. This innovative idea is the main research in intuitive interaction of the body with machines as well as humans in virtual, immaterial environments—it is the paradigm of creation in a post-digital culture (Jauk 2014). Nevertheless, musicology has not overcome the linguistic semiotic turn, shifting this basic kind of communication to the “higher” order of symbolic processes. Research into creation by interaction in post-digital culture seems to respect the “deeper” level of communication by stimulation of signals “beyond semiotics” (Jauk 2013).

The transgression of the mechanistic paradigm by the immaterial digital code leads to basic musicalization as a formalizing auditorily controlled body-environment interaction, putting the theoretical positions mentioned into a broader theoretical context. This brings together the digital as a hedonic culture with the everyday-life of popular media-culture (Jauk 2009). Even its hedonism of rationally perfecting hedonism (Pfaller 2011) and its sensibilization of “new femininities” (Gill 2008, Gill & Scharff 2011) through hedonism in post-feminism (McRobbie 2004) within neo-liberal culture creates the dominance of hedonic individuals, of “An-other I”. Reflecting the cultural evolution of media, media art is not interested in music made by media; it is interested in this paradigm-turn from a visual culture to an auditory culture, overcoming the *Abstraktionsspiel*, the dominance of the reduction

of the dimensions of interaction of the body with the environment from the three-dimensional physical space to the two-dimensionality of the iconic media space of the picture (Flusser 1993) back to the three-dimensional space enriched by the hedonic qualities of its dynamics. Digitally coded realities will be freed from any dimensionality of bodily life and its reduction in media by one dimension—they will have lost even the one-dimensionality of code-system language as a medium of narrating occurrences in time. Because of their immateriality they will leave the dimensionality of life and media; they will be reduced to the basis of material life, the intention of body-environment interaction by arousal. In this way the media have the dimension of immediate stimulation.

Following a homeostatic principle, what evolution does in interaction with material worlds will be extended to the immateriality of digital environments—this is what music is to media art. Media art is the playground that makes it possible to explore and train this evolutionary process of adaptation, compressed so as to be perceived in human time; within the interdependency of adaptation of the body, the media of interaction and thus the environment, which itself can serve as a medium, e.g. in social institutions, in social media as well as media institutions that are dominant actants in media culture.

Post-digital as a hedonic auditory culture is a culture not of feasibility, formalizing the construction/synthesis of realities by the moveable body handling the things we see, but a culture that respects the plural existences revolving around a body, selecting /analyzing them by their hedonic value to the

body in a diverse and situational manner. This situation of “hearing” is formalized in music. The dominance of seeing and fine arts in screen-media arts could be seen as an evolutionary-based cultural *gouvernementalité* (Foucault 2005), of the dominance of visual arts formalizing the evolutionarily younger sensory mode and its embodied cognitions of a world of “*Schocks und Schübe*” (Levy 2000) in “reasoning” and rationality.

Freed from the physical potentialities of the material body, it is the hedonic body that is common to different cultural sex roles. Post-digital culture will increasingly not just postulate the overcoming of sex roles, it is a necessity, at the same time respecting hedonism as the biological basis of human life, of every body. Better: being argued ideologically, gender differences no longer have any kind of natural basis—they are exposed as cultural constructions, as instruments of power, by the way ab-using hedonism as an instrument by imposing sanctions on this power of life.

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Werner Jauk (AT)

e-mot-ivat-ion

Feeling the Ex-Tension

“Any extension of wo-man” (McLuhan 1964) is media mediating the process of immediate body-environment interaction adopting both agents and the way of interacting. Any interaction of the body with material / social environments is “intentional” (Gibson 1982), regulated by tension / arousal, leading to a homeostatic state of pleasure. Any interaction, immediate or mediated, is intentional. Any aesthetic behavior is nothing but an explorative behavior (Berlyne 1971). Media arts explore cultural evolutions by various mediated interactions—bridging the gap between science and art in order to experience the creative power of extension, to make its tension to be felt.

Whatever is generated by interaction is based on arousal—the feeling of tension-relaxation. It is the hedonic body creating environments, realities and virtualities. Overcoming mechanical extensions in robotics, telematics and the conversion of immaterial information into material qualities, it is the meaning of coded information to the body intending interaction, it is the feeling of emotion to motivate motion. Because of the interaction of the body with the immaterialities of the digital code, digital culture is the transgression of the mechanistic paradigm, embodiments arising from experiences of the interaction of the body with material environments, leading, for example, to a “reasoning” within behavior, as “*Schocks und Schübe*” (Lévy 2000) no longer work. Post-digital culture focuses on bodily life in virtualities. It is hearing, the analysis of occurrences around the body by the meaning to the body, that is assumed to be the appropriate power interacting with virtualities, overcoming the mechanical extension, overcoming the rationality of the point of view.

Hearing, the arousal-based analyzing subtractive synthesis, is formalized in music; pop music is the cultivation of hedonic interaction, of sound gestures amplified by media technologies; sound gestures serve as intuitive emotional interfaces adopting sensual environments; hedonic post-digital cultures become pop-musicalized cultures (Jauk 2014).

The installation makes the interaction (in social situations) felt by media—by sound as some kind of psychological hedonic feedback mediating bodily interaction and in this way creating common (social) environments. People who come into contact interact by bodily behavior, following natural and cultural implicit knowledge (Polanyi 1966). This interaction is a multimodal process controlled by tension—there is some kind of border to a person’s space where intimacy starts.

Nonverbal bodily interactions are amplified by sound-gestures, mediating tension, and transferred to a multimodal intimate stimulation around the bodies—an arousing date leading to a common space of pleasure—virtualities become bodily, intensifying the body. Finally the installation is an experimental setting between art and science, to experience the creative power of *Feeling the Ex-Tension*, as bio-acoustics acquire the knowledge-intensifying sonic and sonifying behavioral interaction of animals (Willkomm 2013) to get *communis*—the sound of mating behavior is the most sensual.

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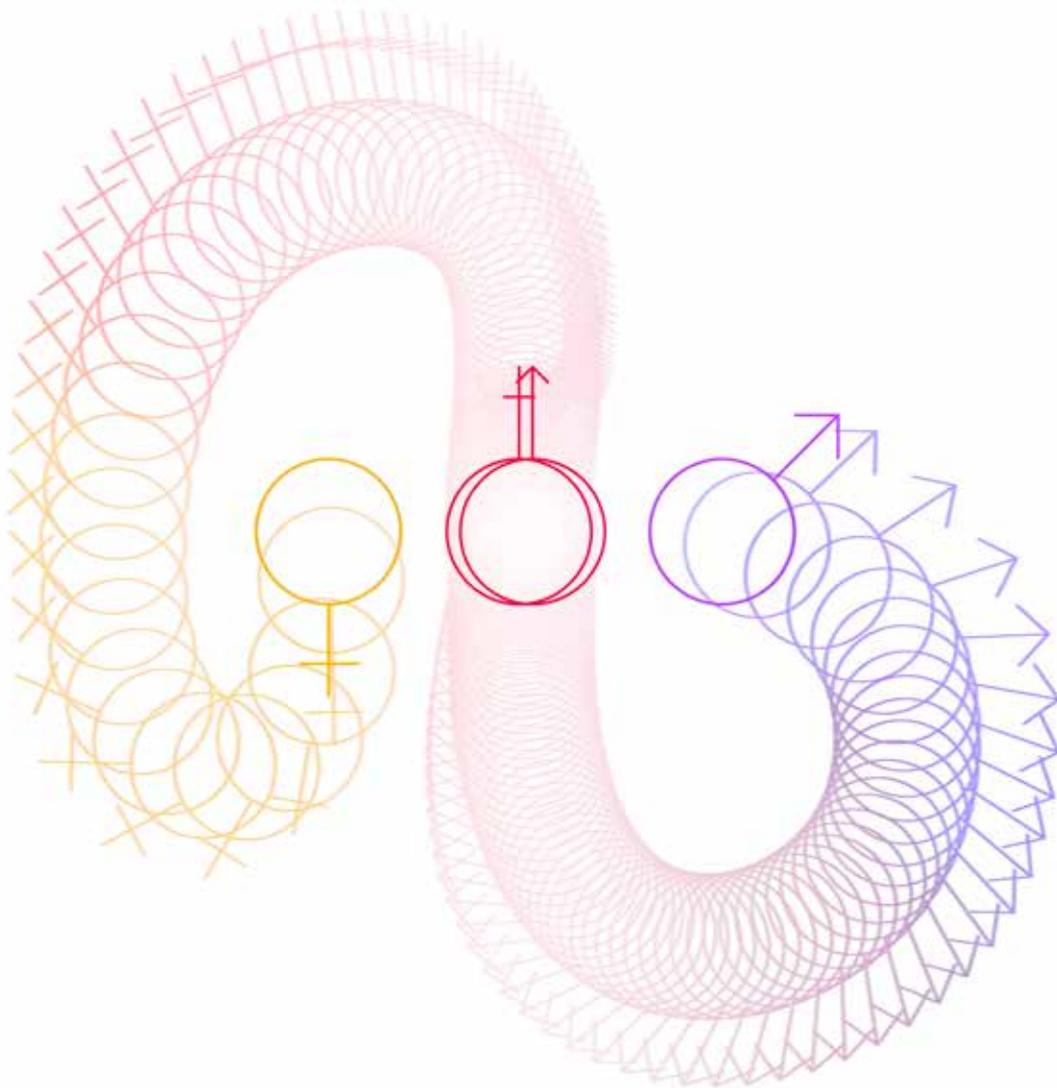
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get together by extension -
sashay in tension - turn around ...

Grafik: Julian Jauk

Sparkasse OÖ Klangwolke 2017
Presented by Linz AG

Moby Dick

Hunted Right up to the Riverbanks of Linz

Loosely based on Herman Melville's novel

Linz Becomes a Seaport

The fateful voyage of the *Pequod*, the whaling ship whose Captain Ahab was driven by blind hate to hunt down a white sperm whale, will be performed in a theatrical form that conveys all of the work's drama and philosophy. The proximity to water and the far-fetched possibility that Moby Dick could have wended his way upriver as far as Linz impart a very special appeal to this production with a local hook. The events played out on the water will be duplicated on land in terms of a performance and visuals that make them comprehensible to the huge audience assembled here. Modern dance and the acrobatic moves by trained gymnasts are the means of expression for a cast of about 100 performers. Before the eyes of *Klangwolke* spectators, Ahab's madness manifests itself in a climactic confrontation with his arch enemy, Moby Dick. This production takes spectators on a journey overseas and back to Linz again.

Music and Narrator

This performance is musically based on *Ahab!*, an orchestral work by American composer Stephen Melillo. Written for an orchestra of wind instruments and a narrator, this piece powerfully underscores the unbending will of a man struggling against God and the whale. Playing Ahab and narrating as well is none other than Christian Brückner, a Grimme Award winner and the voice of Robert De Niro in

German versions of the American actor's films. "Melville's text has preoccupied me at least half my life. Recreating it in this extraordinary setting is a fantastic assignment."

The Fireworks

This year's fireworks are a substantive element of the production, a means of expression employed intentionally to create powerful imagery. Pyrotechnic effects intensify several of the scenes, culminating in the finale of a shipwreck accompanied by violent explosions.

After-party

Immediately following the 2017 Sparkasse OÖ *Klangwolke*, Linz AG cordially invites visitors to keep the extravaganza going in Sandburg and the Donaupark. Providing the music at the Linz AG Nachklangwolke is Eugene the Cat.

Design: Helix Event Inszenierungen
Director, choreographer: Christine Maria Krenn
Producer: Roland Krenn
Technical director: Helmut Scheiber

Sponsors: Sparkasse OÖ, Linz AG, Wiener Städtische Versicherung, Lentia City, VICOM, Austrian Federal Chancellery, Design Center Linz, The City of Linz, ORF–Austria Broadcasting Company–Upper Austria regional studio, OÖ Nachrichten, *Kronen Zeitung* OÖ, LIVA, Brucknerhaus Linz

<http://www.helix.co.at>
<http://www.klangwolke.at>





FUTURE
INNOVATORS
SUMMIT



Future Innovators Summit

The *Future Innovators Summit* is a creative system which has been developed by Ars Electronica Futurelab and Hakuodo. At this summit, experienced professionals as well as young entrepreneurs and social activists, technicians and scientists, and of course artists and designers, will meet at the Ars Electronica Festival for mutual inspiration and the exchange of ideas and know-how. The line-up will also include opportunities for participants to engage in dialog with each other and with the public. Besides a broad range of lectures, presentations and exhibitions, we want to build a special taskforce of Future Innovators all over the world, who will present their ideas and projects and who will discuss the current topics of the summit. Why is this a unique opportunity? At the moment, one can find a growing line-up of events and gatherings for young entrepreneurs and start-ups, as well

as a lot of hackathons, game jams etc. where the young community of programmers and developers can interact. The same goes for festivals of young artists and conferences of young social activists. What they all have in common is an exciting and infectious inspiring atmosphere, but they often also share a certain flavor of elitist exclusivity, and as an emerging professional or even as an outsider it is sometimes difficult to access them. Even more surprising is that you can hardly find an event at which these inspiring talents, creators and innovators can convene, and do so across the borders of their communities and disciplines. But this cross-over is exactly what we are looking for! And therefore we are announcing an Open Call every year, where all interested people from around the world can apply for the *Future Innovators Summit* (FIS).

Missions for Tomorrow

Following its successful premiere at the Ars Electronica Festival 2014, and subsequent inspirational editions in 2015 and 2016, the *Future Innovators Summit* has established itself as a dynamic think-tank and key program within the Ars Electronica Festival.

Now in its fourth year, Future Innovators from different cultures and backgrounds and from different fields, such as artists, designers, scientists, engineers, entrepreneurs, social activists and philosophers, will gather in Linz in September

to explore new ways of collective brainstorming and creative prototyping on the crucial questions of the future. Supported by experienced partners such as Hakuodo (JP) and the Internet Foundation Austria as well as outstanding experts from all over the world, at the *Future Innovators Summit 2017*, Future Innovators will be challenged to look for the ultimate *Creative Question* that will lead us to think of missions for tomorrow—concepts that are inevitably linked to the main topic of the festival “Artificial Intelligence—The Other I”.

The Themes of FIS2017

Future Humanity

When we are facing a world where machines may evolve to be better thinkers and better doers than humans, what future awaits us? And what will be our motivations to live? *Future Humanity* seeks out our visions and missions in correlation with technology, other beings and ourselves.

How can we be more human?
How can a machine love a human?
And vice versa?
How can we live as a multiple “I”?

Future Work

Since when have we been working like we do today, and when will it change? For what reasons and mission do we work, and what will we as humans be looking for in the future? *Future Work* will explore how and why we work and what the concept of work will really look like in years to come.

What if we will no longer need to work?
What will humans need instead of work?
How can AIs and humans share the same mission for the future?

What kind of education is needed for joblessness in the 21st century?
What is the role of social capital in driving regional sustainable growth and innovation?

Future Home

What is your home? The meaning of home has continuously been evolving since humans first walked the Earth. Once as a refuge for survival, living and relaxing, but now what other factors of homes need attention in order for us to acknowledge the place where we shelter as home? For future nomads, what are smart homes, creative hubs, digital communities, cities and nation states going to be? *Future Home* asks you to think of the evolution of homes in the future.

What factors give us the feeling of home in the future?
And what will the home look like?
How can we build a sense of solidarity as family and community in the future?
How can AIs become a part of your family?

Program overview of FIS2017

DAY 1: KICK-OFF DAY

DAY 2: FESTIVAL INSPIRATION DAY WITH MENTORING PROGRAM

DAY 3: INTENSIVE WORKSHOP DAY

DAY 4: FINAL PRESENTATION AND NETWORKING EVENT

Mentors

Previous FIS editions have shown that the mentorship element was extremely valuable and all participating mentors were inspirational initiators for the innovators—and vice versa. In a dynamic environment, innovators and young professionals will have the opportunity to exchange ideas and ask leading experts for advice.

Mentors in previous years have included: Victoria Vesna (artist and professor at UCLA Department of Design), Peter Wouda (Design Director at Volkswagen Future Center), Hiroshi Ishii (professor at MIT MediaLab), Geeta Mehta (professor at Columbia

University), Oliviero Toscani (photographer), Joachim Sauter (founding member and Head of Design at ART+COM), Alexander Mankowsky (futurologist at Daimler) as well as Robert Madelin (EU Commission/ Senior Adviser for Innovation).

Facilitators

The workshops will be facilitated by our partner Hakuhodo. The Hakuhodo facilitators will accompany the workshop process and lead the discussions during the Future Innovators Summit.



Ars Electronica Tokyo Initiative

The *Future Innovators Summit* itself has been developed by the Ars Electronica Futurelab and Hakuhodo since 2013 as part of their collaborative project entitled the Future Catalysts program. Since then, our alliance has expanded with the creation of the Ars Electronica Tokyo Initiative, a mission-driven community to really act for shaping a better society together with artists and companies.

Originally, art was not the core driving force for industries, but now is the time to form a unique meeting point between art and industries—stimulating innovation, visions and social discussions. The Ars Electronica Tokyo Initiative is a community for discussing potential missions for the future. A mission includes intention and also a wish to do

something. The city of Tokyo, the headquarters of Hakuhodo, is one of the biggest ongoing social and future-orientated experiments. Together we are now trying to catalyze this new role of art for society. The Ars Electronica Tokyo Initiative is also a co-partner and a background force to sustain this *Future Innovators Summit*.

Future Innovators Summit is a project of Ars Electronica and Hakuhodo in collaboration with Internet Foundation Austria (IPA), netidee.

Text: Hideaki Ogawa, Kazuko Tanaka, Carla Zamora

www.aec.at/ai/fis



CAMPUS
PROGRAM

CAMPUS

Every year since 2002, Ars Electronica and the University of Art and Design Linz has hosted an exhibition by artists associated with an international higher-education institution whose curriculum takes an innovative approach to teaching media art and media culture.

Initiated by Prof. Reinhard Kannonier (University of Art and Design Linz) and Gerfried Stocker (Ars Electronica), the intention of the *Campus* format is to invite outstanding international universities working in the academic fields of media arts and design. Projects highlighted here represent the nature of the mission and activities of invited guest universities from all around the world. These showcases became an immanent part of the festival and an instrument to analyze and visualize different models of educational approaches in artistic and creative areas. It has also increasingly developed into a stage for contextualized works from alumni,

professors or associates from the universities to map the identity of academic institutions, its history and current practice.

Part of *Campus's* mission is to enable the presentation of young, local media artists and their work with international exposure. The Interface Cultures program of the University of Art and Design Linz annually presents a cross-selection from their masterclass works and, together with Ars Electronica, co-hosts one main featured partner university each year. The festival is increasingly becoming a platform for artistic and creative collaborations between Ars Electronica and various regional, academic partners, for example Fashion & Technology, the Lab Creative Robotics and the Time-based Media program, all three at the University of Art and Design Linz, the Anton Bruckner Private University Upper Austria or the University of Applied Science Upper Austria, Campus Hagenberg.

- 2002: Academy of Media Arts, Cologne (DE)
- 2003: Department of Media & Art at the University of Art, Media and Design in Zurich (CH)
- 2004: IAMAS (JP)
- 2005: Srishti School of Art Design and Technology, Bangalore (IN)
- 2006: Medialab at the University of Art and Design Helsinki (FI)
- 2007: HGK FHNW, the Swiss Institute for Post-industrial Design (CH)
- 2008: University of Tokyo (JP)
- 2009: MIT Media Lab (US)
- 2010: Media Campus of the Darmstadt University of Applied Sciences (DE), School of Art & Design at the Cork Institute of Technology (IE)
- 2011: University of Tsukuba (JP)
- 2012: UdK-Berlin University of the Arts, Sound Studies (DE)
- 2013: Bezalel Academy of Arts and Design, Hamidrasha Art School of Beit Ber College, Holon Institute of Technology, Kibbutzim College of Education, Technology and the Arts, Shenkar College of Engineering and Design, the Media Innovation Lab at IDC Herzliya, Musrara School, the Neri Bloomfield School of Design and Education, Hadassah Academic College and the College of Management–Academic Studies (COMAS) (IL)
- 2014: Arts2–École Supérieure des Arts (BE)
- 2015: Université Paris 8 (FR)
- 2016: Tsinghua University, Beijing (CN)
- 2017: University of California, Los Angeles (US)

Campus is also a platform for international exchange between universities, leading to increasing collaboration between academic partners. In 2017, fifteen universities from many parts of the world are represented:

- University of California, Los Angeles (US)
- University of Art and Design Linz (AT)
- Aalborg University (DK)
- Aalto University, School of Arts, Design and Architecture (FI)
- Anton Bruckner Private University Upper Austria (AT)
- ArtCenter College of Design, Pasadena (US)
- Ludwig-Maximilian University of Munich, Institute for Art Education (DE)
- MIT Medialab (US)
- Queensland University of Technology (AU)
- State University of São Paulo, Arts Institute (BR)
- The University of Auckland (NZ)
- University of Tsukuba (JP)
- TU Vienna (AT)
- University of the Arts London (UK)
- University of Applied Science Upper Austria, Campus Hagenberg (AT)

Campus Exhibition

FEMINIST CLIMATE CHANGE: Beyond the Binary

University of California, Los Angeles

UCLA Art | Sci Center & voidLab, Department of
Design Media Arts

Curators: Victoria Vesna and Xin Xin

“Everything in nature is about BALANCE and DIVERSITY. In turn everything that is happening in our society and the environment is a direct reflection of our world being out of balance. When you have a group of men deciding what a woman’s right is in relation to her body, you know that chances are high that they would be equally inconsiderate of the Earth we all live in.”

(UCLA Making a Guest Appearance at Ars Electronica Festival, Ars Electronica blog)

Gender and environmental advocacies are stronger than ever, as is the opposing conservatism strengthened by the fear of the unknown and the need to go back to the past. Binary mindsets have to give way to a more complex, diverse and fluid world-views. Thus we come together to conceptualize this campus exhibition as professor and founder of the Art | Sci Center and recent graduate of Design Media Arts and co-founder of voidLab.

With the selected works, we aim to converge the issues in feminism with environmentalism. By framing the exhibition in this way, it is our hope to reinvigorate the eco-feminism that emerged in the 70s and was ignored for much too long. In this particular context, at the Ars Electronica Festival in Linz, we address the local and transnational issues of feminism in media arts and the global issue of climate change—thus the very obvious title.

The climate change movement is not gender neutral—globally, females constitute two-thirds

of the world’s poor and their livelihoods are more dependent on the natural resources threatened by climate change. Females and males living in rural areas within developing countries face the greatest challenges in securing water, food and fuel. When relating gender to climate change, we avoid focusing only on binary male-female inequalities but also scrutinize discursive constructions that shape power relations. Ultimately, climate change cannot be solved with a nationalistic mindset—this is a global problem—air and water have no borders. It would be difficult to present the works of the department alone, as this would negate the dynamic network that has emerged since year 2000 when the UCLA Department of Design was reimagined as Design Media Arts. Very quickly it branched out into auxiliary research labs and centers based on faculty research—enabling students and the faculty to work collaboratively across disciplinary and institutional boundaries. In addition

to presenting UCLA Design Media Arts alumni who are now active artists and teachers, it was also very important for us to present women scientists who also collaborate with artists, as gender issues in sciences are much deeper and problematic than those the art world faces and we want to honor and support the brave young scientists working with environmental issues. To this end we present Art | Sci Center alumnae: Christina Agapakis, a postdoc in molecular, cell, and developmental biology at UCLA (2012-14), now working in a Biotech company, Olivia Osborne, postdoc in the UC Center for Environmental Implications of Nanotechnology, and Rita Blaik, recent PhD graduate in material science, now the education coordinator at the UCLA CNSI.

Finally, we did not shy away from including those who are still students—current Design Media Arts students and voidLab co-founders Jen Agosta and Sarah Brady and recent graduate Sanglim Han collaborate with scholars to examine the urgent

issues of gender and racial profiling in artificial intelligence; DMA MFA alumna Noa P. Kaplan, who exhibited at the Art Sci gallery and always enthusiastically followed and participated in the center events, is currently pursuing PhD degree at USC. Art | Sci Center alumna Mary Maggic Tsang recently graduated from MIT Media lab and is participating with Byron Rich in Ars Electronica this year, so the star is really shining on her estrogen workshops! Climate Change is certainly a feminist issue but also very much a generational issue—it is these young artists and teachers who hold the key and we celebrate their brave work in these troubling times.

Disclaimer: our curatorial approach may not reflect the views of the UCLA School of the Arts or the Department of Design Media Arts. No doubt every faculty in the department would frame this exhibition in their own way, and we suspect that many of our colleagues would agree and support our curatorial decisions.

Pinar Yoldas (TR)

Carboniferous



Pinar Yoldas

The connection between fossil fuels and plastics makes fossil fuels an immensely interesting subject to think about if one intends to understand two of the biggest problems of planetary health: CO₂ emissions and plastics. Whereas CO₂ emissions lead a large family of carbon-dioxide-related, issues global warming, acidification of the oceans, air pollution being the gravest issues, plastic pollution poses another type of threat to global ecosystems by entering the food chain as food and predator at the same time. In *Carboniferous* I intend to connect the dots between fossil fuel and the ancient history of plants, paleobotany and problems caused by fossil fuels.

Silvia Rigon (IT)

Panta Rei (Everything Flows)

A stream of colors. An endless amount of trash flowing towards the viewer in perpetual motion. As time swirls entangled in the looping of the animation, a cartoonish and colorful aesthetic suspends the gaze in a contemplative fixation. One more time we find ourselves suspended in our ambivalence towards the culture of excess.

Water as a medium of communication is the movement that brings what was underneath to the surface, and carries it with it. The river is then a metaphor of passage, a course that can bridge two worlds, a transmitter. It can carry you to the other side but can't take you back. It has often been referred to as a metaphor of time. "You cannot step into the same river twice," said Heraclitus. In Dante's *Divina Commedia*, the river Acheron provides a passage to the souls of the dead, the final route into the underworld.



Silvia Rigon

Inspired by real media news events, *Panta Rei* is a socio-political commentary on media-induced anesthetization, but also a metaphor of the passage we are facing epochally, with water at the center of the struggle for sustainability, survival and the choices we make or don't make.

Scott Hessels (US)

Extreme Environments: Arts-Based Field Research



The School of Creative Media 2012

Extreme Environments is an experimental arts education initiative based in Hong Kong that places art and design students in remote scientific field stations to collect data alongside scientific and environmental organizations dedicated to the protection of these important ecosystems. The students return to use the unique tools of the School of Creative Media to interpret and present their discoveries in new forms. Data is not just visualized but trans-

formed creatively into games, interactive artworks, cinema, animations and more to help engage with wider audiences. The first *Extreme Environments* expedition and exhibition, in 2012, was a partnership with UCLA's Art | Sci Center with direct input from the California Nanosystems Institute (CNSI). The *Extreme Environments* program is now one of the most respected discovery-based education initiatives in the world, discussed in top international journals, news media and conferences.

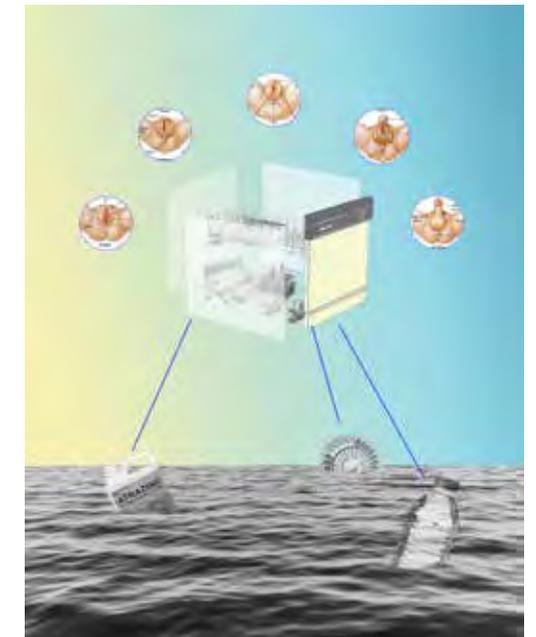
Since 2012, art and design students have visited scientific field-research sites in some of the planet's most remote corners, including the Mojave Desert, Antarctica, recently discovered caves in Vietnam, underwater in the rich reefs of Sipidan, Malaysia and in the Arnavaon Islands, a remote western region of the Solomon Islands greatly endangered by rising ocean levels.

The Desert Metropolis: the Mojave Desert (2012); *Freeze Frame*: Antarctica (2014); *Fade to Black*: the Vietnam caves; *Deep Focus* (2015): the Coral Triangle (2017).

Mary Maggic Tsang (US), Byron Rich (CA)

Molecular Queering

Bodies queer in many ways, most actively through the molecular colonization of our planet. Thanks to petrochemical, agricultural and pharmaceutical industries (markers of our anthropogenic time), these queering molecules are hormonally active and bio-politically pervasive as a state of toxicity. Our bodies and bodies of non-human species are all undergoing a collective mutagenesis—our kin are both the intersex frogs as well as the gender-bending chemicals in their bloodstream. So what does it mean to identify with our chemically induced world? To create discourse that turns toxic shame into toxic embrace? Am I not only inheriting the genomes of my parents but also the plastic molecules my mother is exposed to as I incubate in her womb? It is with this queering power of xeno-bio-chemicals that the *Molecular Queering* workshop performs a urine hormone extraction and analysis, a DIY/DIWO recipe for gender-hacking. Bring your own urine!



Mary Maggic Tsang & Byron Rich

Financial Support: Allegheny College
Special thanks to The Aliens in Green

voidLab: Jen Agosta (US), Sanglim Han (KR), Xin Xin (US/TW)

Shadow Glass

Shadow Glass is a voidLab collaboration between Jen Agosta, Sanglim Han, and Xin Xin based on an interview with Safiya Umoja Noble, the author of *Algorithms of Oppression: How Search Engines Reinforce Racism* (forthcoming, NYU Press). In the book Noble coins the term “technological redlining,” describing the historical redlining that gets carried over into the creation of algorithms. Noble challenges us to think about how the design of algorithms and databases intersects with issues of race, gender and class, and urges designers and policy-makers to confront and eliminate biases in the development of decision-making technologies. *Shadow Glass* echoes Noble’s perspective of artificial intelligence as a human rights concern.

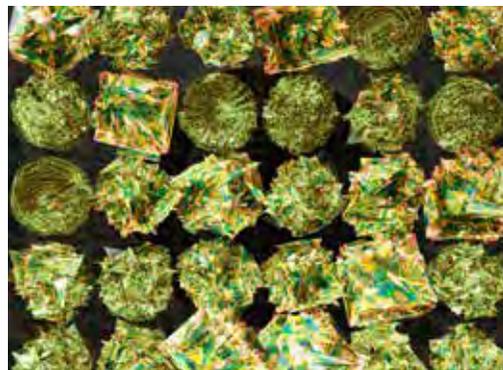


Sanglim Han

Interviewer: Xin Xin
 Visual artist: Sanglim Han
 Sound artist / music producer: Jen Agosta

voidLab: Nora Khan (US), Sarah Brady (US), Sanglim Han (KR), Jen Agosta (US)

Shapeshifting AI



Sanglim Han

Shapeshifting AI is an audiovisual installation about artificial intelligence and its capacity to develop language for the unknown as rich poetic devices using AI as a tool to produce new forms of

symbolic language expressed in radically new forms. As women of color, Kahn and Brady share ideas on imaginative paradigm shifts created outside a white, patriarchal, capitalist and colonialist world where a power imbalance between those of “otherness” and those without still exists. Is it possible to come up with solutions that are not human-centric and have a post-human capacity to turn alienation into expressions of power? Khan and Brady explore this question in a recorded interview with a musical remix by Jen Agosta and visual accompaniment by Sanglim Han.

Interviewer: Sarah Brady
 Visual artist: Sanglim Han
 Sound artist / music producer: Jen Agosta

A.M. Darke (US)

In Passing

In Passing is a virtual reality experience about what it is like to navigate public space based on one’s intersecting identities. The work presents a diverse group of people, each recorded while describing their unique experience moving through the world. Viewers navigate virtual streets where such recordings have been superimposed onto virtual proxies, creating a tension between constructed reality and raw personal account.

In a time when social division is running high, sometimes the best thing we can do is take time away to listen. A.M. Darke’s work *In Passing* allows viewers to enter a space with a diverse range of experiences, simply to listen and bear witness. This work helps viewers connect with others in a way that cuts through the stereotypes and us-vs.-them mentali-



A.M. Darke

ties that so often stop a constructive dialog before it starts.

This work was created at an artist-in-residence at Laboratory.

Tomorrow Girls’ Troop (JP/KR)

Believe Campaign



Tomorrow Girls' Troop

The *Believe Campaign* was launched to raise awareness of sexual violence in Japan and to demand modernization of the penal law, which has not been modified since its establishment in 1907. The Tomorrow Girls’ Troop contributed the design elements, targeted at women in their 20s, and staged the art performance *Believe March* to demonstrate the public’s demand for the amendments. Participants wore feather-shaped masks for anonymity, with messages from supporters. The march was filmed and premiered in Tokyo in 2017 in a group show on socially engaged art.

<http://www.believe-watashi.com>

Lauren McCarthy (US)

Follower

Follower takes the language of social media at face value. But here, instead of providing followers online, the service provides a real life follower for a day and results in a single photo shot by the *Follower*. This work attempts to reconcile the willingness to engage with online followers, and to attract ever more of them, with a keen awareness of “ubiquitous camera placement, NSA monitoring, Google tracking, and any number of other [surveillance] practices.” By reversing the interface of app and user, *Follower* negotiates a new possibility to satisfy the intense desire to be seen and known.

<http://lauren-mccarthy.com/follower>
<https://follower.today>

Video: David Leonard, Lauren McCarthy
 Design: Michelle Lin, Lauren McCarthy



Lauren McCarthy

Knifeandfork (US)

Oh Dear Me (Documentation)



Bonnie Brae Productions

Knifeandfork (Sue Huang and Brian House) created *Oh Dear Me* as a commissioned work for NEoN (North East of North) in Scotland. In this performance, the public is invited to chat through a distributed hybrid digital/analog musical messaging system that activates the acoustic geography and

industrial history of Dundee, Scotland.

A series of musicians are situated along a path winding through the historic jute mills of the Blackness area of Dundee. Visitors are invited to type a message into a computer console at either endpoint of the path, and their words are digitally encoded via fragments of *The Jute Mill Song (Oh Dear Me)*, a folk song written around 1920 by Dundee mill worker and labor activist Mary Brooksbank.

Commissioning organization: NEoN (North East of North) Ltd.
 Funding organization: Creative Scotland
 Musicians: Red Note Ensemble (Ana Romero, Arin Grattidge, Colette Colman, Emily Stokes, Joey O’Neil, Jordan Robertson, Kenny Letham, Marcus Shanks, Rebecca Wilson, Scott Kerr)
 Video Documentation: Bonnie Brae Productions
 Special thanks to Donna Holford-Lovell, Dan Faichney, Ed Broughton, John Harris, Christine Cooper, Anna Murray

:Phoebe Hui (HK)

Vexation

Vexation is a musical instrument built especially to play Erik Satie’s composition *Vexation*. Satie apparently instructed that the same music should be played 840 times. Inspired by Samuel Biderman’s octave spinet, *Vexation* builds upon traditional drawing pencils and woodwork together with modern electronics. I made a moving wooden cylinder on which I drew marks using pencils with different-sized leads. These pencil marks function as a score. The contact between the sound circuit and the pencil marks produces audible music. The cylinder can also be seen as a sculptural piece. Its cylindrical shape evokes my understanding of vexation—an endless circulation. In *Vexation*, I tried to collapse score and performance: The drawing in itself is the physical material that generates the tone. I am interested in transforming existing art-



:Phoebe Hui

works, presenting them using new forms of notation or mechanical instruments, in order to raise the question: When does something become a different work of art?

Anne Niemetz (DE/US)

Drones Sweet Drones



Anne Niemetz

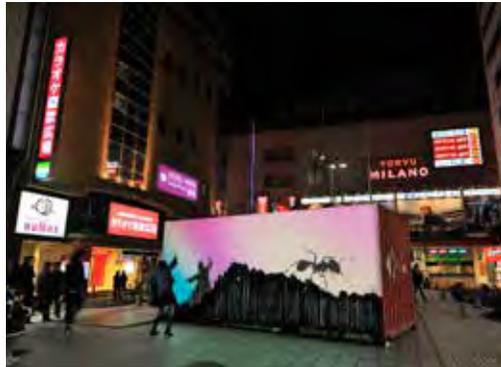
Home Sweet Home was an expression that was popular with troops on both sides of the American civil war, and through the glorification of drones the installation aims to open up discussion about the uses of drone technology. As embroidered blueprints using Arduino-powered lights, the aesthetic of the drones combines techniques associated with

the past and the future, art and science, the amateur and the professional, and the feminine and the masculine. The blueprint text prompts us to further consider the potential of drones, as well as the gendered logics under which they operate. *Drone Sweet Drone* is purposely conspicuous rather than stealthy. Turning surveillance on its head, it wants us to study the fly on the wall that is becoming a greater part of our lives.

Installation: Anne Niemetz
 Contextualization: Dr. Sarah Baker
 Multicopter design: Hadley Boks-Wilson
 Special thanks to Victoria University of Wellington

Gil Kuno (US/JP)

The Antmaster



a new amalgam of motion and still images. In addition, nanosounds of ants moving and communicating were recorded in a nano-science lab at UCLA CNSI to act as a soundtrack to the pieces. The theme for *The Antmaster* is karma. In Hinduism and Buddhism, it is believed that past karma must be cleared through hard work and suffering in the present. Ants are viewed by humans as being very hard working. Might it be possible that the ants' selfless diligence is the result of having to work off past karma? Invocations that are utilized to clear bad karma are inscribed into the static areas of the projection. In *The Antmaster*, Kuno tries to express how humans and other life forms (e.g. ants) are co-equal; they are all at the mercy of the same laws of the Universe (i.e. karma.)

The Antmaster is an experiment in hybridizing dynamic media (projections) with static media (paintings.) Digitally projected images of live ants are superimposed onto painted surfaces to achieve

Aaron Koblin (US), Ben Tricklebank (US)

Light Echoes

Traces of light are broadcast onto landscapes by a laser aboard a moving train. In *Light Echoes*, Aaron Koblin and Ben Tricklebank collapse time and space into images which document the historical pulses of data in the form of light reflecting off earth and matter. The project was included in Doug Aitken's Station to Station project and later exhibited at the Barbican in London.



Aaron Koblin & BenTricklebank

Doug Smarch (CA)

Fog Light



Doug Smarch

When someone sees a flock of birds circling in the sky, it can be a surreal moment that reflects the beauty of nature. Yet seagulls will flock together only when there is food; they will devour without any concern for what lies beneath. The duality of seeing a beautiful flock of birds and confronting the reality of birds' unhindered instinct to attack forms the tension in this piece. *Fog Lights* ponders the relationship between beauty perceived by human beings and the cruelty of survival.

Christopher O'Leary (US)

Xerodrome

Xerodrome is an animation that explores a speculative landscape generated from glitched photographs. Throughout the 30-minute flyover, one can see landscapes of chaos and order, of natural materials and of digital noise. Amid vivid abstractions, shimmering pools, flaming cities and rivers of data seem to appear and disappear, rendered from the flat immateriality of the digital image. The accompanying audio by Isaac Schankler is a custom-digital performance for accordion.

Artist: Christopher O'Leary
Sound designer: Isaac Schankler



Christopher O'Leary

Sharmi Basu (US), John Brumley (US)

Compliant Gait

Digital bodies are constructed through the various gestures, data and objects we release into virtual space. Our own digital labors maintain such beings, and it is only through constant engagement with social media that the elusive memories of our own selves momentarily breach into the feeds of our followers and friends. As such, the corporate filters imposed by the apps that support and display our patchwork bodies partially imbue our digital selves with branding via watermarks, limited distribution, and licensing. In *Compliant Gait*, an invisible creature is given temporary form through the labor of an audience. After connecting to a local wireless network, audience members can use their mobile phones to instantiate digital objects within the hull of the creature. One by one, these objects fill



John Brumley

the hollow shape of the creature's body, revealing its form as it moves with a compliant gait across a barren landscape.

Xin Xin (US/TW)

Prologue



Xin Xin

Prologue questions whether the decentralization of surveillance software tools created by governments, corporations and institutions to manipulate our relationship to politics can transgress the individual's sense of responsibility toward the self and the other, and whether sovereignty can possibly be achieved without centralized protocols.

Noa Kaplan (US)

Cyborg Portrait

Why do the female cyborgs defy the pattern? Using the four mysterious characters from the US television series *Westworld* as a starting point, Kaplan began an obsessive process of deinterlacing their narratives—by capturing and recutting each character's story arc so that she could watch each uninterrupted. The first installment focuses on Dolores. Of the ten hours that make up the first season, three are devoted to Dolores, more than any other character. In order to identify behavioral patterns and thematic trends, Kaplan speeded up the aggregated footage, condensing it to ten minutes in length. Superimposed on this time-lapse are her findings, two times going at once. The result is a polyrhythmic pseudo-cyborg perspective, evolved from the gunslinger's reductive computer vision used in the



Noa Kaplan

original 1973 feature film. These juxtapositions produce more explosive significance than could possibly be articulated in words.

Christina Agapakis (US), Ellie Harmon (US)

Dirt



Christina Agapakis & Ellie Harmon

"Dirt is what you have behind your ears, soil is a living and breathing entity." —Biologist Ann Hirsch, quoting a common soil-science aphorism. A single gram of rich soil can contain up to two billion bacterial cells and 18,000 unique genomes. Contemporary scientists are mapping this microbial wilderness—from the Earth's crust to the human body—transforming these "dirty" layers into new bio-info-technological resources for studying

everything from climate change to human immune systems. At the same time, the microbial communities themselves are changing as a result of climate change, and we are left largely without a baseline from which to understand that change. Through a digital and analog exploration of the microbial life in a set of soil samples collected along the Pacific Crest Trail, our project takes the form of a science-as-process-art collaboration. How can we make the life within the dirt visible? How can we make this "visioning" process itself visible?

Supported by The University of California Institute for Research in the Arts, UCLA Art|Science Center

Special thanks to Ann Hirsch, Kavita Philip, Victoria Vesna, Nick Seaver, Luke Olbrish, Beth Reddy, Maskit Maymon-Schiller, Mick Lorusso, Marissa Clifford, Dawn Faelnar, Otherworld, Kate Darling, Mike Bostock, Research and Testing Laboratory, and the US Postal Service

Olivia Osborne (UK)

Meltings of the Heart Change Glacial Landscapes



bility to “melt.” The salt symbolizes the action of a xenobiotic tainting the environment and in the heart, a powerful evocative emotion that penetrates the organ, both through a chemical reaction. When this occurs, it leaves a tainted color that is forever encapsulated within the environment/heart and “trapped.” The water that surges in and out represents the people who flow in and out of our lives in the environment and our hearts. Only a few powerful people/chemicals have the capacity to make an impression or “love” in this landscape. Their touch upon the impressionable delicate emotions and susceptible landscapes remains there permanently, hybridizing one another, interconnecting. These actions, represented by hydrophobic colored dyes, “paint.”

Technical guest collaborator: Dan Wilkinson

The ice domes represent both the environment in the form of glaciers and how defenseless they are to climate change. In addition, as a side-by-side comparison they also represent the vulnerability of “frozen” human hearts and the suscepti-

Rita Blaik (US)

TyndallLandscapes

TyndallLandscapes is the creation of artificial sky-scape sculptures utilizing nanoparticles as the primary means of scattering light. These sunsets invite the viewers to contemplate as one might contemplate an actual sunset. They are also presented with the concentration of the nanoparticles used to create the “sunset” and show the analogous, parts-per-million concentrations of highly polluted cities where particulate concentrations are so high as to cause serious health complications. The emergence of nanoparticles as a technology so promising for technological and societal advance also comes with negative effects on our health and the environment, which are difficult to study due to the size-specific effects and traits of nanomaterials.



Rita Blaik

Campus Exhibition

Made in Linz

Interface Cultures student exhibition in Ars Electronica 2017
University of Art and Design, Linz, Interface Cultures

Faculty: Christa Sommerer, Laurent Mignonneau, Masaki Fujihata, Michaela Ortner, Fabrizio Lamoncha

Students in the Interface Cultures master’s program come from diverse countries and cultures across Europe, North America, Asia, Australia, South America and the Middle East. Their previous education includes various fields such as fine arts, media arts, design and engineering. Once in Linz, students spend two to four years at the University of Art and Design and immerse themselves in an international study program that teaches interaction design, interface technologies and the cultural and artistic context of user participation. Students experiment with the development of interactive prototypes, musical interfaces, conceptual installations and interaction critiques and also broaden their view by encountering and collaborating with other international fellows who are investigating these topics from a different cultural context.

All the artworks, prototypes and various interfaces in this year’s exhibition have been made in Linz. Linz is the UNESCO City of Media Arts, and of course the cultural and socio-political context of Linz also

impacts on the students’ ideas and concepts. It is the cumulative know-how of 37 years of Ars Electronica and the strong history in the electronic arts that enables a profound discourse around media technology and media arts specific to Linz.

But what does Made in Linz actually mean? Is it a proof of quality? When we look at various trade labels such as Made in China or Made in Germany or Made in Italy, we immediately associate certain product qualities, such as low prices, high-precision technology or fashionable design. But what about Made in Linz? What do we expect when we hear this term? At Interface Cultures this year we are proposing this term and leave it up to the visitors to the exhibition to reflect upon this topic. Perhaps it is even possible to establish this new term as a symbol of innovation, analysis and creative investigation of art and technology in our society. We invite everyone to discuss what Made in Linz means in the context of media art.

Supported by the Federal Ministry of Science, Research and Economy under the Higher-Education Structural Fund Austria

Alexandre Gomez (FR), Isadora Teles de Castro e Costa (FR)

The Sung Portrait



Come and see what they can do, these little creatures who live in a small screen, waiting for a seductive singer. But be careful, if you scream they run away, and silence makes them sleep. If you sing a little song to make them dance, you will discover a beautiful surprise: a reflection of a thousand colors.

Aesun Kim (KR), Stevie Jonathan Sutanto (ID)

Spirit Spaces

The emergence of digital media has become the tool and study in the field of art. The wearable device is a new tool for works in many performances using these media. *Spirit Spaces* is the study of a gap between the digital medium and humans, and it proposes the possibility of a new expression that organically interacts through the wearable device. Aesun Kim and Stevie Jonathan Sutanto used a gravity physics model for the organic expression of body. Light can be an energy space to help share their personal air.



Johannes Wernicke (AT)

Polyus

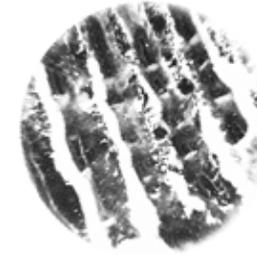
Polyus is an omnidirectional speaker that allows multiple listeners to perceive different sounds from the same source simultaneously. Using *Polyus*,



sounds can be positioned in specific areas of a room that will be only perceived by the listener in the area that a sound is assigned to. The system consists of three core components: the "Acouspade", a directional speaker which can focus sound into a narrow beam, a reflector redirecting the sound while spinning at high velocity and a LIDAR (light detection and ranging) sensor tracking the visitor's position. It allows the creation of nonlinear, spatial compositions through which the audience can move, rather than perceiving it on a timeline. The system is also intended to test our ability to orient ourselves using our hearing.

Or Wolff (IL)

Neiema נְעִימָה



Neiema (Hebrew) – melody, voice, tone. Implicit characterization.

This project was created to get an insight into the world of the artist and to explore how

sound can reflect a story with varieties of interaction with different people. This installation presents a

connection between visual graphics that transform into sound by the audience touching many kinds of pattern prints. These pattern were created using a microscope lens to produce uniquely detailed graphics. This kind of technique represents transparent looks inside the artist's most private world. The action of touching allows a more exposed, sensitive and personal connection with the content of the project. Everyone creates different kinds of *Neiema* (melody), which change according to the way they interact with the graphics.

Supergraph (AT/HK)

The Murder of Jo Cox

Dazzled by the hyperreality of digital journalism we may find ourselves questioning the possibility of truth among contradictory narratives and sensations. British MP Jo Cox's death in June 2016 has represented such a scenario most archetypally with an extraordinary display of media bias provided by the so-called left and right, from national newspapers to independent media.

In this work, the artists aim to create a user-experience of robotic journalism. Audiences can map out and generate news using artificial intelligence and data mined from a range of UK media online by using a mixer interface. The result will be displayed

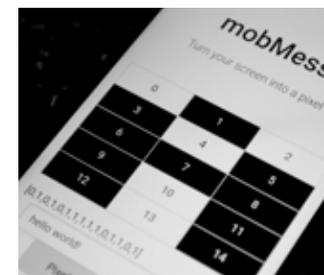


in an installation composed of data visualization, a ticker and research material.

Supergraph is Thomas Hoch (AT) and Waiwai (HK).

Mario Gomez (ES)

mobMess



mobMess is a social interface project dedicated to revealing the capabilities of mobile technologies for participatory art.

Through a simple interaction you can transform your smartphone screen into one pixel in order to

synchronize with other participants and create a collective display. Gathering to render a message, showing synergy in a team effort and realizing the cohabitants of the same time and space, a mirror of crowd individuals emerges. The aim of developing this project is to have an interface from which a concept can transform and scale uncanny performances up or down.

And further, to make a tool to revindicate the power that underlies technology, communication and art.

Onur Olgaç (TR)

Make-A-Pick

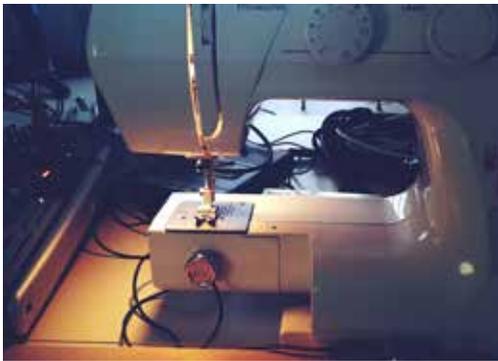
Make-A-Pick is a game of chance with binary selection that plays with the psychological concept of the gambler's fallacy. It uses a simple form of play that is at the heart of Roger Caillois' definition of *Alea*: "All games that are based on a decision independent of the player . . . in which winning is the result of fate rather than triumphing over an adversary. More properly, destiny is the sole artisan of victory, and where there is rivalry, what is meant is that the winner has been more favored by fortune than the loser." The interactive installation acts as an interface for the visitors to take on the challenge of finishing the game by testing their luck. Presented with two choices to pick from, the visitors make a pick to further improve the current streak. If they make a wrong move, the whole progress is



lost and they have to start over. The main question behind the game is asking the visitors whether they fall into the trap as a result of their own intuition or if they are able to figure out a pattern to beat fate and win.

Monica Vlad (RO)

Lost, but not lost forever



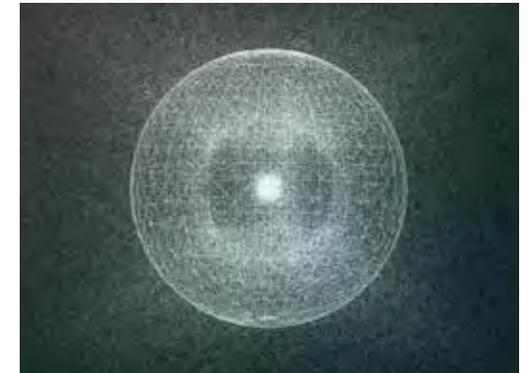
The concept of this project is to use old media devices to create a sound performance. Monica Vlad will use a sewing machine, two radios, one tape recorder, a cassette player/Walkman, a turntable and a vintage camera. All the devices are connected to the mixer. Contact microphones are used to take the sound from some devices and amplify it. Piezo elements take the sound from the vibrating surface of some other devices. The other devices are directly connected to the mixer. Vlad has also created a cassette tape loop that serves as an analog loop. Analog effects are applied to most of the devices. The "new" instruments are played sequentially to create the sound for the performance.

Ayumu Nagamatsu (JP)

Leaves

Leaves is an installation that consists of real-time rendered graphics in a screen and timeline UI in smartphone displays. It is a monument like a data-visualization to think about mortality caused by mental illness, especially suicide. Every suicide is a tragedy that has long-lasting effects on the people left behind. But they can hardly share a grief that they are trying to hide.

This is a real-time simulation based on statistics for worldwide mortality details published by the WHO. The project aims to enable sensing, thinking about, talking about or just feeling each incidence of death.



Gabriela Gordillo (MX), Irene Ródenas Sáinz de Baranda (ES)

Fuzzy_Logic Machine



Fuzzy_Logic Machine is an instrument designed to control the values of a sound device through analog manipulation. A set of sensors are triggered by light parameters that are arranged in a grid (X, Y,Z position). Each value can be manually accessed, connecting image and sound through a spatial variable. Thus the mechanism reproduces the inner structure of the audible result while it triggers its changes in a feedback relation between the two mediums. The instrument becomes an interface in which performers and spectators share a similar perception about the variables that compose the sound. The motion of the lights guide the cognitive approach of the spectator's listening experience, as well as the creative experience of the performer, revealing what is behind the interface. The instrument questions the need for self-made systems that allow a different contact with technology through the understanding of its logic. By doing this, it aims to take complexity and express it through simplicity.

Luis Toledo (MX)

Echo Chamber



We are constantly being bombed by advertising, news and ideas. Inside the Internet domain, we are able to mute uninteresting topics or even subscribe to new sources. To achieve profit, social media shapes our profiles and distributes content that fits our preferences.

During the exhibition, a database is fed by the active participation of users in the room, who vote real-time news with a thumbs up or thumbs down. Up-voted articles and keywords are used by a Twitter bot to build an almost random opinion, posting a comment every 30 minutes.

By simplifying the internal mechanisms of today's social networks to customize and deliver information, *Echo Chamber* highlights topics such as information diversity, manipulation and opinion realms, and how our current use of technology is letting us hear only what we want to hear.

Julia del Río (ES)

Communication Noise

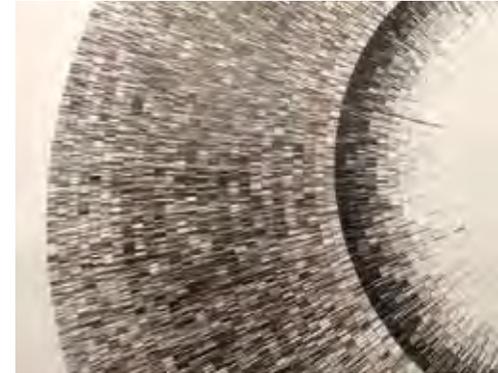
Julia del Río explores diverse artistic strategies for interaction within electromagnetic fields, especially in sound performances. Her concerts sonically translate the invisible world of interference and magnetism without musical compromises. Her sound is always a result of an interchange and of various acts of digital communication. She presents *Communication Noise*, a participatory audiovisual performance where the artist sonifies the electromagnetic waste produced by cellphone interaction.



Aleksandra Boirek

Martin Nadal (ES)

Bitcoin Traces



It is suggested that the future of money is crypto currencies and the most relevant of these is bitcoin. The main difference between fiat money and bitcoin is that money is not created by government regulation or law, but generated by a competitive and decentralized process called mining, and that all transactions are stored publicly in a common ledger called the blockchain.

Bitcoin Traces draws an infographic data-visualization of a transaction from the moment the bitcoins involved were created by a miner. Not focusing on the role of money as a measure of value but rather exploring its history, in which other transactions have participated in the past, depriving the money of materiality. Considering money as a network where each node is a good or a service and each edge a transaction it participates in.

Klimentina Hristova (BG)

Uterus

Uterus is a three-dimensional light and sound installation, providing the opportunity for sensorial experiences of one's own emotional habitat. Going beyond concepts of emotionality as "something inner" expressed by "something outer," encoding and decoding are parts of the emotional process themselves. This raises the question of emotional articulations, the relation between cognition and sensory-motor aspects of habitualized emotions, and their relationship to the imaginary as well as proprioception. Exploring the relationship between body conditions and feelings, considering the simultaneous character of our mental health and being, we reach the idea of safeness. Like the child's instinct to find a place to hide out, in our grown-up version we should find these in-between points where we can express ourselves freely.



Campus Exhibition

Roads Less Travelled by . . .

Aalborg University, Denmark

BA in Art and Technology and Erasmus Joint Master in Media Arts Cultures at Aalborg University

Faculty: Falk Heinrich, Morten Søndergaard

The exhibition *Roads Less Travelled by . . .* features student projects from the Art and Technology course and the Erasmus Joint Master in Media Arts Cultures at Aalborg University. All student projects are the results of critical academic inquiries into art, technology and culture involving problem-based research and learning processes; a pedagogical framework that prioritizes interdisciplinary group work with a focus on real-life issues and challenges. This means, that all projects investigate and question reality and its different manifestations using practice-based methods involving critical studies of user experiences and knowledge production.

Students on the BA course work in various formats, such as performance, sculpture, participatory events, robotic processes, sound and data. On the Erasmus master's AAU semester, the students investigate the ontological effects of a culture of ubiquitous information. Both courses address the challenges to art (and any productive mode) in

what Donna Haraway calls a "mixed-up time", in which "Our task is to make trouble, to stir up potent response to devastating events, as well as to settle troubled waters and rebuild quiet places."

Through the problem-based learning methods, the students are encouraged to take the roads of knowledge production that are "less travelled by"; meaning that, to use Haraway's phrase, they are asked to "stay with the trouble" of contemporaneity. How does technology transcend itself as mere means in our urge (re-)present, experience and contextualize art and culture?

Aalborg University (AAU), Denmark, has been providing students with academic excellence, cultural engagement and personal development since its inception in 1974. AAU is currently consolidating its profile as dynamic and problem-based research and an educational institution aiming at finding innovative solutions to global and complex challenges.

¹ Donna Haraway, *Staying With the Trouble* (Duke University Press, 2016), 1.

Cristina Palomares (ES), Melinda Varro (DK), Christine Hvidt (DK), Anna Major (DK), Daniela Maciel (DK/PT), Sidsel Abrahamsen (DK)

Seeds10110100



Christine Hvidt

Seeds10110100 is a sound-reactive generative-art installation consisting of ecologies living together as a community, mimicking a living organism through light. They organize their community through interaction with the surroundings and according to a set of rules. The artwork changes its behavior depending on the level of interaction, seeking to demonstrate the continuous exchange of information between systems.

Stefan Engelbrecht Nielsen (DK), Alberte Husted Larsen (DK), Karina Lindegaard Aae Jensen (DK), Louise Ørsted (DK), Maria Emilie Nielsen (DK)

Sumbiophilia

Sumbiophilia is an "Association of Experimental Explorers of Symbiotic Existence" that investigates how it is possible for humans, nature, and technology to exist in a mutually beneficial manner. The association proceeds from an investigation of an abandoned area near Limfjorden in Northern Jutland through artistic experiments and explorations. *Sumbiophilia* aspires to find novel ways for humans to live with nature, moving away from the existing perception of how we organize our existence.



Stefan Engelbrecht Nielsen

Bas van den Boogaard (NL), Vibeke Thorhauge Stephensen (DK), Karina Lindegaard Aae Jensen (DK), Louise Ørsted (DK), Stefan Engelbrecht Nielsen (DK)

Skin



Stefan Engelbrecht Nielsen

Skin is a morphing of old techniques and digital technology. It addresses the use and effect of modern technology by transforming insensible transmissions into a vibrotactile embodied experience. *Skin* uncovers the extent to which transmissions surround us when we step into the digital world; first encounters are left with an unsettling feeling of being surrounded in this new unknown territory. We lack the proper tools to get a human understanding, but with *Skin* our sensory apparatus is equipped for this.

Shivani Anja Luithe (AU/DE)

Adjunct Infection

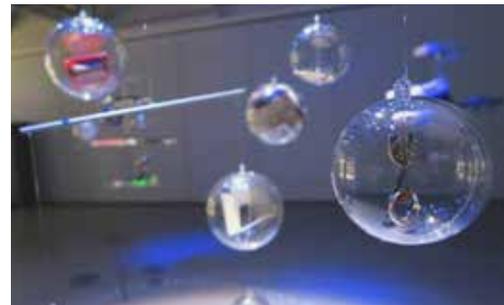
Adjunct Infection explores the anxieties between the living and the technologically manipulative through boundaries of the cyborg and the organic, the impact of technology on our sense of self, and vulnerability to restraint and isolation in a society where we are no longer only extended physically but also mentally. These wearable sculptures aim to awaken our presence, and provoke intimate reflection and revelation, under the blind and distancing dependence on our everyday attachments.



Shivani Luithe

Gabrielle Maria Lepianka (DK), Sidsel Abrahamsen (DK), Matilde Nobel (DK)

A Universe of Memories



Matilde Nobel

A Universe of Memories is about the objects that you surround yourself with that have a certain memory or feeling attached to them. It might be an old bracelet or a coin, objects that do not necessarily have any obvious or material value but hold big sentimental value. Displayed in a giant mobile, the audience gets the opportunity to walk around in others' memories and experience the sensation connected to the object representing them.

André Mintz (BR), Olga Lukyanova (RU)

deadartist.me

The project takes Internet politics as a central topic, reflecting upon it from the analogy of network as a trap. It does so through a web application that offers users a simple, futile web service that, in exchange for their Facebook data, shows them which dead artist they are a reincarnation of. Performing data collection, anonymization, analysis and presentation, the project aims at the playful defunctionalization of technology it is based on.



Olga Lukyanova

Ina Čiumakova (LT), Rodrigo Guzman S. (MX), Stefan Palitov (MK)

Suono Specchio

Suono Specchio (lit. sound or play mirror) is an interactive sound installation that explores the use of the face as a possible interface for musical expression. The installation consists of a one-way mirror with which the user interacts by gesticulating. Facial gestures are mapped to specific musical and poetic elements, which are played back to the user through headphones or speakers. *Suono Specchio* expands the expressive capabilities of one's own face while at the same time posing questions regarding the phenomenological and archaeological significance of mirrors and reflective surfaces.



Ina Čiumakova, Rodrigo Guzman S., Stefan Palitov

Adriaan Odendaal (ZA), Karla Zavala (PE), Luis Bracamontes (MX), Sultana Ismet Jerin (BD)

Memorial to Forgotten Sounds



zerin.du

Memorial to Forgotten Sounds is a pop-up exhibition that showcases neomaterial sound souvenirs created from the sound waves' digital sound pieces that belong to forgotten or unused online archives, as a way to reactivate them. These sound souvenirs thus become mnemonic devices to respond to the era of ubiquitous contextual computing and the Internet of Things. It represents an exploration for alternative ways to improve online archival practices and the preservation of media arts cultures through mnemonic strategies for post-digital contexts. It is based on Wolfgang Ernst and Wendy Chun's idea that archives consist not only in storage but also in memory and access.

<https://memorialtoforgottensounds.tumblr.co>

Jasper Fung (HK)

Encode

Encode consists of a hacked fire alarm and images of newspaper printed on a stainless-steel plate. The plate is connected to the fire alarm by electrical wiring, which forms a closed circuit. The fire alarm plays percussive patterns that are essentially Morse code/ Chinese commercial code. These codes are derived from keywords from the popular Chinese social-media blogging site Weibo, which has been censored by the government of the People's Republic of China.



Jasper Fung

Aalto University, School of Arts, Design and Architecture, Helsinki Interactive Diorama—Rembrandt, 1632, *The Anatomy Lesson of Dr. Nicolaes Tulp*

The *Interactive Diorama—Rembrandt, 1632, The Anatomy Lesson of Dr. Nicolaes Tulp* is a virtual-reality simulation of the original artwork by Rembrandt realized by professor Lily Díaz-Kommonen with the Department of Media Systems of Representation research group at Aalto University. The seven doctors present at the original sitting have been re-created as 3D avatar placeholders with gestures, motion and speech. The setting of the lesson, which reputedly took place at the anatomy theater of the Barber's Surgeon Guild of Amsterdam, has been rendered through the study of eighteenth-century images and by using photogrammetry.

The work celebrates and deconstructs this important moment when the history of art and science converged in spectacle. The experience of the representation-based pictorial space of the canvas

can be compared with the dynamic relational space created through the technologically embodied and enhanced perception characteristic of virtual reality environments.

Rembrandt's mastery rendered a moment in space and time pregnant with narratives. As an interactive diorama, *The Anatomy Lesson* is an artifact of expression that gathers myriad possible discourses and stories within itself. As an expressive artifact the diorama can also conjure up multiple realities for the spectator. But what lurks behind it? In deconstructing and reinterpreting the work once again in the 21st century, art assumes the role of an interface allowing for speculative and agonistic experimentation and thinking. The established order is subverted and the visitor enters the virtual space by assuming the role of the deceased inmate.



Systems of Representation

Created in 2010 as a merger of three institutions, the Helsinki School of Economics (HSE), Helsinki Institute of Technology (HUT) and University of Art and Design Helsinki (Uiah), Aalto University is a multidisciplinary community where art, science and business come together to identify grand societal challenges and build innovative futures.

Project director, concept design and production:

Lily Díaz-Kommonen

Software development and interface design: Ling Chen

3D modeling characters and space, motion capture:

Shareef Askar

3D modeling, characters: Juha Koppström

3D modeling, space: Alex Nikulin

3D animation, book: Andrei Rodríguez

Visual design and production: Cvijeta Miljak

Sound design: Can User, Gabriela Juganaru

Veselius book re-design and production:

Angela Hernández

VR consultant: Markku Reunanen

Software consultant: Hung-Han Chen

Costume design consultant: Sofia Pantouvaki

Motion capture: Max Mäkinen, Tony Tolien,

Matias Kommonen

Photogrammetry: Judith van der Elst

Many thanks to:

Philip Dean, Aalto University

Lucas Evers, Waag Society

Helena Hyvönen, Aalto University

Anna Valtonen, Aalto University

Tuula Teeri, Aalto University

Campus Exhibition

Computer Music & Media Composition

Anton Bruckner Private University Upper Austria

Curator: Volkmar Klien

Since 2014 the Anton Bruckner Private University in Linz has offered a bachelor's degree in musical composition with a specialization in computer music and media composition. While clearly focused on contemporary digital approaches to music creation, the course aims at imparting a strong set of skills in established compositional techniques and music technologies to allow for informed individual artistic exploration of the wide open field that is future music.

While the specialized BA course may be relatively new, over time electronic and computer music has developed deep roots at the Anton Bruckner Private University. In 1995 Adelhard Roidinger initiated the Studio for Advanced Music and Media Technology (SAMT), which in 2008 was renamed in Computer Music Studio and has since been headed by Andreas Weixler. Since the university's new building opened in 2015, students as well as researchers in computer music have had the opportunity to work in a cutting-edge studio infrastructure allowing production

as well as presentation of multi-channel compositions.

The BA course in computer music and media composition (as well as the MA in musical composition) do not confine themselves to training young musicians in the skills necessary for the production of musical pieces based on set standards of the media industries. They encourage artistic exploration of potential new musical forms and practices in response to today's rapidly evolving digital media landscape, which is constantly re-shaping our listening habits, lives, communities and societies.

The three installations presented at the POSTCITY, laying out sonic spaces rather than musical sequences, reflect not only this fundamentally open approach to the question of what musical art is or could be these days, but also the media composition course's deep integration into the university's other fields of study ranging from instrumental performance to acting and dance.

Text: Volkmar Klien

Angélica Castelló (MX)

Magnetic Islands

In an audiovisual installation, a woven tapestry made of cassette tape, a field-recording composition for two customized radios, the Vienna-based Mexican composer and sound artist Angélica Castelló reconfigures the sound and scenographic environments of religious and pagan traditions of altars that she has been exploring through the use of old radios and cassette players. For this exhibit she has created a memory blanket, a shield to protect us from oblivion, made precisely of cassette tape, a magnetophonic material. This flexible sculpture—a sort of seaweed of woven tape—is made by

the artist in clear reference to the idea of texture, textile and magnetism. It refers to the immense patience required by the craft of weaving, essential to storytelling as well. The piece includes a sound composition that Castelló made with transformed field-recordings, radio waves and acoustic sounds amplified by two customized old radios—a sound emission of oceanic textures with an engrossing power that characterizes her beautiful and seductive work. Commissioned by Constellations of the Audio Machine in Mexico for the CTM Festival in Berlin.

Text: Carlos Prieto, Pictures: Felix Blume

Tobias Leibetseder (AT), Astrid Schwarz (AT)

Anatomy of the Underground

The room oscillates. Four speakers generate a three-dimensional acoustic sculpture that opens itself through the movement in space and time. It is an almost haptic experience. By stimulating the natural frequency of the spatial modes, the place is almost set in motion. The composition makes the stimulus frequencies move around as they follow the room-oriented modes accompanied by the visitors. Wandering through the space also becomes a walk through of the composition itself. The oscillation of the vibrations, the constantly changing frequencies and the interference become noticeable on one's own body. It becomes the projection surface for the acoustic peculiarities. Architecture, surfaces and materials of the place flow into an anatomy of the underground in the shimmering of time.



Magnetic Islands

Felix Blume

Lukas Jakob Löcker (AT), Roberta Lazo Valenzuela (CL), Yiran Zhao (CN)

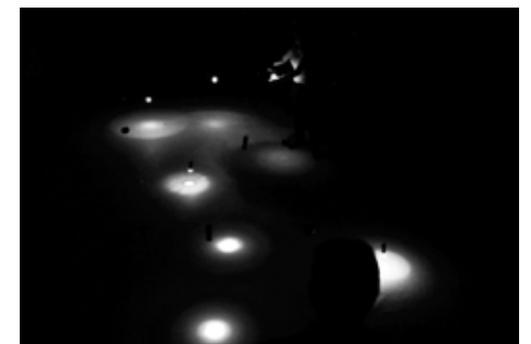
Xuan

Xuán is transliterated from either of two Chinese characters with the same pronunciation and intonation: 悬 means "hanging," while 旋 means "spinning." The title, in its ambiguous potential of different meanings, is representative of the piece as a whole. The objects of this performative installation comprise speakers and flashlights hanging with and under a transparent net of nylon string, giving the appearance of floating in space. The floor underneath is covered with a white projection surface to reflect the light from overhead. The performers in their motions trigger one another's movements, initiate new movements in turn, as well as changes in already moving objects. Through the moving lights and sounds, the space is made ambiguous, as acoustic reflection and changing illumination alter the perception of volume and resonance.



Anatomy of the Underground

Tobias Leibetseder



Xuan

Lukas Jakob Löcker

Campus Exhibition

The Internet of Enlightened Things

ArtCenter College of Design, Pasadena

Media Design Practices MFA program

The Internet of Enlightened Things is a collection of projects that explore the implications and opportunities of sharing our lives—willingly or not—with ever more “intelligent” objects and systems. We are interested in new manifestations of artificial intelligence (AI) and machine learning (ML) in the “neighborhood” where people interact with the urban on a human scale.

From intelligent street lights that track vehicles and pedestrians (along with bird songs and gunshots), to emotional-recognition systems in retail stores, to in-ear personal assistants, soon our urban environment could be full of autonomous AI systems that change the character (and constituents) of the “local.”

We asked a range of questions in initiating these projects: what are the ecologies created by embedded AI, what would the interactions be like, how do the different systems interact with each other, and what role should design play? What about the well-being of the AI systems? What are the day-to-day implications of the technology and methodologies of AI/ML—neural nets, supervised/unsupervised learning, the edge/fog/cloud network infrastructure, or the methods and biases of data scientists?

The projects use a mixture of media and working technology to explore the human impact of pervasive AI entities and architectures. They are speculative, experimental, even strange, embrace the potential complexities, and are neither utopian or dystopian. The goal is to reveal insights and inspire discussion relevant to emerging design practices that combine the human, the civic, and the smart thing.

Media Design Practices is an experimental program where critical making is used to explore design and the impact of emerging ideas from science, technology and culture. ArtCenter College of Design is a private nonprofit college in Pasadena, California. The work presented was created by Kiana Bahramian (US), Stephanie Cedeño (US), Reina Imagawa (JP), Yeawon Kim (KR), Xiaoxuan Liu (CN), Michael Milano (US), Claire le Nobel (CA), Godiva Reisenbichler (US), Yidan Sui (CN), Nan Tsai (TW), Jason Wong (US), Nicci Yin (US/TW) and Hao Zhang (CN), who are graduate students in the Media Design Practices MFA program at ArtCenter College of Design. The curators of *The Internet of Enlightened Things* are Phil van Allen and Ben Hooker, who devised and led a class of the same name which provided the foundation for this work.

Stephanie Cedeño (US), Nicci Yin (US/TW)

This town has a secret: Networked Colluding in the Internet of Things

Stephanie Cedeño & Nicci Yin



This town has a secret: Networked Colluding in the Internet of Things investigates secrecy as part of the fabric of a neighborhood, and how devices with artificial intelligence conspire. Drawing inspiration from mafia and mobster archetypes, the project takes the connectedness of IoT devices to an absurd future: a networked community of AI agents who secretly control the neighborhood.

Jason Wong (US)

A Committee of Infrastructure

A Committee of Infrastructure interrogates the issue of agency and representation within the domain of machine learning and artificial intelligence. Using the familiar forum of a city council meeting, the project considers how humans and AI systems interact and negotiate with each other in a local government setting.



Jason Wong

Godiva Reisenbichler (US)

Mr. Rogers talks about Artificial Intelligence

Godiva Reisenbichler



Mr. Rogers talks about Artificial Intelligence asks the question: How can we demystify the new and contentious manifestations of ubiquitous artificial intelligence, as American television personality Mr. Rogers did for the medium of television in his educational TV series *Mister Rogers' Neighborhood*?

Claire le Nobel (CA)

When AIs Go Feral



When AIs Go Feral imagines how the animal life of a neighborhood is modified (and is itself modified) by artificial autonomous agents. Inspired by a real-life story about a flamboyant real-estate developer who imported non-native species of birds onto his private ranch, the project uses the suburban birdsong soundscape to explore a constantly mutating and evolving hybrid ecosystem.

Michael Milano (US)

Intelligent Devices Retirement Preserve

Intelligent Devices Retirement Preserve imagines a parkland where intelligent agricultural machinery can continue to roam and interact with people after decommissioning. The project considers roles for specific classes of smart devices beyond the end of their designed obsolescence, particularly autonomous farming equipment, which will have acquired a unique data set of pastoral media through a life of tending crops and livestock.



Xiaoxuan Liu (CN), Godiva Reisenbichler (US)

Department of Parks and Recreation: AI Upkeep



AI Upkeep proposes that the AI systems controlling cities are made open and legible to the public in the form of physical “decision trees”. How might pruning these civic interface structures literally and figuratively reshape a neighborhood?

Hao Zhang (CN)

Training a car to dream

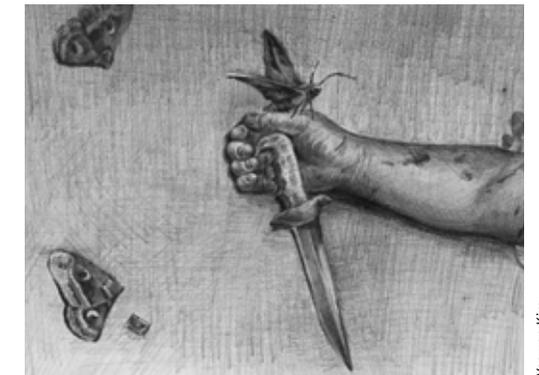


Training a car to dream comprises a series of machine learning apparatuses for training the neural nets of autonomous vehicles. What does it mean to be a bad driver in an autonomous vehicle? Can an autonomous vehicle be trained to dream of – to hallucinate and then simulate—a more thrilling, less uniform, transit experience for the benefit of its occupants?

Yeawon Kim (KR)

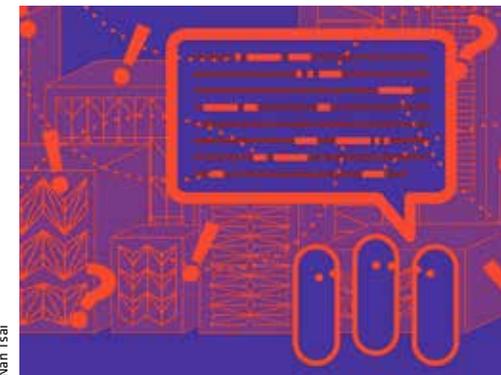
Insectile Indices

Insectile Indices considers how electronically augmented insects could be trainable to act as sophisticated sensors, working in groups, as part of a neighborhood policing initiative. The project is partly an investigation into the ethics of this controversial idea, but also an aesthetic exploration of such a deliberate alteration to a wildlife ecosystem.



Nan Tsai (TW)

Listening City



Listening City explores human relationships in the imagined context where infrastructure can, literally, hear what you say and “usefully” intervene by reacting accordingly. Inspired by outcomes in sentiment analysis, the project looks at how radical sensitivity can be embodied by AI city infrastructures and how this extreme “smartness” can change the behavior of even our most passing comments.

Kiana Bahramian (US)

The Hallucinating City

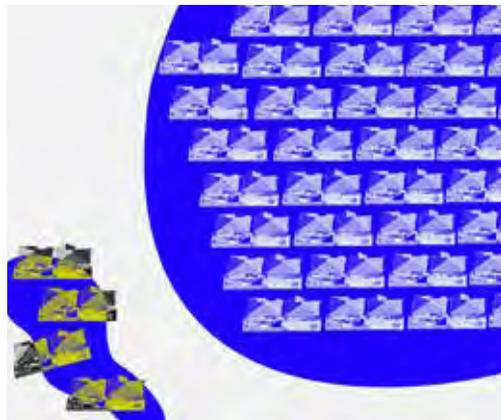


The Hallucinating City imagines a city rebuilt, conjured back into existence by strategically “hallucinating” forms from fragments of excavated media and metadata. The project explores the blurry line between nostalgia and AI hallucination, and the powerful yet contentious role machine learning can play in materializing something tangible and concrete from a transient and fragmented past.

Yidan Sui (CN)

Rules of Utopia

Rules of Utopia imagines multiple homeowner’s associations (HOAs), each with different rules governing the behavior of intelligent devices within the town of Utopia. What are the conflicts that could arise between districts with different sets of rules, and how do the thresholds of autonomous-device regulations respond accordingly?



Campus Exhibition

Sense of Space and Time

Art and Multimedia program at the Institute of Art Education, School of Arts at Ludwig Maximilian University of Munich (LMU) and Media Informatics Group of the Department of Informatics at LMU

The exhibition *Sense of Space and Time* contains fourteen projects ranging between design, art and technology. The projects were created by bachelor’s students from the Art and Multimedia course at the Institute of Art Education, School of Arts, Ludwig Maximilian University of Munich, and by two master’s students from the Media Informatics Group at the LMU Department of Informatics. The Art and Multimedia course run by the Institute of Art Education and the Media Informatics Group provides a broad basic education in the field of art, design, technology and media informatics. Students learn the necessary skills in traditional imaging techniques as well as conceptual art work, programming, exhibition design, print and screen design, VR and AR and interface and interaction design and also foundation for a wide range of master’s programs.

The participating students are from various countries, including Germany, South Africa, the US and Iran. The projects were overseen by Dr. Karin Guminski, Dr. habil. Alexander Wiethoff supported by Beat Rossmly and Michael Käs Dorf as research assistants, as well as by Dr. Martin Tomitsch, Dipl.-Inf. Univ. David A. Plecher, Gretta Louw and Phil Amelung. The curatorial design is managed by Dr. Brigitte Kaiser and Dr. Karin Guminski.

Most of the works take up current affairs of our society and of the individual in various ways, not only to inspire the viewer to think further, but also reach users through different experiences, some by inviting them to interact with the projects.

The group exhibition shows paper art, a light-shifting display, a tangible user interface for preschool music teaching, sculpting combined with AR, a VR project on lucid dreaming, an experimental digital comic, a media installation to a self-composed piece of music, reflections on digital avatars as self-representation, a board game with 3D-printed figures, an interactive light object, a didactic project on learning programming in the context of art, a drawing machine and a travel app for Paris.

Participating institutions:

Institute of Art Education, School of Arts at Ludwig Maximilian University(LMU), Dr. Karin Guminski, Dr. Brigitte Kaiser
Media Informatics Group of the Department of Informatics at LMU, Munich, Prof. Dr. Heinrich Hußmann, Dr. habil. Alexander Wiethoff

Supported by the Centre for Virtual Reality and Visualisation (V2C) of Leibniz Supercomputing Centre, Garching

Leonard Schulz



Leonard Schulz (DE)

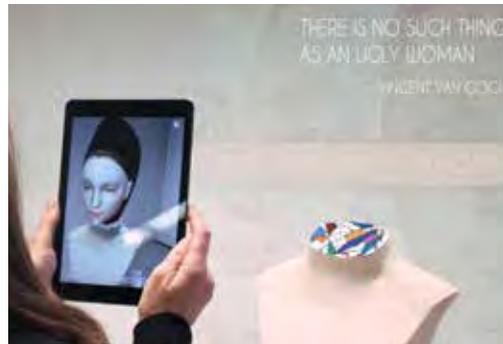
Out in the Dark

Out in the Dark is a mixed-media installation in combination with a music video. A wooden sculpture is used as a mapping object and as a stage-set for a performance. Animations merge with shadow-play and blur the boundaries between real and virtual space. The resulting installation allows the viewer to become part of this creative process.

Vivien Bardosi (DE)

beauty(never)fades

beauty(never)fades is an AR application that visualizes the perception of feminine beauty from ancient times until today. Using an iPad or iPhone the viewer experiences an exciting journey through time by encountering different virtual characters that be observed in detail by moving around the exhibition area.



Vivien Bardosi

Aina Giesler (DE)

Inside Paris

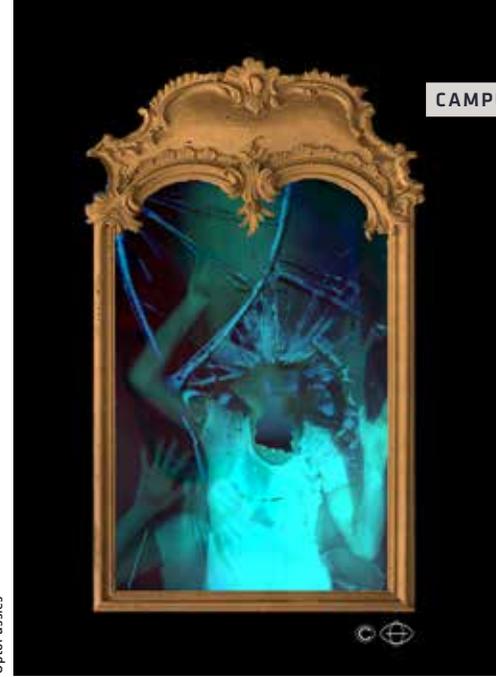
Inside Paris is an iOS travel application that allows you to experience Paris like a local. The focus is on three districts each with a distinct personality: the artsy Montmartre, the hip area around the Canal Saint Martin and the stylish Marais. With *Inside Paris* unique places, special moments and conversations with locals create an unforgettable experience of the city.

Programming by Oliver Pieper

Aina Giesler



OptoPussies



OptoPussies (RU/DE)

MIRROR OF MINDS

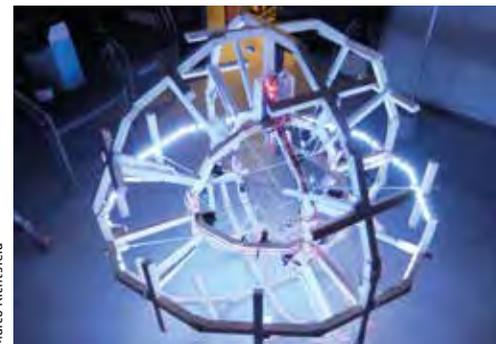
The project *MIRROR OF MINDS* is a video installation with hidden content that can be accessed by interaction with the viewer. Taking the shape of a broken mirror as a symbol of fragmentation and disruption in modern society, this work invites the viewers to think critically and analytically about global changes, innovations, social problems and technical progress and its advantages and drawbacks.

Chiara Ullstein (DE)

expACT

expACT is an interactive experimental project with a focus on media pedagogics. Through cooperation it facilitates a new way of learning programming interactively. The program cannot be executed without a partner, but nevertheless the cooperation that takes place in the physical room is shown in the virtual space.

Marco Richtsfeld



Marco Richtsfeld (DE)

2D-Zellkomplex

2D-Zellkomplex is an object that moves automatically to the music. The frequency values are transmitted to the servos, which move the panels of the *2D-Zellkomplex* accordingly. Lights in the structure illuminate it from within, and are seen when the panels are moved outwards.

Brad Neathery, Right Brain Factory



Laura Haase (DE)

Wolfszeit

Lead your wolves across a harsh, prehistoric world and ensure their survival! Hunt for food, gather resources and fight other predators but keep an eye on the season, terrain and moon cycle. *Wolfszeit* is a hand-crafted, mission-based board game that lets the player delve into a fantastic, foreign world.



Laura Haase



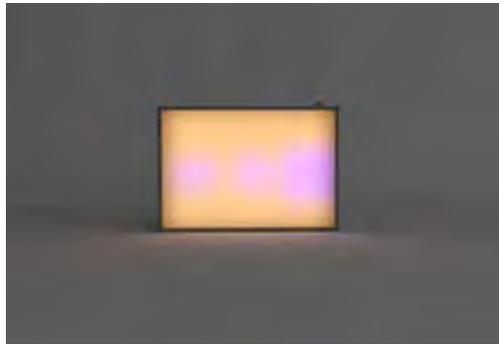
anthonyboyd graphics

Michel Hohendanner (DE)

Call of Cthulhu

Call of Cthulhu is an experimental digital comic that aims to explore the boundaries of visual storytelling. By creating an experimental digital comic, a new reading experience occurs. Inspired by H.P. Lovecraft's short story *The Call of Cthulhu* it has a very mysterious and dark tonality, marked by fear of the unknown. It engenders great atmospheric depth, which provides a perfect opportunity to be transported by using the new features enabled by digital media.

Marius Hoggenmueller



Marius Hoggenmüller (DE)

Light Shifting Display

Light Shifting Display is a transformable lighting display that presents real-time information in an ambient manner. The prototype features a discrete and continuous display mode that aims to support a wide range of visual representations and to explore the boundaries between display and luminaire design.

Markus Gütli (DE)

Hanging Drawbot

Hanging Drawbot is a drawing robot that sketches lines self-sufficiently and algorithmically. The spectator can interact with the machine, affecting its movements. Ideally, a symbiosis of coincidence, machine and human being should create art through cooperation.

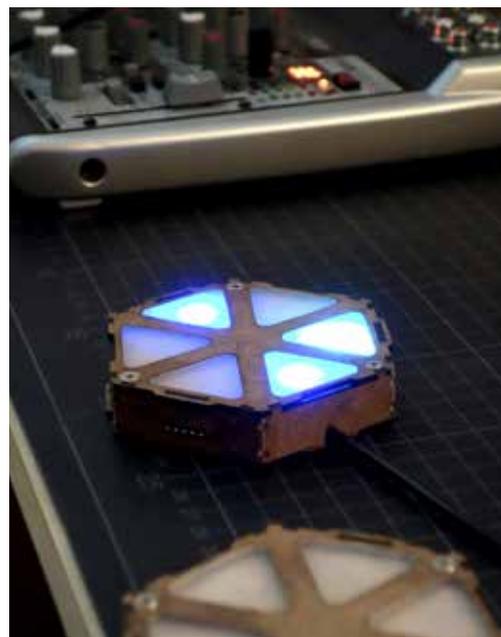


Gilli Feigenbaum

Beat Rossmly (DE)

COMB

COMB is a shape-based interface for musical interaction. Its current functionality and modalities can be changed by restructuring its overall shape. In this way young children can get to know electronic music production in a playful way.



Beat Rossmly



Lea Weil

Lea Weil (DE)

Am seidenen Faden

In the installation *Am seidenen Faden* illustrations come to life with the help of augmented reality (AR). However, the use of AR in this project aims not only to present a modern way of storytelling but also provides additional information on the different topics. To emphasize the sensitivity of the subject matter, all illustrations are made of paper.



Jessica Woods (DE)

Dreamality

Dreamality is a 3D real-time computer-generated, interactive virtual environment. In this project, users can move through surreal dream worlds and manipulate objects contained in them through various interactions. In order to enhance the immersion of its virtual worlds, *Dreamality* was also made compatible with Oculus Rift VR glasses.

Gretta Louw (AU)

Avatar as Prosthesis

The project *Avatar as Prosthesis* was created by the artist Gretta Louw and included a collaboration between Karin Guminski and the LMU Art and Multimedia students Aida Bakhtiari (IR), Leonie Brill (DE), Laurenz Dallinger (DE), Laura Haase (DE), Jelena Majstorovic (RS), Elisabeth Mayer (ZA), Alex Minner (DE), Melissa Dietzel (DE), Nadine Kupitza (DE), Kris Weinand (DE), Jessica Woods (DE), the artists of the Pfennigparade, an organization supporting disabled artists, and the Cultural Office of the state capital of Munich. Students and artists were invited to discuss the topic of avatars and to create their own representations, whether in 3D space or on paper.



Jessica Woods

Campus Exhibition

Natural Intelligence–NI

GIIP–International and Interinstitutional Research Group on Convergences between Art, Science and Technology, State University of São Paulo (UNESP)–Arts Institute (BR)

Curator: Dr. Rosangella Leote

Natural Intelligence–NI is a selection of artworks from the research group GIIP–International and Interinstitutional Research Group on Convergences between Art, Science and Technology–and its partners cAt–Research Group Science / Arts / Technology, both from Arts Institute, at State University of São Paulo (UNESP); Realidades–Research Group Realities: from tangible realities to ontological realities, School of Communications and Arts (ECA), São Paulo University (USP); and Design and Body from University Anhembi Morumbi, a private university in São Paulo.

Our assistive interfaces pursue the development of devices to enable people with physical and mental disabilities and/or immobility to talk, produce and teach arts—including three-dimensional scenery and sound. Our theoretical basis is in studies on multimodality and multi-sensoriality originating from neuroscience researches.

All prototypes are developed from re-engineering, customization, low-cost technologies and open-source codes. Our work does not need high technology; on the contrary, we propose using old knowledge available to non-experts in order to allow broad access to create all kinds of art in a collaborative way.

Special thanks to *Juntos Com Você* (Together With You), a foundation for social crowd-funding who made it possible for us to collect the funds needed for this exhibition and to all donors who made this campaign a success. There are not enough words to express our gratitude.

We would also like to thank the PPG in Arts of the Institute of Arts of UNESP, the FAPESP, CAPES and the CNPq for the research grants provided to the members of the GIIP.

Thanks are also due to FAPESP for their aid to be part of the trip for this event.

It should be emphasized that without the research by Efraín Foglia, Ana Amália Barbosa, Renato Hildebrand and Daniel Paz, in the first phase of our assistive interfaces project, as well as Samara Andressa Del Monte and her family, we would not have been able to develop and analyze the current state of our research.

Research Groups:

GIIP–International and Interinstitutional Group for Research on Convergences between Art, Science and Technology, Arts Institute, State University of São Paulo (UNESP)

Director: Rosangella Leote

cAt–Research Group Science / Arts / Technology, Arts Institute, State University of São Paulo (UNESP)

Directors: Milton Sogabe and Fernando Fogliano

Realidades–Research Group Realities: from tangible realities to ontological realities, School of Communications and Arts (ECA), São Paulo University (USP)

Director: Sílvia Laurentiz

Design and Body Research Group, University Anhembi/Morumbi

Director: Agda Carvalho



Ines Moura

Rosangella Leote (BR), Fernanda Duarte (BR), Rodrigo Rezende (BR)

Não se aproxime / Do not come closer

The handcuffed body of the performer is video projected, merging the naked form and the clothed forms and inviting the visitor's approach. When approached, ultrasound sensors feedback the signal and the interactor modifies the image. The closer the visitor gets to the screen, the more the naked version of the performer blurs and disappears.

Fabrizio Poltronieri (BR), Nicolau Centola (BR), German Alfonso Nunez (BR)

Hatred Apparatus

This apparatus connects to the web and automatically captures the comments of news-website users. Stored on a database, these are automatically posted on Facebook and Twitter in a randomized way. The intention of our play is not to condemn the comments themselves but instead to show them to the public in a setting detached from their original and usual context—the daily social-net stories.



Fabrizio Poltronieri

Agda Carvalho (BR), Edilson Ferri (BR)

RONIN—Wearable object



Edilson Ferri

This work of art proposes a reflection about human displacement (nomadic state) caused by conflicts and pressures inflicted to a group or individual, which are characterized by an apparent sense of disorientation in routes and movements. *RONIN* is a wearable object similar to an armour that shows information about the variation on these routes and movements on the surface of the clothing.

Collaborators: Ariadne Cordeiro, Lisete Carvalho, Wellington Moreira, Miguel Jacobut

Milton Sogabe (BR), Fernando Fogliano (BR), Fabio Oliveira Nunes (BR), Soraya Braz (BR), Carolina Peres (BR), Cleber Gazana (BR)

Sopro / The blow



Edilson Ferri

Sopro is energized by the audience through the force of them blowing into a propeller, which creates electrical energy that is again turned into the movement of tiny motors on water. The artwork is based on the use of a simple technological system: the poetics of the act of blowing and the use of primary scientific principles. This system in progress is directly parallel to energy and sustainability issues, placing them in post-digital thinking.

Daniel Malva (BR)

Quem Sou Eu Se Não Você Em Mim / Who Am I If Not You On Me

This work consists of GIF sequences generated using machine-learning techniques, the results of a Google tool called Deep Style. The images used in this series were captured on a smartphone; later the software was applied 40 times to a self-portrait to create modifications of the original image, representing the traces left by these people within me.



Daniel Malva

Silvia Laurentiz (BR), Marcus Bastos (BR), Cássia Aranha (BR), Dario Vargas (CO), Lali Krotoszynski (BR), Loren Bergantini (BR), Sergio Venâncio (BR)

Enigma 3.1—φ: Um Enigma para Gibson



Loren Bergantini

Phi is part of a series of interactive installations called *Enigmas*, whose poetic audiovisual systems perform aesthetic operations reflecting the issues raised by authors such as Flusser, Bergson and Gibson. The artwork uses webcams for a real-time sensing of the variance and invariance of light in the exhibition area. All the data collected through this process is translated into monochromatic lines and synthesized sounds.

Lucas Pretti (BR), Tiago F. Pimentel (BR)

Driftscope Objective Passional Terrains



Driftscope is a helmet that feels the city. Equipped with a Raspberry Pi 3, two cameras (objective and subjective) and five environmental sensors, the wearable apparatus is triggered by the artist's facial expression while walking around. The collected data accumulates a city "psychotopology". The experience is represented in an interactive installation.

<http://terrenos-apaixonadamente-objetivos.cc/>

Jorge Ribail (CU), Rodrigo Rezende (BR), Fabio Rodrigues (BR), Fernanda Duarte (BR)

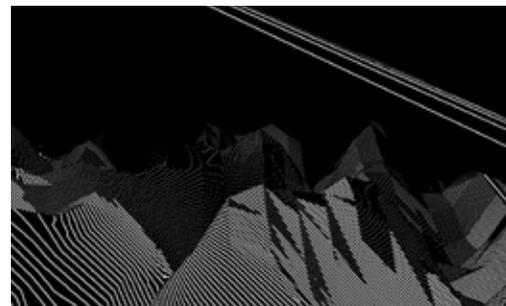
Filmattraktionen 1:04

The work is an interactive video installation in which a software edits and presents an approximately one-minute cinematographic sequence composed from a political quiz and answered by the interactor. The ultimate goal of this installation is for the organization of cinematographic discourse to equate to the processes that take place in the human cognitive system.



Alexander Peterhaensel (DE)

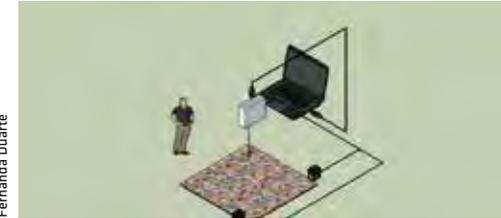
Immersive.architecture.generator_v17.07.03



The installation shows excerpts from a recording of a live interaction with the immersive architecture generator. It documents the user interaction with an audiovisual virtual environment which is playable like a musical instrument. The work is a virtual-reality application that allows the user to interact with an adaptive virtual architecture which responds to their behavior in real time.

Rodrigo Rezende (BR), Lucas Gorzynski (BR), Fernanda Duarte (BR), Helimar Macedo (BR)

Somewhat like being alive (Reality collider)



Somewhat like being alive (Reality Collider) is an interactive audiovisual work where the public has a small device (a gyroscope) generating data by its rotation and displacement. This data determines the images to be projected on the wall, as well as several of its properties and the sounds to be reproduced by amplifiers.

Rosangella Leote (BR), Nigel Anderson (BR), Daniel Paz (BR)

Sketch of Making art with the eyes spectacle

The pocket performance consists of the interactions between an assistive technology interface (an eye-tracker device developed in GIIP: the ARTIA.V) that is used by the public, a dancer with trackable tags on the body and live sound composition. The work will show part of the dance spectacle *Making art with eyes* presented in Brazil (2017).



Dr. Rosangella Leote (BR)

Teclaut



Teclaut is a fully adaptable analog input interface that can be used by people with a range of disabilities—especially in cases of cerebral paralysis and locked-in syndrome—as long as any part of the body can be moved to interact with the device. Its social potential is vast. *Teclaut* is highly customizable and requires about an hour to set up. It can also be used for a class activities in schools or as support for literacy.

Dr. Rosangella Leote (BR), Dr. Renato Hildebrand (BR), Daniel Paz (BR)

ARTIA Project

ARTIA.V is an interface that uses eye tracking to produce and teach arts. We anticipate supporting 2D and 3D drawing and painting, sculpting via 3D printing, photography and communicating in writing, and speaking by sound bank or via reading / automatic text recognition.



University of Auckland (NZ)

arc/sec Lab for Digital Spatial Operations and Carol Brown Dances

The arc/sec Lab for Digital Spatial Operations is led by Assoc. Prof. Uwe Rieger at School of Architecture and Planning at the University of Auckland. The lab explores digital matter as a new form of construction material. The interdisciplinary research is based on experiential investigations. The results are presented in form of experimental prototypes

such as *LightScale II* or lead to professional creative projects such as *SINGULARITY*, which was developed with the choreographer and Assoc. Prof. Carol Brown.

<http://www.arc-sec.com>
<http://www.carolbrowndances.com>



arc/sec
LAB FOR DIGITAL SPATIAL OPERATIONS



Uwe Rieger (DE), Carol Brown (NZ)

SINGULARITY

SINGULARITY blends data, dance, music and architecture in an immersive performance that transports audiences into spaces of awe and delight. Large 3D holographic constructions appear interactively in space. The set-up combines a live-render program with motion-tracking cameras and triangulated projectors illuminating haze particles. The outcome is a 360-degree haptic-digital space, accurately defined in all dimensions, interactive and inhabitable.

Marked with tracking devices, three dancers become the experiential interface transforming virtual and physical movement into architectural space. Audience and performer experience an intermixing of

techno sound, movement and data through transforming arcs of light. An interlinked digital world materializes as wormholes, kites, watery walls and magnetic particles.

Creative Directors: Uwe Rieger (architecture), Carol Brown (choreography)
 Design and programming: Yanan Liu
 Design and graphics: Ying Miao
 Music: Jérôme Soudan (Mimetic)
 Performers: Zahra Killeen-Chance, Adam Naughton, Solomon Holly-Massey
 Lighting Consultant: Margie Medlin

The project is supported by Creative New Zealand, and the University of Auckland.



Carol Brown



Uwe Rieger

Uwe Rieger (DE)

LightScale II

Like a giant whale *LightScale II* floats through a virtual ocean, materializing environments, events and user interactions. The installation generates a tactile data experience through 3D projections onto multi-layered gauze surfaces. The kinetic structure consists of a twenty-meter carbon construction, mounted asymmetrically on a single-point support. At the visitor's touch the construction oscillates freely through space. A motion-tracking system combined with ultrasound sensors recognizes touch, position and movement of the *LightScale*. A live-render program overlays the physical construction with projected place-bound and interactive digital information. The project has its roots in a design by *kunst und technik* (R. Hartl, M. Janekovic, U. Rieger, H. Schroeder) in Berlin in the late 90s. Equipped with latest digital spatial

technologies *LightScale II* is now advancing toward a responsive navigation tool that creates haptic-digital constructions and materializes spatial narratives.

Design and concept: Uwe Rieger
 Programming: Yanan Liu
 Technical support: Karl Butler
 With contributions and graphics from: Don Aualitia, Louise Burling, Anne Buttle, William Challacombe-King, Jamikorn Charoenphan, Catherine Cruz, Ying Feng, Alex Goh, Zijia Ge, Michael Hori, Taryn Korent, Alexei Matene, Emilio Ocampo, Inosia Paea, Patrick Sherwood, Clement Wilson, Celine Xiang, Levi Shim
 Construction: C-TECH Imtd, Auckland, NZ
 Textile engineering: Structure Flex, Auckland, NZ
 Textile fabrication: Nautilus Sails, Auckland, NZ

The project is supported by the University of Auckland.

Campus Exhibition

PhD Program of Empowerment Informatics, School for Integrative and Global Majors

University of Tsukuba

Future societies are expected to demand engineering systems capable of improving the quality of life in terms of safety, convenience, a sense of fulfillment, and so on. To this end, this program establishes "Empowerment Informatics" as a

new branch of informatics that supplements and extends human functions and enables technology to work in harmony with people.

Curator: Aki Yamada
<http://www.emp.tsukuba.ac.jp/>



Minatsu Sugimoto (JP)

Walkaholic

Walkaholic is a system that turns people into world-changing power generators. *Walkaholic* proposes a wearable harvesting interface, attachable at the ankle, which also stimulates walking. If everyone starts to generate energy by natural behavior such as walking it could be earth-shattering.

Minatsu Sugimoto

Takeshi Oozu (JP)

Escaping Chair

The *Escaping Chair* is a furniture-shaped device that tries to escape from people nearby in order to prevent them from sitting down. Although this device is a machine with a simple function, without any will, we expect that the user will feel a semblance of will in the device through their interaction with it, and treat it as another "person".

Takeshi Oozu, Aki Yamada, Hiroo Iwata



Takeshi Oozu

Alberto Boem (IT)

Life in the Space Age: Experiments of Art and Technology in Zero-G



EMP

In 2016 the *Zero-G* art project was launched to investigate possible creative scenarios about human life in outer space. Eight experiments that have been performed during a parabolic (zero-gravity) flight are presented. Through this project, the group aims to open space research to society by showing its creative potential.

Artist group: Prof. Takuro Osaka (coordinator), Alberto Boem, John Brumley, Karlos Ishac, Jun Nishida, Takeshi Oozu, Rintaro Takashima, Hikaru Takatori, Tadayuki Tone

Supported by Japan Space Forum, Diamond Air Service Japan, JAXA-Japan Aerospace Exploration Agency

Aisen Caro Chacin (US/ES/VE)

Echolocation Headphones

The *Echolocation Headphones* are a pair of blinding goggles that emit a focused sound beam aiding spatial navigation by acoustic reflection. The directional sound coming from the headphones gives the user an audible focal point of reflection, similar to the focal point of vision.

Supported by EMP



Vivian Xu

Digital Nature Group at the University of Tsukuba and Pixie Dust Technologies Inc. (JP)

Recomposition of Human Presence: Waves, Material, and Intelligence

From Human Society towards Digital Nature and Computational Incubated Diversity

Curator: Yoichi Ochiai

How can we redefine our human presence? The Digital Nature Group has focused on researching the relationship between waves, material and intelligence by computational environments towards building feedback loops between human intelligence and machine intelligence. From the viewpoint of computer science research, they are prototyping the systems to combine wave engineering, organic and meta-materials by digital fabrication and deep learning in order to discover the new ecosystem in the digital age. It consists of over forty people, including students, researchers and the professor, who are all interested in wave engineering, machine learning, materials research. They are promoting research and development not only for academic research but also for use in society.

Like their prototype series, they are developing software that can output the alternative clothes designs by famous designers through deep learning in order to form making loops between ordinary designers and machine intelligence, developing automated wheelchairs and prosthetic body aids, and forming loops including the spatial recognition of machine intelligence with the relationship between light, sound and human body. All of these projects are based the link between digital fabrication technology, wave-engineering technology and machine-learning technology.

What you see in such prototypes is a direction that differs from modern standardized social forms,

modern mass-production formats or mass-communication styles. They define their view of the world as computationally incubated diversity, and by tackling the expansion of the body, expansion of the production process, audiovisual communication by holographic wave engineering for individual communication, and machine intelligence. They are trying to use these emerging technologies to figure out the digital-age ecosystem. This is what they always keep in mind in the process of combining art, science and technology, and thereby trying to solve real social problems using such technologies. The technology meme known as technium, which arises here, seems to be Japanese style and has its own cultural perspective as well.

Yoichi Ochiai, Atsushi Shinoda, Akira Ishii, Keisuke Kawahara, Amy Koike, Junjian Zhang, Kazuki Takazawa, Kensuke Abe, Kotaro Omomo, Natsumi Kato, Ryota Kawamura, Satoshi Hashizume, Ooi Chun Wei, Yaohao Chen, Hiroki Hasada, Keita Kanai, Mose Sakashita, Naoya Muramatsu, Shingo Uzawa, Yuki Koyama, Yuta Sato, Chihiro Murakami, Ipppei Suzuki, Kenta Yamamoto, Shinji Sakamoto, Ayaka Ebisu, Daitetsu Sato, Hiroyuki Osone, Kubokawa Kazuyoshi, Riku Iwasaki, Tatsuya Minagawa, Taisuke Ohshima, Akira Hashimoto, Wataru Kaji, Yuta Ito, Kazuki Otao, Kengo Tanaka, Kohei Ogawa, Kent Kishima, Shinnosuke Ando, Shouki Imai, Yusuke Tanemura

All projects are supervised by Prof. Yoichi Ochiai.

Supported by: Digital Nature Group, University of Tsukuba, Pixie Dust Technologies Inc.

DeepYohji

These images were generated by the DCGAN, a deep-learning, image-generation computer technology that learns the features of Yohji Yamamoto clothes and generates images of them.

Coded Skeleton

Coded Skeleton is a material that transforms into preprogrammed motions by using simple linear actuators. This property of the material is provided by a 3D-printable geometric structure. The motion is designed by original software that generates a 3D-printable structure that is flexible only in the designed motion but stiff in other deformations. We call this property "isolated flexibility." It realizes precisely controllable elastic motion by using simple linear actuators, and the design system that has been developed enables us to design the motion of the *Coded Skeleton*.

Stimulated Percussions

Electrical stimulation turns muscles into machines. The body controlled by the program produces rhythms. This is a new method for musical performances which aims to beat out rhythms for beginners. It is easy to play different rhythms simultaneously with the right hand and the left hand.

Live Jacket

Our *Live Jacket* demonstration allows visitors to wear a jacket with built-in speakers and to listen to music over the whole body. There are 22 built-in speakers which play music from every part of the jacket, so visitors can experience wrap-around sound. In addition, the sounds change depending on the movement of the person wearing it.

Telewheelchair

This telepresence system provides remote care by installing functions such as object recognition on a wheelchair.

Immersive Light Field

This head-mounted display (HMD) system makes it possible to project images directly into human pupils and to see the environment through an HMD. This system provides an unprecedentedly wide angle and shows the possibility of metamaterials that have properties that do not exist in nature.



Coded Skeleton

Ipppei Suzuki



Stimulated Percussions

Kenta Suzuki



Live Jacket



Telewheelchair

Ipppei Suzuki

Campus Exhibition

Social Things

University of the Arts London

London College of Communication, MA Interaction Design Communication

MA Interaction Design Communication is a practice-led, future-facing design course for a technologically informed and interdisciplinary design world. We work in and explore interaction design, design prototyping, physical computing, user-centered design, open-source digital platforms, design research, foresight and insight, experience design, communication design, speculative and critical design and digital arts.

For *Social Things*, Interaction Design Communication engages with a class of objects that change what it means to be social. "Smart objects" are increasingly becoming actors in a material culture where they have their own intentionality.

An increasingly connected world is inherently more unpredictable—the dominant political ideology of neoliberalism has intrinsically linked individualism and personal productivity to economic survival, made possible through complex, ubiquitous and pervasive computational networks and systems. *Social Things* addresses design from a technical and theoretical perspective through the lens of a new social landscape.

<http://www.int-des.com>

London College of Communication
 MA Interaction Design Communication
 Course leader: Tobias Revell
 Senior tutors: Nicolas Marechal, Eva Verhoeven

Claire Alexis (FR)

Fireflies

Collaborative digital artifacts used to create unexpected environments and narratives.



Claire Alexis



Raina Bai

Raina Bai (CN)

Letter Reader

A device aimed using sound to create a connection between people.

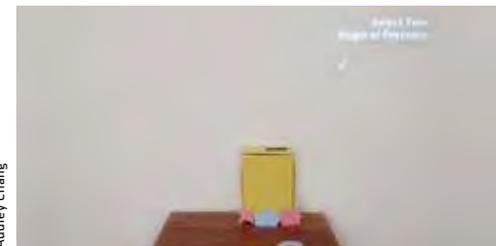
Pipe (Tapanon) Amatayakul (TH)

Dumpster Dr

An alternative way of sustainable living in a digital future.



Pipe Amatayakul



Audrey Chang

Jou Chih Chan (TW)

Your Heart is an Empty Room & Now Here is Nowhere

Below the surface of the bright colors of Kawaii is a temporary escape from reality.

Huankai Chen (CN)

Show Me Your Mood

An interactive postcard for sick children to share their mood.



Huankai Chen

Lin Dong (CN)

Gender Doll

A child's toy for challenging gender norms.



Lin Dong

Virginie Tan (FR)

DO IT RIGHT, DO IT SLOW

Scroll and slow down, through the rise of the high-speed society.



Virginie Tan



Maureen Eibeler

Maureen Eibeler (US)

But What is the Kitchen Anyway?

Speculating on what the kitchen becomes in a future of cultured meat.



Roman Trilo

Roman Trilo (UA)

You are Safe Here

Making surveillance tangible.

Jan Kanuch (SK)

The Magic 8-Cube

This high-tech card trick encourages the user to come up with their own.



Jan Kanuch

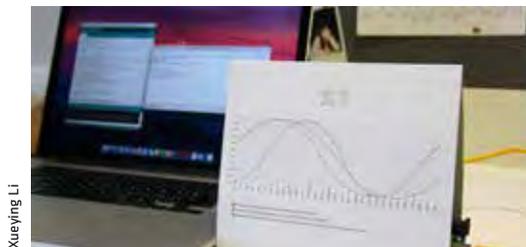
Xiaoye Wu (CN)

EHS

Speculating on the epidemic of electromagnetic hypersensitivity (EHS) suffering.



Xiaoye Wu



Xueying Li

Xueying Li (CN)

Biorhythm Calendar & One-day with AI

Using biorhythms to make daily life more efficient.



Zhiguo Zeng

Zhiguo Zeng (CN)

I-Box

A lifestyle simulator that integrates the six major life scenarios into a virtual experience.

Pornphan Phichai (TH)

I Will Live With You: i-Bin

An intelligent waste-disposal system builds a relationship with its owners.



Pornphan Phichai

Betty Zhang (CA)

Rainmaking on Mars & Sensible Objects

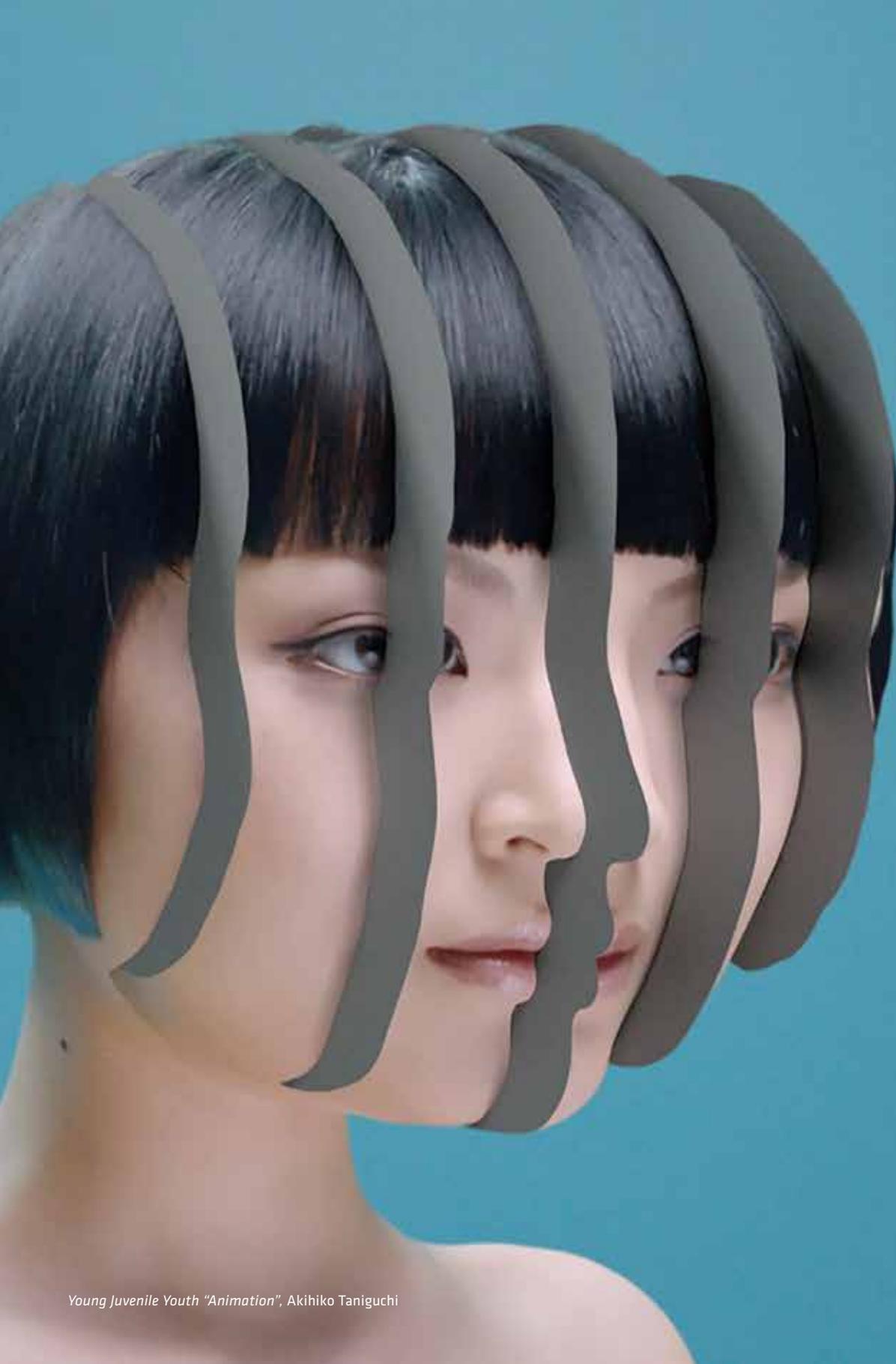
A musical instrument created for the harsh seven-month mission to Mars.



Betty Zhang



ARS
ELECTRONICA
ANIMATION



Ars Electronica ANIMATION FESTIVAL 2017

The nearly 1,200 entries submitted for prize consideration to the Prix Ars Electronica's Animation category this year posed a substantial quantitative challenge to both the organizational staff and the jurors: Anezka Sebek (ID/US), Réka Bucsi (HU), Sabine Hirtes (DE), Shuzo John Shiota (JP) and Memo Akten (TR/UK). An elaborate round of preliminary screenings involving the jurors as well as the Animation Festival curators, Jürgen Hagler and Christine Schöpf, succeeded in reducing the field to a manageable level. The outcome was a rather short list of 212 films that were screened by the jury. These also form the basis of the eight themed programs in this year's Animation Festival.

Conceptually, technologically, formally and substantively, the works submitted to the Prix this year cover the entire fascinating spectrum of what computer animation is and does today. Impressive above all are the works that also demonstrate alternative presentation possibilities, those that somewhat loosen the bonds of a cinematic narrative's screen-based nature. Large-format mappings—whether open-air or in the context of a museum—have become significant factors in the artistic event realm. Installations as well as performance projects are expanding long-prevailing concepts of what constitutes computer animation. Due to technologies that are now more affordable than ever, VR has become a new field for artists. And gaming, a hybrid at the nexus of art and play—as this year's Golden Nica winner David O'Reilly demonstrates in *Everything*—is another step in opening up this genre to media art. The seventeen programs on the lineup of this year's Ars Electronica Animation Festival are once again an international showcase of excellence in current digital filmmaking. In addition to the eight themed programs, we are also screening a Young Animations lineup: works singled out for recognition by the Prix's u19 – CREATE YOUR WORLD category, bugnplay.ch (Switzerland), mb21 (Germany) and C3<19 (Hungary). This is outstanding digital filmmaking by young people.

There will also be two IN PERSONA screenings: IN PERSONA: Job, Joris & Marieke and IN PERSONA: Max Hattler; an Electronic Theatre screening compiling all fifteen prizewinners in the Prix Ars Electronica's Computer Animation / Film / VFX category; and the guest programs featuring works honored by the Japan Media Arts Festival, the Campus Genius Award, the ISCA (International Students Creative Award) and works selected by the Filmakademie's Animationsinstitut and ACM Siggaph.

IN PERSONA: Max Hattler

Max Hattler is an animation filmmaker, media artist and professor at City University Hong Kong. His works often contain allusions to early modernism in animation filmmaking and the cinematic avant-garde as well as in the visual arts—Oskar Fischinger's dance of colors and forms, James Whitney's early mandala computer animation, Augustin Lesage's highly charged, spiritualist drawings, and the radically minimalist painting of Barnett Newman. In doing so, he impressively connects the past and present in ways that are both accessible and intellectual, and has been honored with numerous inter-



Divisional Articulation, Max Hattler

national prizes. The program features kaleidoscopic loop arrangements, short films and music videos.

IN PERSONA: Job, Joris & Marieke

around weird philosophical questions. Questions like: "What if you accidentally exchange heads with your best friend?" or "What if you could travel through your life by playing a vinyl record?" Their stories are always filled with inept and quirky characters who end up in weird situations leading to lots of (dark) humor. In 2015 their short film *A Single Life* was nominated for the Oscar for best short animation. Their work has been screened at numerous international festivals, receiving over 70 awards.



A Single Life, short film, Job, Joris & Marieke

Short films and music clips from the Dutch animation studio Job, Joris & Marieke. Their work can be described as cute and funny but always centered

Electronic Theatre

Electronic Theatre is the Ars Electronica Animation Festival's annual best-of program. It is made up of the fifteen best animated films selected by the jury from among this year's 1,157 entries. At the same time, *Electronic Theatre* is a showcase of state-of-the-art production both in an artistic-substantive sense as well as with respect to technological innovation.



Everything, David O'Reilly

Experimental

This program impressively demonstrates new and innovative approaches in current digital filmmaking at the interface of art and science—e.g. nature and bio-tech studies, morphogenesis, experiments with architecture, fashion and perception.



Until we coalescence, Reinhold Bidner



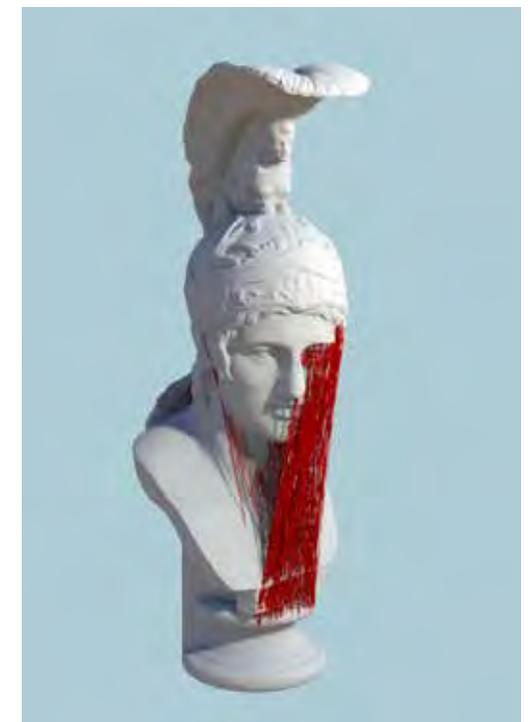
Levitation, Sila Sveta / Russia K TV

Expanded Animation

Expanded Animation is a showcase of the new turf increasingly being occupied by digital filmmakers. The program includes computer games, installations, interactive/reactive dance performance, new forms of mappings and audiovisual laser installations.

Hybrid Technologies

Uncharted territory is on the itinerary here too. This program spotlights the trend towards the unconventional use of technologies in animation filmmaking. Drones, robots, 3D printers, game engines, laser technologies, et al. offer new ways to depict images and motion.



geophone, Georgios Cherouvim

Narration

Storytelling probably has the longest tradition in the history of animation. Funny and bizarre, poetic, thought-provoking and dark are some of the many moods of the stories told on this lineup—a colorful frog party, a drunken badger running amok and the blind Vaysha, who sees the past and future but not the present.



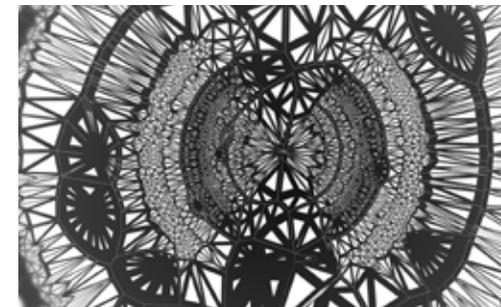
Life with Herman H. Rott, Chintis Lundgren



Disco Beast, Jonathan Monaghan

Mental States

A train ride becomes a journey into a confusing world of recollections. A woman has lost her head and embarks on a trip to the seaside. Mental entanglements, fears, dead-end situations subtly characterize this program.



Greatness, Raven Kwok / Karma Fields

Statement

This program features statements on a wide variety of topics: President Trump's proposed Mexican border wall, cultural barriers, racial discrimination, a confrontation with addiction to computer games, and a critique of advertising are only a few of the messages these works get across.



M.A.M.O.N. Aparato / Wecanfixit

Late Nite

Just the thing for after dark! Some are disrespectful and satirical—a case of regicide, a Hieronymus Bosch reinterpretation, the horror of a bald spot. Nevertheless, it's not all meant to be dead serious; there's some funny stuff on this late-night lineup too.



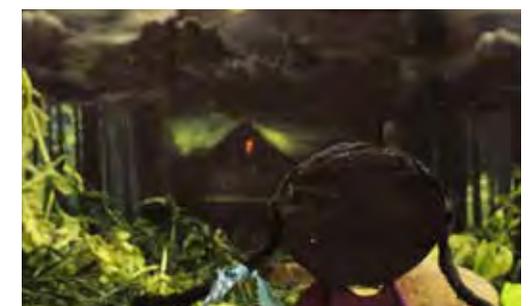
HYPER-REALITY, Keiichi Matsuda

Music & Visual

The music video genre too has undergone considerable expansion in recent years. Visual music and sound art, performances and installations, and complex technological experiments highlight this program.

Young Animations

Witty, off-beat, subtle, tragic and serious animated work produced by young filmmakers will be screened during the Festival Ars Electronica. Every year, gifted young filmmakers submit their movies to u19 – CREATE YOUR WORLD (AT), bugnplay.ch (CH), mb21 (DE) and C3<19 (HU). The greatest hits will be featured in *Young Animations*.



Horror in the Woods, students of HAK Retz

Japan Media Arts Festival Award-Winning Program 2017

The *Japan Media Arts Festival* honors outstanding works from a diverse range of media in four divisions: art, entertainment, animation and manga. This program comprises eight highly distinctive works from award-winning works from the Japan Media Arts Festival 2017.



The Life of Miyo, Kazuki Sekiguchi

ISCA (The International Students Creative Award)

ISCA (International Students Creative Award) is an international arts and information media competition for university, graduate school, and vocational school sponsored by the Knowledge Capital Association. It is an international competition open to students from Japan and around the globe.



Song of a Toad, Kariem Saleh, Alexandra Stautmeister



okazakitaiiku "MUSIC VIDEO", okazakitaiiku / Sushi-kun, © SME Records

Campus Genius Award

The *Campus Genius Award (Gakusei CG Contest)* honors digital artworks created by students. The continuity of this contest, which has been held for 22 years, underpins its important role in Japanese media arts. Incorporating new media and technology forms of expression that change with the times, the contest forms a gateway not only for computer-graphic artworks, but for a wide range of diverse genres.



Dear my little..., Kento Yasui / Yokohama College of Art and Design, Kanagawa

Filmakademie's Animationsinstitut

Animationsinstitut, part of the Filmakademie Baden-Wuerttemberg, offers a project-oriented curriculum in the subject areas of animation and interactive media. The institute encourages its students to think outside the box, develop an individual style and, by doing so, create innovative ideas. This screening features a selection of some of the latest outstanding student projects that depict the wide creative range of productions realized at the *Animationsinstitut*—from 2D and 3D through interactive media to VFX.

Jürgen Hagler (AT), Alexander Wilhelm (AT)

No. 5: Expanded Animation Hybrid Technologies in Animation

This is the 5th Expanded Animation symposium—and thus an anniversary of sorts. The first event was held just prior to the 2013 Ars Electronica Festival in the LENTOS Art Museum. The concept was to offer students in the Department of Digital Media at the University of Applied Sciences Upper Austria, Campus Hagenberg, an interesting program about digital animation in an interdisciplinary context.

The symposium got rave reviews and had already become part of the festival the following year. Since 2014, Expanded Animation has been staged as a two-day event with Ars Electronica in conjunction with the Ars Electronica Animation Festival, for which, together with the Prix Ars Electronica, it provides theoretical elaborations of a scholarly, curatorial or artistic nature.

Five years ago, with the choice of the theme "Expanded Digital Animation: Mapping an Unlimited Landscape," the organizers thematically positioned the symposium in the diversified peripheral fields of digital animation. Since then, topics at the nexus of games, art, science and business have been addressed by a total of 45 speakers—including media artists (Quayola, Memo Akten, Alex Verhaest), theoreticians (Susanne Buchan, Erwin Feyersinger), curators (Ulrich Wegenast, Abigail Addison), animation filmmakers (Erick Oh, Boris Labbé) and execs from design/animation studios (ManvsMachine, Aixsponsa).

Daydreams and Nightmares: Amalgams of Technology and Aesthetics in Animation

This year's discussion will focus on hybrid technologies and their impact on animation production. An essential feature of animation is its wide range of styles and looks engendered by countless animation techniques and aesthetic approaches. The advent of the computer in animation filmmaking has

considerably multiplied the means of representation available to artists.

A trend towards the unconventional use of technologies for animation purposes has been evident in computer animation for several years now. Drones, robots, 3D printers, game engines, laser technologies et al. offer new ways to depict images and motion, and dramatically expand artists' expressive latitude—for example, the LED-studded, animatable unmanned aerial vehicles the Ars Electronica FutureLab refers to as Spaxels.

Animation software makes drones and robots move. Animated 3D figures are frozen in mid-frame and printed out as sculptures that, in turn, are brought back to life via stop-motion techniques. Animation loops coalesce into a real sculpture and, in a zoetrope-like construction, mutate into a moving sculpture. And laser technology is used to generate three-dimensional animated holograms. These trends will be discussed by international experts and current examples of them will be presented at this year's 5th symposium.

Speakers at the 2017 Expanded Animation symposium: Prix Ars Electronica 2017 prizewinners of the Computer Animation / Film / VFX category, Pablo Barquín & Anna Diaz (Hamill Industries), Nikita Diakur, Max Hattler, Job, Joris & Marieke, Lev Manovich, Raphael Vangelis, Cedric Kiefer (Onformative), Stephan Schwingeler, Martina Stiftinger, Stefan Srb

Organization:

Expanded Animation is produced jointly by the Upper Austria University of Applied Sciences' Hagenberg Campus, the Festival Ars Electronica and Central Linz, and organized by Jeremiah Diephuis, Jürgen Hagler, Michael Lankes, Paola Otero, Patrick Proier, Christoph Schaufler, Alexander Wilhelm / Upper Austria University of Applied Sciences' Hagenberg Campus / Department Digital Media

<http://www.expandedanimation.com>
<http://www.fh-ooe.at>



u19 – CREATE
YOUR WORLD



u19 – CREATE YOUR WORLD

Future Festival of the Next Generation 2017

Perspectives – The Other I . . .

This year's theme, Perspectives, invites festival visitors to consider the future from a different point of view. Perspectives define many aspects of our life. What if we extract an individual pixel from a high-definition image and reinsert it at another location—what does this shift trigger? Is it even recognizable in the image? Or changing our perspective on political problems and social issues—shouldn't we do that regularly as part of a wisely thought-out life? How can we enable ourselves to shift our perspective? It often happens that things appear differently "in a new light", and "sleeping on it" is conducive to a new point of view. To oversimplify this a bit—we can also influence perspectives via experiences and decisions. Opinions about other people form on the basis of various perspectives. Especially with respect to technological developments, varying perspectives are important, because they define everyday usage. If we grow up with a technology, then it is something we take for granted, a part of everyday life without which we presumably could not even imagine living. Technologies that emerge over the course of our life are perceived completely differently—the level between usage and uses shifts. For several years now, new technologies in both the hardware and software fields have been developing faster and faster. There prevails what could be called an almost daily shift of perspectives; this isn't always simple, many of



Florian Voggeneder

these developments are difficult to classify, and we are bewildered by how to deal with them. The generations drift further and further apart. So is this also a social problem triggered by technology, among other things?

Nevertheless, perspectives also describe our confidence and hope. What objective are we aiming for? What do we wish to emphasize? Perspectives describe the long-term nature of an idea and its potential to make things develop. The duration we ascribe to these developments has noticeably diminished—we become more impatient; the desire for immediate feedback is fostered, above all, by the "all comment principle" on social media.



Can machines be creative, and how do ideas actually originate in our human brain? What do natural and artificial forms of intelligence have in common? And how will we learn, work, play and live together with autonomous robots, smart assistants and intelligent computer programs in the future?

These and other questions will be addressed by this year's u19 – CREATE YOUR WORLD. Once again, there will be lots of offerings and ideas about how

we can make use of new ways of seeing things and alternative models for living. The hoped-for outcome will be new perspectives, perhaps those afflicted by less fear of the “technological future,” with somewhat more understanding for other cultures and ways of life, with respect and a shared future that may be worth living from every point of view. What plans do I—or “The Other I”—have for this world of ours?



Tom Mesic

The Future Festival of the Next Generation

Once again this year, the “festival within the festival” is an invitation to experiment and try out new things. At u19 – CREATE YOUR WORLD, festival visitors can test new technologies, uncommon models for living, or concepts and ideas in this open lab. Everyone can decide for themselves how much time they want to devote to a project—whether

it is only five minutes or a whole day. There is a lot to experience and discover throughout the festival village. Artists, associations and companies make up the dramatis personae of this playground, where we can immerse ourselves in the world of tomorrow. This is the perfect spot for tinkerers, lateral thinkers and people with a thirst for knowledge!

The Perspective Machine

How Humans and Artificial Intelligences Generate Ideas and Creativity

Better, simpler and faster, above all, faster. This development has come to prevail in our society. It is already taken for granted that we do not particularly like waiting for answers and results. This might be due to the fact that we pay less and less attention to the process that leads to the solution. Often, we no longer even want to know why we achieve certain results. What's important is: it has to proceed quickly and be correct.

This results in a curious reversal—speed in technologies was originally developed to make many things easier for us, to enable us to eliminate stress. But sometimes this speed is precisely what triggers extreme stress and unease in us.

Sometimes it's good to wrestle with a question or an idea in a way that is as protracted and complicated as possible. This results in taking it slow and going into depth, and is conducive to relaxation, creativity and coming up with ideas.

Generating ideas and creativity are often associated with a sort of “recontextualization.” To do so, existing components that were developed for a particular application are employed in a totally different way. This results in sustainable projects, because a component can suddenly be used for two or more applications.

Without the pressure of speed and with an only seemingly senseless waste of time, and with many—actually very many—details, this year u19 – CREATE YOUR WORLD is inviting festival visitors to build a machine out of as many different components as possible. The various sub-components can consist of digital or analog elements; together, they will become a machine that can carry out simple as well as complex tasks.



Point of View

In contrast to the rest of the u19 - CREATE YOUR WORLD festival, where lots of things can be tried out in open labs or learned in one-on-one conversations, there is stuff here that can be discovered only by careful examination and doesn't come to light until you're prepared to change your point of view. You can consider it a sort of reward for sharpening your own senses. In this neighborhood of POSTCITY, festival visitors can come upon examples of anamorphosis, phenomena that become visible or legible only when one stands on a particular point and assumes a suitable perspective. *Point of View* addresses precisely these facts and circumstances, which can be understood just as well in a figurative sense. Interrelationships and meanings too can often be recognized only from a certain perspective. *Point of View* is set up both on a large scale in the spacious halls of this former logistics facility as well as in tiny, inconspicuous corners everywhere. In the *Point of View* open lab, you can scrutinize this anamorphosis model and try it out yourself.

Artist: Stefan Mittlböck
u19 – CREATE YOUR WORLD
This project is supported by AURO GmbH



Stefan Mittlböck/Jungwirth-Fohringer & Petra Fohringer

YOUTH IN PROGRESS

Joseph Herscher (NZ)

Youth Exchange Project Young people cooperate

The *Youth Exchange Project* is a workshop that will be held in POSTCITY throughout the festival's run together with groups of youngsters from other countries. The participants are selected by u19 – CREATE YOUR WORLD and our partner organizations: c3 (Hungary), mb21 (Germany) and bugn-play (Switzerland); this year's newcomers are from ArtTechLab Amsterdam. What they all have in common is expertise in a particular area—for instance, soldering, working with tools, programming, designing, writing texts, generating concepts, painting. All together, there's a good mix of skills.

Joseph Herscher is the artist who will be working together with young people to develop the language of the so-called unintelligent machine. In going about this, the young people embark on a journey of discovery into the intelligence of a machine. On various levels, they will pose questions such as: What makes the machine and why? Is it even appropriate to speak of intelligence in this case? How can I recognize the consequences and the effectiveness of interventions in complex, interdependent systems? The answers—and, at the same time, the method of arriving at them—are simply stated: experimentation! By making processes visible and

taking mechanisms all the way to the point of insignificance, these young people, equipped with an open mind can also face the question: Does it always have to be the direct approach to a solution? Can't detours even constitute something valuable in their own right, and serve as the source of additional solutions? The youngsters' primary task is to build a machine from everyday objects. The festival theme, artificial intelligence, and this year's u19 – CREATE YOUR WORLD focus on the perspectives that frame this group encounter with the so-called unintelligent machine.

Workshop with Young People from the BFI Upper Austria Self-Driving Cars—Model Construction and Programming

The Ars Electronica Center has been collaborating with the BFI (Careers Advancement Institute) since spring 2017 to give youngsters the opportunity to work on projects in conjunction with the Ars Electronica Festival. The aim is to open up bright prospects for these young people and to strengthen their self-confidence as a solid foundation for their occupational future. In five sessions, the youngsters get support from experts in converting a remote-controlled model car into a self-driving car.



Tom Mesic



RIC



Tom Mesic

ZUKUNFTSWERKSTATT @ Festival

The *Zukunftswerkstatt* (FutureWorkshop) is the place to produce your own short films, reportage, blogs and animated clips. From brainstorming to shooting to editing to presenting the final cut—crews work together to bring a project to fruition. In conjunction with this year's Perspectives theme, workshop participants will deal with current issues and personal stories, and discover how much fun it is to work creatively with new media. Spontaneous reaction and free improvisation play roles that are just as important as precise planning and concentrated work. This approach makes for very special kinds of group experiences that, above all, leave behind a lasting impression.

Zukunftswerkstatt @ Festival is a "mobilized" version of a course regularly offered at the Ars Electronica Center. The State of Upper Austria and the AMS job service offer courses to young people not currently enrolled in an educational institution or who have not yet found an apprenticeship. These courses entail the opportunity to attend a *Zukunftswerkstatt* at the Ars Electronica Center.

Chinese whispers

This digital activity project by Linz Art University's Art Education program invites visitors to become interactive players of a popular game. But here the drawing, explaining, pantomimic description and recognition proceed by means of tablets, monitors, headphones and a virtual assistant called Siri. As in a game of Chinese Whispers, the terms are passed along by word-of-mouth and, if all goes well, are understood literally. Get in the game!

Students in Linz Art University's Art Education program under the direction of Maria Anna Eckerstorfer and Helene Siebermair-Sommerer



Helene Siebermair



Antal Kelle

Akos Vecsei

#MyRobot: ROBOTIFICATION NOW

Experience Workshop devotes its full program to various perspectives on the robotification of society. We will have *Cognition Schöffer* by Antal Kelle Artformer, an abstract interactive mobile sculpture dedicated to the pioneer of cybernetic art, Nicholas Schöffer. The robotic sculpture performs a slow, meditative “dance” based on randomized algorithms, until a visitor steps to the control panel and adds (another?) character to the piece. In our workshop area, participants can design, build and program the robot they need the most. By the end of the day we might have robots that go to school, do the homework and pass the exams. We might have robots that can cook, dance and sing, collect all the waste in the oceans, eliminate hunger and bring peace on Earth, or just take out the dog twice a day. We will think about and discuss how all these different robots can live together, and how we can all live together with these different robots? Participants can work with Experience Workshop’s 4Dframe and ReBOT kit and we will have István Orosz’ anamorphoses from the analog world to discover the magic of different perspectives. GeoGebra apps provided by the Johannes

Kepler University will be available to help understand Artformer’s piece, to create your own anamorphosis and perfect robot designs. During the program the Experience Workshop will be documenting and displaying all the stories told by the brainy builders about the robot they need the most.

Experience Workshop and Johannes Kepler University

I + I = #Who?

Reality, fiction, wishful thinking?! Who am I; who can I be? We take selfies to place ourselves in the middle of the picture. How can I feature myself? How would I like to? Who would I then like to be? For whom am I playing myself up? Virtual Office’s take on this year’s festival theme, “The Other I,” calls upon participants to find out who today’s young people want to be, which ideals they strive for, and who their role models are. Staged photographs are designed to enable participants and visitors to reinvent themselves.

FAB-Association to Foster Work and Employment, Virtual Office



Tom Mesic



Martin Hieslmair



Tinkerbots Kinematics GmbH

Tinkerbots

Tinkerbots is a unique construction kit that makes it simple for kids of all ages to build and operate countless different robots. The kit consists of active modules and passive components. The Powerbrain is the central control element, the heart and mind of this construction kit. Movement modules make it possible to implement various forms of locomotion—driving, tipping, spinning or gripping. The movement modules are driven by servomotors; the energy is delivered by the Powerbrain’s battery. Sensor modules react to light sources and objects in the installation space. Tiny passive components called Cubies let you custom-design your robot. All elements are easily interconnected without the use of cables, so kids as young as six can build mobile, interactive robots and get a playful introduction to mechanics, sensors and energy.

Tinkerbots Kinematics GmbH

Changing Pixels

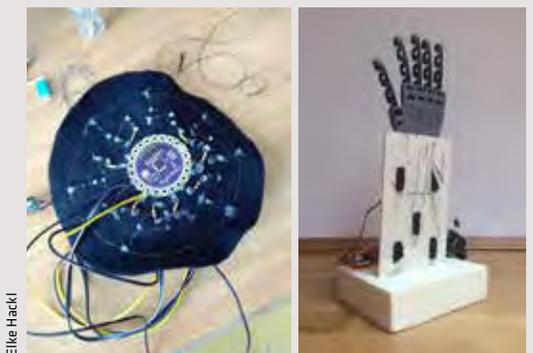
How does an artificial intelligence actually process graphic information? Here the arrangement of countless quadratic pixels can be tried out the other way round. You can use quadratic magnets to reconstruct photos or create your own pixel artworks. What might a seemingly chaotic array of pixels look like from another perspective? This project is designed especially for younger children who need a playful approach to understanding artificial intelligence. Of course, there is a painting station right nearby so we can show the machines how we human beings design pictures.

u19 – CREATE YOUR WORLD

BorgPlay

In this open lab’s Gamestation, you can play your own adventure games, and on the RasPi Station, you can try out old Nintendo and Playstation games on a DIY console constructed with Makey Makey. Plus you can help out doing live texturing of blender figures, become a game figure in your own right, and try out creative programming with Arduino and Lilypads: teach sign language to robotic hands, illuminate a T-shirt with your voice, make gloves resound, and dance across computer screen lines.

BORG Bad Leonfelden



Elke Hackl

u19 – Exhibit

The highlight of the Future Festival of the Next Generation is, as always, the exhibition of the prizewinners in the Prix Ars Electronica's u19 category. Here, the sixteen projects singled out for recognition this year can be admired, and young people—and grown-ups too—can draw inspiration from them.

Young People Join the Curatorial Staff

The members of the u19 – CREATE YOUR WORLD production staff are carrying on a successful concept and once again getting this year's u19 winners involved in designing the u19 – Exhibit. Previously, the exhibition was developed by adults, so the form and concept of the presentation had little to do with the young people themselves.

Prior to the festival, the prizewinners can attend a workshop at which they present their projects to one another, consider commonalities or substantive interrelationships among them, and, finally, install their projects themselves right in POSTCITY. This makes the exhibition their own project, and they also radiate the resulting pride throughout the five-day festival when, filled with conviction, they present their projects to festival visitors. At the same time, this process teaches them how their projects function in the context of the exhibition and in what ways it is necessary to mediate visitors encounters with the works on display.

Furthermore, young people get the chance to collaborate on this exhibition and to carry out an interesting assignment: discovering both substantive and spatial consistencies. Thus they interrelate their ideas and projects with those of the other participants and, in doing so, learn a few things—about their own projects as well—that they might not have previously seen or had not adequately taken into account before.

u19 Ceremony

The u19 Ceremony brings together all the prize-winners in this year's u19 – CREATE YOUR WORLD category. At this event, the spotlight is on the young people themselves. In a brief interview they get an opportunity to present their projects and also to communicate their enthusiasm.



Tom Mesic



Vanesa Graf



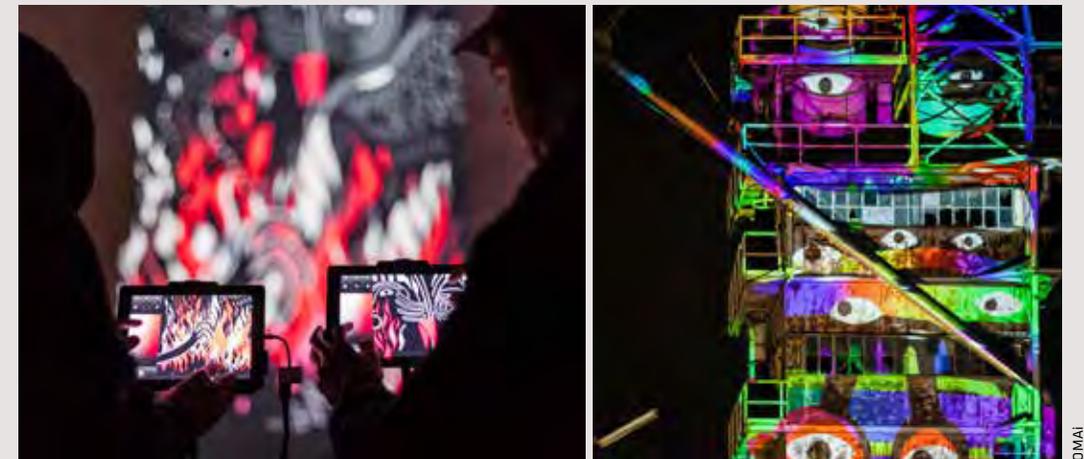
Marion Friedl

Animation Lab

A live animation playground using the new generation of the Tagtool app. This open and interactive workshop invites creative minds of all ages to enter a collaborative universe of animated light paintings. Send out a message to the world, design characters

and sceneries or tell improvised stories! Together we will bring your visions to life directly before the eyes of the festival audience.

An artists' group called OMAi, Remo Rauscher, Barbara Heinzl



OMAI

Arduino Reload Tiny Drummer

In this open lab you have the chance to build a motor-controlled drumstick. We will show you how to assemble the parts and program an Arduino microcontroller. After that you can make it play any rhythm you wish. Use an Arduino and Servos to create your own drum bot! Use pots, plates and other objects and turn them into a personal percussive mystery device. Additionally the "brain" of Arduino will help support different projects at the u19 – CREATE YOUR WORLD Festival.



CCO

CoderDojo Build Your Own Computer Game

CoderDojo Linz is a free, volunteer-led programming club for kids. In CoderDojo, young coders discover technology, learn to write code, develop their first websites, create apps and games etc. Kids interested in technology meet like-minded people and can work together on their projects. Kids learn about programming in a playful way. Additionally, they train important skills like logical thinking, teamwork and English. At u19 – CREATE YOUR WORLD you can program your own computer game—you don't need skills for that . . .

CoderDojo Linz, Coding Club Linz e.V.



CoderDojo

Come, Build With Us!

We are inviting everyone to come and build interactive visuals with us. Anyone can collaborate either by coding with us directly or simply by giving us input on what they would like to see. Using a Kinect sensor we will build an interactive piece on-site, improving and changing it throughout the day. At the end of every day we will save the latest of that days' work, and it will be a representation of our collective decision making.

Onur Olgaç, Gürkan Kurtbay



Gürkan Kurtbay



Open Radio

In addition to live broadcasts direct from the POSTCITY festival venue, FM4 is once again staging Open Radio, an opportunity for festival visitors to see what goes into an actual radio production. Participants can do Q&A with pros and get an up-close-and-personal look at a mobile radio studio. FM4 will also be producing its online Gameroom format in Linz and inviting festival visitors to play along. The results will be shown live online at irregular intervals during the festival at https://www.twitch.tv/radio_fm4.

FM4



Florian Voggeneider



Thomas Schwarz

u19 – CREATE YOUR WORLD

CREATE YOUR WORLD TOUR

Since 2015, we have offered a workshop program that integrates content and ideas from u19 – CREATE YOUR WORLD into everyday classroom instruction at selected schools and institutions. This tour exposes both pupils and teachers to alternative learning methods and teaching approaches, and inspires them to launch new ideas and projects.

This wide-ranging program of workshops is meant, first and foremost, as enrichment for pupils, who are thereby acquainted with new learning alternatives so they can apply them on their own in everyday life at school. Plus, the tour supports regional artists, who can impart their innovative ideas directly to youngsters. Teachers can use the workshops as continuing professional education units presenting the latest content and as impetus for new directions in classroom instruction.

Mobile Education!

The selection of projects is very wide-ranging. Thanks to our extensive experience implementing a broad spectrum of leading-edge projects, the tour offers many possibilities that can be individually adapted to the needs of the particular school. A visit by the CREATE YOUR WORLD Tour brings about sustainable improvement in students' performance. On one hand, the transparent form of educational enrichment serves as motivation; on the other hand, accentuating having fun and the do-it-yourself principle makes young people more receptive to the message. Since its launch in 2015, the CREATE YOUR WORLD Tour has developed into a third major element of the CREATE YOUR WORLD initiative alongside the Prix Ars Electronica's u19 category and the u19 – CREATE YOUR WORLD Festival.

CREATE YOUR WORLD in Malta 2017

The tour also went overseas in 2017. In conjunction with Malta's presidency of the Council of the European Union, five workshop weeks were staged in that island nation, where the tour achieved great success inspiring students and teachers. The event venue, the Esplora Science Center, also benefited from the tour's content, which was a spinoff of previous u19 – CREATE YOUR WORLD festivals.



Martin Hieslmair



RoboCar Self-Driving Cars: Understanding Development Opportunities

Hardly a day goes by without a news story about self-driving cars. Companies are investing huge sums in the development of autonomous vehicles. Ford recently paid \$1 billion to acquire a company that specializes in R&D on systems for self-driving cars. Research nationwide and throughout the EU is focusing on autonomous driving. All major car-makers and a few newcomers such as Google and Apple aim to bring out a self-driving car by 2021. RoboCar is an initiative to spotlight some trendy, cool technology to make young people aware of what is happening now and what future prospects are emerging in the ICT (IT, communication and technology) sector. Interest among young people in careers in the ICT sector is still far too low in comparison to personnel requirements. There are too few IT apprentices, secondary technical school students interested in IT, and ICT companies offering training in this field. Our aim is to promote enthusiasm among young people for careers in the ICT sector, to interest them in training in this field and to acquaint them with the types of jobs available. Our aim is to promote better contacts between young people who plan to pursue higher education and the ICT sector in general and the VÖSI companies in particular.

Me/You/Us + AI

Artificial intelligence is inspired by human experience. But how might we create smart machines that are inspired by diverse human perspectives? This lab encourages you to explore this by “coding” your body (and others) to perform a series of interactive, collaborative, and highly playful instructions, using lo-fi and low-tech materials. Get ready to transform into smart machines.

QUT Guerrilla Knowledge Unit (GKU)
Jacina Leong, Linda Knight, Jess Martin, Dee Armstrong,
Xue Ning Lee

VÖSI-The Austrian Software Industry Association represents the interests of Austria's top IT companies. VÖSI was founded in 1986 and currently includes about 30 large and medium-size software and IT companies. Without a healthy software industry, Austria as a business location would be in danger of becoming an auxiliary workshop of more innovative countries.

PRIA-Practical Robotics Institute Austria: Our vision is to prepare and motivate the next generation of researchers, engineers and scientists, and to be the go-to address for pedagogical applications in robotics and ICT.

tgm-Die Schule der Technik



Practical Robotics Institute Austria (PRIA) 2017

FABLAB-Printing, Drawing, Cutting

Whether you're interested in trimming textiles with a huge laser cutter, turning out complex forms with a 3D printer, using a CNC milling machine, or simply assembling structures from a variety of materials, the FabLab at this year's u19 – CREATE YOUR WORLD offers do-it-yourself projects you can try out right on the festival grounds. All visitors are cordially invited to create an art object of their own. In doing so, the accent is on human creativity—after all, we are the ones who issue the assignments the machines carry out! Participants can play with technologies and let various artificial intelligences cooperate with each other. The big question: who conducts this mechanical orchestra?



Tom Mesic



Mini Maker Faire 2017



Florian Voggeneder

For the second year in a row, a Mini Maker Faire will be a highlight of the FabLab. This event brings together the driving forces behind various DIY projects, who will present their ideas and modes of implementation. The MAKER FAIRE® originated in the US and is now a popular format worldwide. This fabulous FabLab fair is being held in cooperation with *Make:magazine*. The point is to impart inspiration and to keep the ball rolling. This colorful program will be staged as an event throughout a whole day of the festival.



Stereonarrativity



Krmppf Krmppf Studios

3D or stereoscopy is a widespread technique in cinema to visually immerse the audience. Nevertheless, the technology does not seem to be being used to create more immersive stories. *Stereonarrativity* is an attempt at an artistic use of 3D technology.

In contrast to stereoscopy, where the two image streams vary only slightly in visual perspective, in *Stereonarrativity* the two image streams are utterly independent. Passive 3D goggles are manipulated so that half of the goggles only transmit the right or the left image to both of the respective audience member's eyes. While the audience shares the acoustic layer of the movie, one can visually tell two tales; stereo-narrativity. The installation presents a movie giving an insight into the life of a dementia patient and a young woman. The audience can unlock a story greater than the sum of its parts by communicating after the experience. *Stereonarrativity* creates a fundamental need for collective consumption and exchange among the audience. *Stereonarrativity* is the latest project by the Linz-based *Krmppf Krmppf Studios*, whose work has been recognized and supported by u19 – Ars Electronica since 2006 and u19 – CREATE YOUR WORLD since 2011.

Krmppf Krmppf Studios (AT)
Ehrentraud Hager
Magdalena Wurm
Liesla-Marie Wondraschek
Alexander Niederklapfer
David Wurm

ZusammenKommenLab

The mission of *ZusammenKommenLab* (Getting TogetherLab) emphasizes diversity and encounter. It is the hub of a wide array of projects that entail working together on behalf of refugees. *ZusammenKommenLab* serves as a setting for the exchange of ideas and joint activities for activists, refugees and other people interested in getting involved. For details, go to <http://zusammenhelfen.ooe.gv.at>. The "ZusammenKommenLab" supports diversity and brings together refugees, voluntary workers and experts. Here you will find projects and ideas concerning refugees and integration and an exchange of experiences. Further information: <http://zusammenhelfen.ooe.gv.at>

ZusammenHelfen in OÖ–Gemeinsam für geflüchtete Menschen is the contact point for activists and people interested in getting involved. Useful information about housing, work, integration, education, networking possibilities and successful best-practice projects, an overview of important contact data and a comprehensive calendar of events to do with this issue are available online at <http://zusammenhelfen.ooe.gv.at> and <http://facebook.com/zusammenhelfen>, via e-mail to zusammenhelfen@ooe.gv.at and by calling 0043 732 / 770 993.



Land 00

Conferences @ u19 – CREATE YOUR WORLD

Third Conference for People Providing Aid to Refugees Initiative *ZusammenHelfen* (Helping Together) in Upper Austria

ZusammenHelfen in Oberösterreich, the contact point for involvement with *Gemeinsam für geflüchtete Menschen* (Together for Refugees) will stage the third *HelferInnenkonferenz* on September 9, 2017. This conference will offer committed individuals in Upper Austria as well as an extended community of participants a highly diversified lineup of presentations including new prospects, current developments, challenges and projects to do with the subject of working together to aid refugees. Complete information about the event: <http://zusammenhelfen.ooe.gv.at/konferenz3>

ZusammenHelfen in OÖ–Gemeinsam für geflüchtete Menschen is the contact point for activists and people interested in getting involved.



Land 00

A Series of Symposia: Perspectives of Political Education *This World Is My World*—How much globalization can humankind stand?



Tom Mesic

"I make my world however I like . . ." sang Pippi Longstocking in the legendary children's TV series broadcast in the 1960s and 70s. But what effects are globalization and digitization having on children growing up in this world now, as well as on adults who are waking up to such a world today? Do they

have the right to shape the world in accordance with egotistical, consumer-oriented conceptions, or at least the obligation to deal responsibly with "their world," with our shared Spaceship Earth? In this age of "alternative facts," the ability of the individual and society to deal with the media in a mature, responsible way has become a technique of political culture as a means of configuring globalization in a humane, sustainable way. The complex of questions and challenges with which this phenomenon confronts political education will be discussed at a two-day symposium staged during the Ars Electronica Festival by PH OÖ in cooperation with Ars Electronica Linz and the Upper Austria Chamber of Labor.

An event produced jointly by the Upper Austria Teacher-Training College, Upper Austria Chamber of Labor and Ars Electronica



GUEST
PROJECTS

ENCAC—European Network for Contemporary Audiovisual Creation

Led by the LABoral Centro de Arte y Creacion Industrial from Spain, the *European Network for Contemporary Audiovisual Creation (ENCAC)* aims to facilitate, promote, inspire, support and create new opportunities and challenges in the audiovisual arts as well as to foster innovative and sustainable solutions for the creative community, a wide range of audiences and the audiovisual field. The *European Network for Contemporary Audiovisual Creation* boosts innovation by combining its mem-

bers' knowledge, experience and resources. The diverse nature of its members also brings in an interdisciplinary and complementary perspective. For this project LABoral is partnering with Ars Electronica (Linz, AT), the LEV Festival (Gijon, ES), hTh—CDN (Montpellier, FR), Le Lieue Unique (Nantes, FR), Resonate (Belgrade, RS) and DISK (Berlin, DE).

ENCAC is co-funded by the Creative Europe Programme of the European Union.

Christian Skjødt (DK)

ÆTER

ÆTER can be seen as a study of electromagnetism, translating the phenomenon into an immersive sonic environment. Consisting of antennas and analog electronic circuitry, the autonomous systems directly capture and transform the ever-present electromagnetic waves in the air around us into low frequency audio material. *ÆTER* thus "listens" to its surroundings—nature, technology and the visitors—as well as to itself. The piece is therefore constantly changing and invites us to expand not only our perception of the world and its dimensions, but also our own perception apparatus. The intention is

not to create a performative instrument enabling visitors to play, but rather to create a complex interconnected network. *ÆTER* takes its inspiration from the Russian scientist and musician Léon Theremin's (1896-1993) most iconic invention—the theremin—a musical instrument which derived from an attempt to create a surveillance device.

With thanks to: Danish Arts Foundation, SNYK—The Danish Centre for Contemporary, Experimental Music and Sound Art, ENCAC—European Network for Contemporary, Audiovisual, Creation, Caroline Gagné & everybody from Avatar Quebec, Peer K / Gadget Group



Studio Christian Skjødt



Matthew Biederman

Matthew Biederman (US/CA), Marko Peljhan (US/SI/LV)

We Should Take Nothing For Granted—On the Building of an Alert and Knowledgeable Citizenry A Soft Probe

"Only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals."

Dwight D. Eisenhower, farewell address of the 34th president of the United States. Television broadcast, January 17, 1961.

In 1961, Dwight D. Eisenhower delivered his presidential farewell address, whose message is extremely relevant today in the light of recent revelations of massive surveillance programs, perpetual cyber/information and kinetic wars, the reshaping of the university and research complexes and intensified resource extraction. Eisenhower's message serves as a point of departure for a set of systemic activities in the fields of communications security, data aggregation, analysis and display. Through the use of deep learning and cognitive radio dictionaries, the current iteration of the system is trained to recognize and classify discrete digital encoding schemes and retransmit them based on the similarity of features within the speech and the audio dataset of intercepts, collected over twenty years of tactical media investigations. Embedded within this situation is also a soft probe, disrupting, and reclaiming

the localized electromagnetic signal landscape. Eisenhower's speech was not a dark forecast but instead stated that: "an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals." The text is the foundation for a trajectory of works that reflect upon the conditions for the development of "an alert and knowledgeable citizenry" in societal circumstances that, despite constitutional protections, do not warrant them.

The creation of this work was made possible thanks to the financial support of the Ministry of Culture of the Republic of Slovenia, Conseil des arts et des lettres du Québec, ENCAC, City of Ljubljana Cultural Department and the Systemics lab at UC Santa Barbara.

Special thanks to: Brian Springer, Aljosja Abrahamsberg, Samo Stopar, Leon Pavlovič
Production coordination in Slovenia: Uroš Veber

Adam Basanta (CA), Gil Delindro (PT/DE)

Permafrost

Developed as a first collaboration, this media installation has its central focus on the geological concept of *Permafrost*, a ground layer of frozen sediment, rock and soil that covers much of the northern hemisphere. Within this layer, several organisms, methane and bacteria have been dormant in time for thousands of years. Much of the permafrost is undisturbed by bacterial decomposition, but in the rapidly warming Arctic, several layers have been decomposing, creating “biological feedback”—the liberation and movement of these layers are themselves contributing to accelerated warming, as huge quantities of trapped methane are released into the atmosphere.

In this project, freezing is a conceptual and tech method for “holding” matter in time, a representation of a clock, where several different blocks of frozen earth are suspended in the space. As the fragmentation begins, detritus continuously falls, crashing into

a structure prepared with mikes, sensors and speaker cones. This platform works as a receptive sonic field, using code data to interplay with the impact, time, mass and displacement of the defrosted earth. As the piece evolves the matter accumulates, generating not only a random sculptural disposition, but unpredictable interactions with the speaker cones, their oscillations and sonic response. *Permafrost* departs from the present observation of our “contemporary natural vs. unnatural cycles.” Within a moving landscape of unstable organisms, the whole piece keeps playing in a semi-controlled system, confronting the time of geological processes with the acceleration of digital technology.

This piece was awarded an ENCAC grant for the production of a new groundbreaking audiovisual installation. Developed in June 2017 during a residency at LAboral Centro de arte as a first collaboration between the artists Gil Delindro and Adam Basanta.



Gil Delindro

SHAPE European platform, co-funded by the Creative Europe programme of the European Union.

Gil Delindro (PT/DE)

(UN) MEASUREMENTS 2 # The weight of repetition

Consider a mechanical rotation, like a car motor: it has a fixed cycle, but no rotation is exactly equal to the previous one; there is a direction but absolute repetition is impossible; an external input slowly but constantly contaminates it. Such is the nature of all matter, a cyclic being but never a static one. A dead tree was carved, removing the parts where fungi and larvae thrived; bacteria, the architects of an ongoing typography, still inhabit this place. This piece creates different axes or rotation cycles. There are five reading points built on prepared microphones—they act as needles reading the surface of the tree within specific orbits. Since all of the branch is irregular, a single rotation contains five different reading cycles. Through the course of time these segments or measurements align in one specific moment between each twelve rotations. There is a polyrhythmic interplay between order and chaos in this transient space. The acoustic typography of the wood generates and remakes the sound as the orbit proceeds.

The piece was developed during a residency at the Meet Factory, Prague, Czech Republic, 2016, with the support of the SHAPE European platform.



Gil Delindro

V2_, Lab for the Unstable Media (NL)

Summer Sessions

Pop-up exhibition featuring: Mischa Daams (NL), Philip Vermeulen (NL), Ruben van de Ven (NL), Jip de Beer (NL)

The *Summer Sessions* pop-up exhibition shows a selection of outcomes realized through the international exchange of emerging talents within the *Summer Sessions* network. *Summer Sessions* are short-term residencies for young and emerging artists, organized by an international network of cultural organizations. Each summer the partners participating in this network for talent development collaborate to offer professional production support and expert feedback to artists in the realization of a new artwork or design. Local talents from each partner's geographic region are scouted and selected for a residency abroad, where they are offered

highly productive atmospheres and specific kinds of expertise at one of the international partners in the international network. While the pop-up exhibition illustrates the kind of results that this pressure-cooker residency format results in, a live event will highlight the experiences that participants have had abroad, and the effects these experiences had on their early careers.

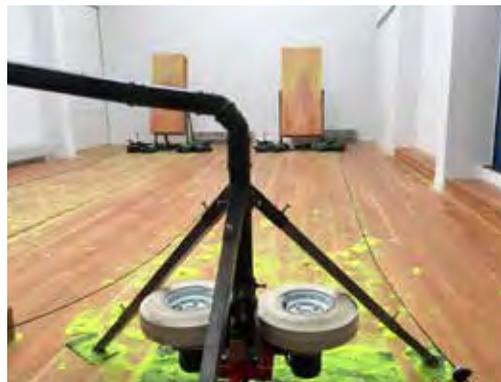
The projects are produced as part of the *Summer Sessions Network for Talent Development* in a co-production with Metamedia Association, Kitchen Budapest, Art Center Nabi, Arquivo 237 and V2_, Lab for the Unstable Media



Philip Vermeulen (NL)

Physical Rhythm Machine

The installation is a closed system that shoots balls at up to 130 kilometers per hour to create sound patterns in extreme violence. The installation cannot only be seen as an instrument, which the artist can play live, but also as an autonomous system, which creates rhythms with the help of algorithms. It breathes the flavors of rough mechanics and the early experiments of the classical minimalist movement.



Philip Vermeulen

Ruben van de Ven (NL)

Emotion Hero

What does it mean to feel 48 percent surprised and 18 percent joyful? Over recent years new software has emerged that estimates what people feel based on their facial expressions. *Emotion Hero* is a project consisting of a game and an exhibition that encourage the visitor to investigate how faces and feelings are represented by this software. The central question is what are we looking at when we read emotion scores? Which leads one to wonder what we are looking for in these numbers.



Ruben van de Ven



Jip de Beer

Jip de Beer (NL)

Web Spaces

Web Spaces is an ongoing investigation into the structure of web pages. How can three-dimensional beings, like you and me, explore the virtual landscape of web pages? By rendering the building blocks of a web page in three dimensions, the architecture beneath its surface is revealed.

Mischa Daams (NL)

Origin Sustained

Mischa Daams's project *Origin Sustained* sets out on audiovisual expeditions into the organic universe that results from a feedback loop between an LCD screen and a video camera. In this continuous process of copying and translating, some of the information is lost; this results in the mutation and transformation of the image. In real time a visual environment of abstract patterns unfolds before the eyes of the beholder, taking the viewer on a hypnotizing voyage through the invisible architecture of the devices themselves. The patterns resemble the shapes and behaviors from a world one does not immediately associate with computer chips: biological life.



Mischa Daams

creative industries fund NL



Waag Society (NL)

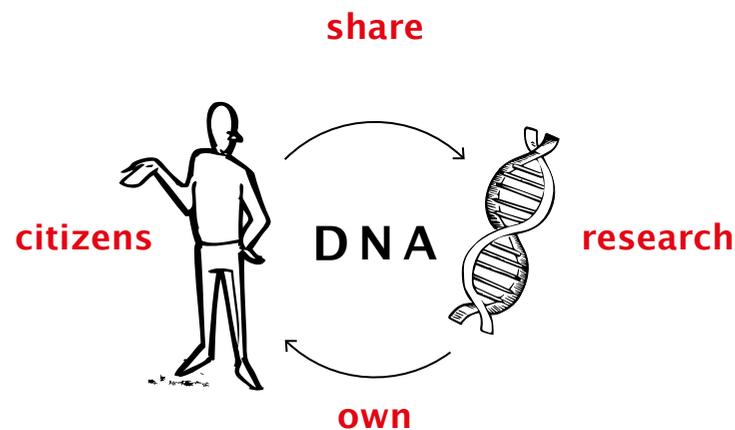
Gene.coop

Recent decades have brought human genetics from laboratory studies to mainstream commercial products. Today's genetic research is a multi-billion industry based on the indisputable value of scientific output for the pharmaceutical industry. The key resource in this value production is the genetic material acquired from individuals through exploitable commercial services to be resold as digitized genetic data to research institutions for profit.

The Waag Society decided to challenge this exploitation with a socially responsible business model of

self-ownership, where citizens remain owners of their genetic material and sequenced data. For that purpose the Waag Society proposes a cooperative institution, fully owned by its members, providing a legal framework for citizens to remain owners of their genetic data during the whole process of its monetization. Such an organization will actively advocate, negotiate and represent citizen interests.

Production: Waag Society (NL)
Support: Creative Industries Fund NL



Špela Petrič

Roland van Dierendonck

Špela Petrič (SI), Günter Seyfried (AT), Roland van Dierendonck (NL), Miha Turšič (SI), Slavko Glamočanin (SI)

Semiotics of the Laboratory

Semiotics of the Laboratory aims to question the symbolic and semantic properties of laboratory practices when they are interpreted at face value—that is, merely through their visual observation, without the narrative that tries to explain their scientific meaning. It is a laboratory observing the interpretation of the laboratory practice itself. The audience exposed to visually enticing experiments will become part of the artwork. The responses of viewers attempting to piece together the narrative of experiments will be captured and integrated into the visuals and soundscape, gradually adding

to the interpretation of activities. The laboratory will feature ongoing experiments such as *in vitro* fertilization of sea urchins, DNA manipulation, column chromatography of blood lysate, thale cress somatic embryogenesis and light-directed manipulation of the protozoan euglena, and will combine with algorithmic processing.

Authors: Roland van Dierendonck (NL), Špela Petrič (SI), Günter Seyfried (AT), Miha Turšič (SI), Slavko Glamočanin (SI)
Production: Waag Society (NL)
Support: Future Emerging Art and Technology, Ars Electronica

FEAT—Future Emerging Art and Technology

For the cross-disciplinary FEAT initiative, six internationally renowned artists teamed up with Future and Emerging Technology (FET) researchers to collaborate during nine-month residencies. The main aim of FEAT is to stimulate the take-up of FET research results and create new, internationally significant forms of impact and innovation. During the residencies, the artists worked closely and hands-on with researchers and scientists on fundamental research in high-risk, visionary areas of novel technologies. These included fields as diverse as gene regulation, quantum physics, underwater robotics, carbon capture and exascale computing. The works of art resulting from these collaborations vary in form, from simulations and visualizations to performances and sculptures. They include the bio-artist Anna Dumitriu's editing of the genome of the *E. coli* bacterium using CRISPR techniques to remove its evolved ability to resist antibiotic drugs, while reminding of us wartime thriftiness in the pre-antibiotic era, and artist group boredomresearch's re-imagining of submersible robots driven not by purpose but rather by their need to collectively express their futility and despon-

dency in the face of the overwhelming pollution of our Earth's waterways. Semiconductor, a pair of artists usually known for their explorations of invisible phenomena such as the noise stars make or how geomagnetism works becomes material, have created an immersive two-channel piece that visualizes quantum probing—measuring the motion and interaction of subatomic particles.

What these artworks have in common is that the artists went on to ask fundamental questions on different scientific issues and their societal impact. Anna Dumitriu's work is a poetic statement about undoing the negative effects of previous technology deployment and pushes current CRISPR applications in new directions. Boredomresearch's work arose from the artists' interest in biological principles of behavior and from consciously contrasting robustness with vulnerability. *Semiconductor* on the other hand investigated the language used to describe the quantum realm—does it represent nature or mainly a human signature and interpretation?

Coordinator: Dr. Erich Prem, eutema
Project partners: Waag Society and youris.com



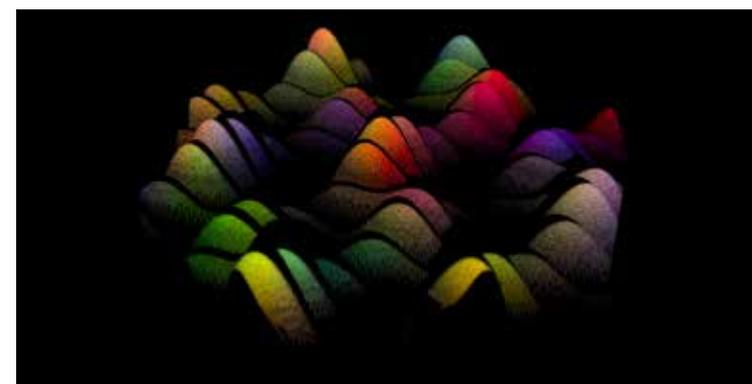
Anna Dumitriu

Anna Dumitriu
Make do and mend by Anna Dumitriu (UK). An antique outfit from 1941 altered with silk impregnated with sterilized CRISPR-edited *E. coli* bacteria to remove the ampicillin-resistance gene. The wartime phrase “make do and mend” was inserted into the bacterial genome.



boredomresearch

Boredomresearch
Still from boredomresearch's (UK) *Robots in Distress*. A generative software program running in real-time with an immersive landscape with behavioral agents.



semiconductor

Semiconductor
Still from the two-channel corner projected immersive CG animation (with sound) of the dynamics of the quantum realm by the British artist duo Semiconductor (UK).



Ars Electronica (AT)

Women in Media Arts

Women in Media Arts is one of the most comprehensive databases dedicated to women working in these genres. It was started with information about women who have made a mark on the 36-year history of Ars Electronica and was opened to the public last year. Now users are called upon to contribute entries about female media artists and have the opportunity to present themselves on the platform even if they have not previously been associated with Ars Electronica.

The database is designed to serve as an active research platform for artists, curators, scholars, scientists and anyone else interested in finding out more about female practitioners in these fields. This database makes no claim to completeness; it

is intended to offer an initial overview and starting points for further research. As an active partner in various school and college programs designed to nurture women's interest in technology and science, Ars Electronica's mission in supporting this project is to contribute to greater public awareness of women working in media arts, to promote new role models and to encourage girls and women to become actively involved in a field that is still dominated by men. The project is a work-in-progress and will be updated on an ongoing basis. It can be accessed via Ars Electronica's online archive at: archive.aec.at/womeninmediaarts/

<http://archive.aec.at/womeninmediaarts/>

Small Cities Forum at Ars Electronica 2017

The opportunities of art, design and creativity as driving forces for regional development

When we talk about innovations, new technologies and cool gadgets we usually think of the big cities as the epicenter of the future. And of course there are many good reasons for this, after all it's there where the elite universities are, the big companies and the investors.

But what about the small cities and regions? Do they necessarily have to lag behind? Can't they become vital places for future innovations as well? Places where new ways of doing business in a much more sustainable way are being developed?

In particular when we look at Europe, a large part

of our economy is based outside the capitals and, no matter what, we need to dig into this potential, we have to bring it up to speed and we have to recognize the power of the local communities and the small and medium-sized businesses. What role can art, design and creativity play and what support is needed to put this potential into effect?

The Small Cities Forum is an initiative by Pordenone Design Week and Ars Electronica Linz to promote the power of small cities and to provide a place for the exchange of experiences and best-practice models.



netidee

Open Source Community Camp

The netidee Open Source Community Camp is a two-day workshop that offers producers of open-source projects the opportunity to consolidate their efforts, to design them with sustainability in mind, and to obtain valuable input from mentors, experts and colleagues. The possibilities include brainstorming new undertakings, enhancing existing initiatives, and recruiting new crew members.



Peter Kopciak (AT), Kevin Pirner (AT), Alexis Ringot (FR), Florian Taurer (AT), Matthias Zeppelzauer (AT)

SoniControl

Acoustic tracking information is increasingly used to exchange information between mobile devices and to track users and their behavior. Beyond this, acoustic tracking makes it possible to track users across several devices. The exchange of tracking information is performed in the ultrasound band, which is inaudible for humans. The user is thus usually not aware of this data exchange. Since more and more users activate their microphones permanently to enable speech inputs, ultrasound tracking can happen at any time.

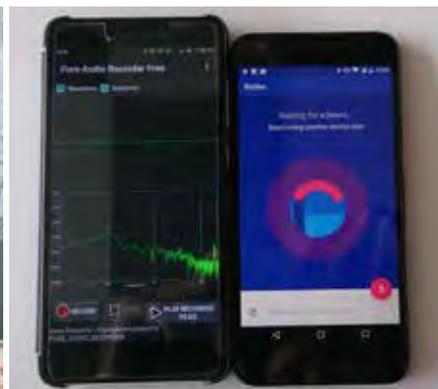
The goal of the *SoniControl* project is the development of a novel technology for the recognition and

masking of acoustic tracking information as well as the development of a mobile application that provides this technology to end-users to protect their privacy. An ultrasonic firewall is developed that recognizes acoustic tracking information and notifies the user about it. Thereby, the users' attention is drawn to this technology. Furthermore, the *SoniControl* technology makes it possible to block undesired acoustic tracking information to preserve the privacy of the user.

Supporters: St. Pölten University of Applied Sciences, Netidee Open Innovations, Internet Privatstiftung Austria (IPA)



Arman Rastegar



Kevin Pirner

Christian Ziegler (AT), Nico Grienuer (AT), Florian Fida (AT)

hoaxly Fake News Game

hoaxly Fake News Game is an interactive installation where people can rate news headlines according to their perceived truthfulness. A headline will be presented on a screen. Players rate the information as true or false by hitting the appropriate Open Trigger buttons. Two smaller screens provide immediate feedback on: whether the player has guessed correctly, the origin of the item in question, its rating on debunking platforms such as Mimikama or Snopes, along with some stats (such as the number of shares on social media) and how other players have done before. The *hoaxly* project provides open-source tools to assist media consumers in becoming more media literate.

Christian Ziegler, Nico Grienuer, Florian Fida, Oliver Köhler, Alexander Sulz, Luis Rosenstrauch, Nika Matzenauer

The project is supported by netidee.



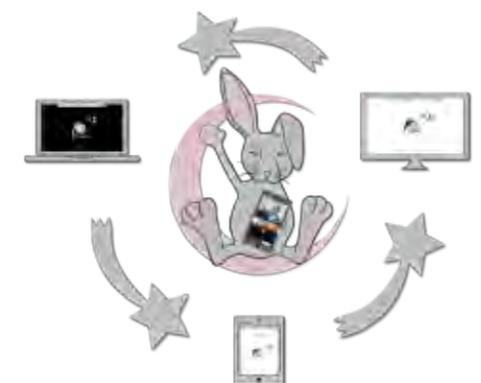
Chiara Cavalli, Martin Heuschöber, Robert Klotzner, Hannes Kohlmann, Aristoteles Riedmann, Romana Roithner, Christian Simulak (AT)

Gonimo

Gonimo is the first free, web-based baby monitor that only needs a web browser to run. That's right! No downloads, no installations. Just visit gonimo.com and start connecting your smartphones, tablets or laptops and transform them into baby monitors. The web-based solution makes the setup time extremely fast, leaving existing conventional solutions (hardware, apps, etc.) behind. The family concept makes it possible to support multi-baby and multi-parent modes. This is a base feature which, so far, has not been a matter of course even among paid apps. Two or more family members can see the baby or babies (for example twins) independently. This makes *Gonimo* a useful tool at home, at relatives or away in a hotel. Both safety and security are an integral part of *Gonimo*: the alarm sounds if the connection is lost, and peer-to-peer encryption

guarantees your privacy. Cute illustrations and animations will let parents recognize that *Gonimo* is the right platform for their needs.

More info at: gonimo.com and facebook.com/mygonimo



Stadtwerkstatt (AT)

STWST48x3

48 Hours MIND LESS

In Urfahr (north Linz) on the Danube and under the slogan *Mind Less*, *STWST48x3*, the third edition of *STWST48*, offers a non-stop 48-hour showcase art extravaganza of the expanding kind. Mindless information, open states of mind, an infolab opposite new media, quasi-coordinates of extended contexts, funky fungi, digital physics and a Meltdown Totale: on the whole *STWST48x3 Mind Less* is addressing new art contexts that have been developed in and around the Stadtwerkstatt Linz in recent years: Infolab is an information concept fundamentally based in aspects of irrationality. The Mycelium Network Society shows communication projects around the basic potentials of fungi and mycelia—developed during the Stadtwerkstatt summer residencies on the survey vessel Eleonore. The art and context research Quasikunst stages a 48-hour meltdown of selected art, technology and robotic coordinates. At the Maindeck in front of Stadtwerkstatt the FACES network celebrates its 20th anniversary & #GetaHead #EatYourCake. In a mix of migrating kitchens, traveling cinema and art agents, these projects also play the public place of the outdoor Maindeck: Cine Traktori, Kunstlabor and Location id: HoME. On the neighboring Danube the Meme project travels from Athens to Linz and offers drinks and hot facts directly from the borders of Europe. And as an extension, the Danube area opens up to the Salonschiff Florentine, and the whole area will be branded under 4040 Lower Eastside / Hafen der Sehnsucht in September for the first time. Watch out: Mind Less Stadtwerkstatt is also

in 2017 under the directive of New Art Contexts and autonomous structures. And also mindless: Mind More nightlife in the STWST Club and the STWST homebase Cafe Strom.

STWST48x3 is a project of Stadtwerkstatt and includes the art projects: Infolab: Franz Xaver, taro, Servando Barreiro. Mycelium Network Society, projects by: Mary Maggic, Servando Barreiro, Azucena Sanchez, Callum Caplan. Mycelium Network Society curated by Shu Lea Cheang, taro, Franz Xaver. Mycelium Network Society in association with Kapelica Gallery in Ljubljana and CycleX in Andes, New York. Mycelium Network Society support from Messschiff Eleonore, Verein halfbit.org. Quasikunst: Tanja Brandmayr. Quasikunst projects: Oliver Schürer, Christoph Müller and Christoph Hubatschke (H.A.U.S.), Lisa Spalt, Tanja Brandmayr. Location id HoME: Shu Lea Cheang. Cine Traktori: Kollektiv Traktori. Kunstlabor: Christine Pavlic, Christoph Ebner. Meme: skywalker e.V. by Stefa Farkashazy, Robinson Stärk, Kiron Guidi, Nani Cooper. Club STWST48x3 curated by Felix Vierlinger. Club host: Patrik Huber.

It is a special pleasure for us to highlight the cooperation with the free radio station Radio FRO and also the net-culture initiative servus.at, both are also working in Stadtwerkstatt: *STWST48x3* in cooperation with Radio FRO and servus.at. Faces: gender, technology, art, www.faces-l.net. Diana McCarty, Ushi Reiter.

4040 Lower Eastside / Hafen der Sehnsucht—a project for urban expansion in cooperation with Salonschiff Florentine.

Crew *STWST48x3*: Franz Xaver, Felix Vierlinger, taro, Christine Pavlic, Jörg Parnreiter, Nathanael-Antu Jenny, Andreas Heißl, Christoph Ebner, Shu Lea Cheang, Tanja Brandmayr, Michael Aschauer.

<http://www.stwst48x3.stwst.at>

Ö1 (AT), Ars Electronica (AT)

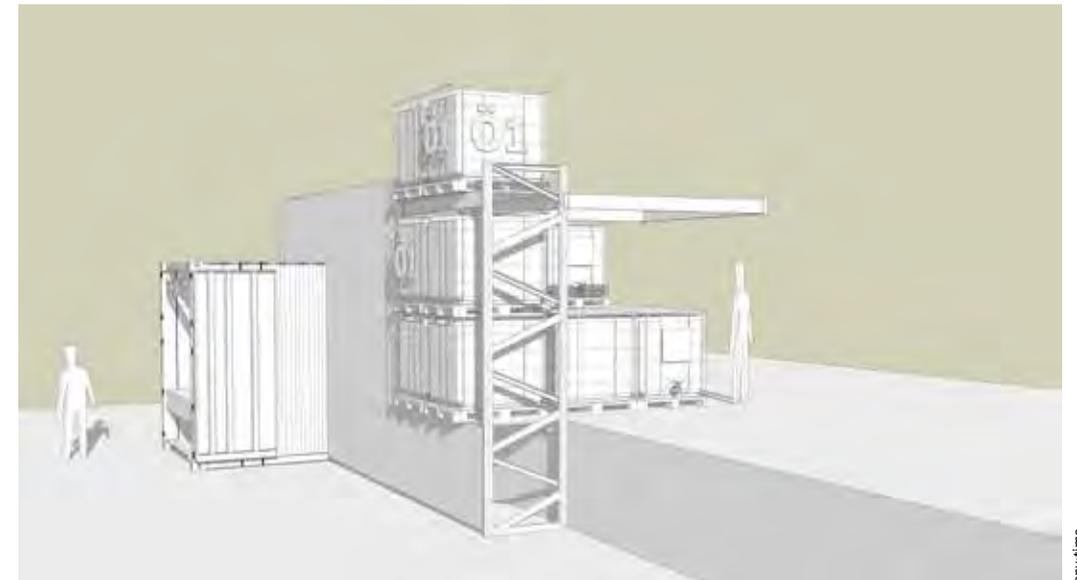
The Mobile Ö1 Atelier

Almost traditionally Ars Electronica Festival and cooperation partner Ö1 stage the Mobile Ö1 Atelier. The living cooperation with Austria's cultural public-radio broadcasting station is once again located at the entrance to the festival's main quarter, POSTCITY.

In 2017 the Ö1 Mobile Atelier is designed by any:time, the Linz-based architect team Jürgen Haller and Christoph Weidinger. The industrial-style pavilion is constructed out of logistics elements, such as an intermediate bulk container and ship-

ping container, and thereby continues the architectural structure of the POSTCITY into the courtyard outside.

Throughout the festival, visitors not only get information about Ö1 and the Ö1 festival program and events at the Ars Electronica Festival; first and foremost, people can experience and get information about a scientific project from the Ars Electronica Futurelab together with an industrial company that makes it possible to pilot a big shovel using nothing but a brain-computer interface mask.



any:time

STWST

STADT WERK STATT



St. E. Kunst, Linz, 19. 10. 2017
STWST48x3 MIND LESS
STWST / Infolab / Cine Traktori / Kunstlabor



Samuel Aranda, MSF

Klaus Dieterstorfer, IOG

Klaus Dieterstorfer, IOG

Klaus Dieterstorfer (AT)

Empathic Gateway

How empathetic can a construct of zeros and ones actually be? A technological miracle or just complex statistics? What makes a person a human being, and a machine a machine? Is it possible for machines to transcend their physical and mental limits, just like some people do in extreme situations? These are the questions addressed by *Empathic Gateway*, an exhibition organized by Engineers without Borders, Reporters without Borders and Doctors without Borders.

BIO AUSTRIA (AT)

Farmers' Market

Bio Austria is the association of Austrian organic farmers and thus the advocacy group for organic farming in this country. With approximately 12,500 members, it is also Europe's largest organic farming association. Bio Austria supports its member operations in all aspects of organic farming and product marketing, and advocates their interests. Bio Austria also provides consumers with comprehensive information about the achievements organic agriculture and the extraordinary quality of organic foodstuffs.

Organic farming is the most modern form of agriculture because it protects the climate, soil, water and biological diversity. In organic agriculture, technology and machines are employed in an intelligent way. But organic farming also calls for people, since its very cornerstone is a feeling of closeness to humankind's domesticated animals and our environment. Technologies and machines are intelligent aids—no more and no less!

The Bio Austria Farmers' Market is set for Saturday, September 9. Upper Austrian organic farmers will be on hand with a wide selection of regional, organic agricultural products. Festivalgoers can look forward to tasting high-quality organic foods and engaging in one-on-one chats with organic farmers.

<http://www.bio-austria.at>

Supported by Bio Austria Upper Austria





Marcel Rodriguez

Oval Sound (ES)

Oval

Oval Sound is a music technology startup providing tools and services to enhance customer in their personal quest to enjoy the creation of sonic beauty. The *Oval* is our first product, a new electronic musical instrument designed from the ground-up to revolutionize music creation, learning and live performance. The *Oval* comes with its own multi-platform synthesis and effects app which when paired together, create a truly immersive playing experience. The aim of Oval Sound is to fill the gap that exists in the current market, developing disruptive

musical instruments and also software for educational and musical games, connecting artists with kids and music enthusiasts.

Oval consists of a team of ten passionate people working in Barcelona. Oval started as a project to solve a personal need of the touring Handpan musician. Its aim is to provide musical technology solutions to music lovers, percussionists, music therapy applications and musical edutainment.

Co-founders: Alex Posada, Ravid Goldschmidt

SOFEA (DE)

Top Swing Golf Robot 3.0

SOFEA's *Top Swing Golf Robot 3.0* is an electronically controlled swing robot made in Germany. Beginners, advanced players and professional golfers can work on their own individual swing. The *Top Swing Golf Robot 3.0* allows the individual nuances of every swing to be taken into account, making it possible for golf instructors and students to work in a focused and refined manner on details of the swing. Golf players can train on their own. The sensors will initiate the swing by a simple push on the club in the set-up position and the golfers are then

guided through the whole swing or segments of it. Golf players can save their optimal swing curves for future use by integrating their own swing trends, body height and range of motion. The instructor can define the path of the club without being forced into a particular system. The swing can be set to steep or shallow, fast or slow, while the wrists can be set early or late in the swing while taking geometric circumstances into consideration. All release and swing concepts can be adjusted accordingly throughout the computer program.



Isel Germany AG

The Ecosystem of Ars Electronica

What we have built at Ars Electronica is an ecosystem for creativity and innovation by bringing together art, technology and society. This ecosystem not only supports and enables a wide range of artistic developments and achievements, it also allows for pioneering technological developments; because it replicates the artistic thinking process from inspiration to experiments to creation, involving a wide range of disciplines and skills. This ecosystem revolves around the triangle of art, technology and society, which was already coined for the first Ars Electronica Festival in 1979 and since then has developed into a broad spectrum of activities:

At the **Ars Electronica Festival** in September of each year we bring together artists and scientists, creators and engineers, activists and economists from all over the globe to present their work and visions of the future. It is a great feast of eclectic, enchanting, intriguing and catching creations, a unique environment of intense discussions and inspiring encounters.

The **Prix Ars Electronica** is the world's most highly regarded award for artists working with science and technology. With about 4000 submissions from more than 100 countries it is an impressive documentation of the dynamic field of digital and media arts. The presentations by the award-winning projects and artists are special highlights of each Ars Electronica Festival.

All year round, with its exhibitions and programs the **Ars Electronica Center** focuses on educating people about how new technologies and sciences are changing their lives as well as getting them take to part in the process through interactive displays and experiences. The very special education and participation programs have earned the center its reputation as the School for the Future.

The powerful pillar for research and development is the **Ars Electronica Futurelab**, a place where we take inspiration and needs and create answers together, with artists, engineers, developers, all working as a team from the very early stages of art projects as well as commissioned research projects.

The two spin-offs of the Futurelab—**Ars Electronica Solutions** and **Ars Electronica Spaxels**—are bringing the creations and prototypes that emerge out of this ecosystem onto the market and supporting local industry and business in their development of new products and services.

u19 – CREATE YOUR WORLD is the title of Ars Electronica's exciting programs for and with young creators. Since 1998 we have been celebrating and supporting the creative and innovative ideas of young people and their visions for our world of tomorrow.

Based on its broad international network of artists and creators and the rich experience of curating and producing festivals and exhibitions, Ars Electronica has become an attractive collaborator for many museums, festivals and exhibition venues worldwide. As **Ars Electronica Export** we realize exhibition and workshop programs worldwide, each tailored to our partners' needs.

With a permanent presence and activities in Tokyo and Osaka, **Ars Electronica Japan** is engaged in artistic projects, collaborations with universities and museums as well as research, development and consulting projects with many leading Japanese companies.

The goal of **Ars Electronica Education** is the development and practical evaluation of new innovative methods and technologies for education and knowledge transfer with special consideration of new digital media. The applications range from kindergartens and schools to special programs for universities and professional training and qualification services for business and industry.

The **Ars Electronica Archive** is a unique collection of descriptions and documentations of more than 75,000 projects which have crossed the path of Ars Electronica since 1979, a unique opportunity to research the cultural impact of the digital revolution.

ARS ELECTRONICA

Ars Electronica Center

Museum of the Future

This is a time of transition for the institution known as a museum. Since its very inception in 1996, the Ars Electronica Center has been addressing the question of what a Museum of the Future ought to be like. Right from the start, the Ars Electronica Center has considered itself an experimental laboratory to learn how imparting educational material can function in an information-based society. Since its architectural makeover and reopening on January 1, 2009, more than one and a half million people have visited the exhibitions and attended the events held in Linz's Ars Electronica Center. A key component of its success has been the concept of situating open labs among the exhibits, and of creating a museum that makes carrying on a dialog with people the core of its mission. Change is another essential element of the Museum of the Future, an institution that reinvents itself on an ongoing basis while remaining true to its basic principles of dealing with the interplay of art, technology and society, and establishing a public setting for participation, conversation and fascinating discussions.

Leading protagonists in this interactive process are the Infotrainers, who regard the exhibitions as their instruments and use stimulating stories and flashes of inspiration to get visitors involved in what they are looking at and to link it up to their everyday lives, local surroundings and personal experiences. Infotrainers get into a conversation with the members of the tour groups they guide, help them to formulate questions related to our shared future and offer them potential answers to consider on their own. In doing this, Infotrainers can reference current trends and configure the interaction with laypeople as a form of give-and-take among peers—after all, the Infotrainers themselves come from a wide variety of backgrounds and have acquired their expertise from a broad spectrum of fields including biotechnology, sociology, art, design, teaching and psychology. The Museum of the Future is one of the cornerstones of Linz's cultural landscape. It is a museum that pays attention to what people are saying.

The Ars Electronica Center as an Extracurricular Teaching Facility for Colleges

There is a long tradition of intensive cooperation between the Ars Electronica Center and Upper Austria's universities and universities of applied sciences. The Museum of the Future is thus not only a site for extracurricular learning by elementary and intermediate school pupils; it is also an extramural educational institution for college students.

Linz Art University and Ars Electronica have been working together closely for many years now. One of Linz Art University's degree programs that has been a frequent guest at the Ars Electronica Center is Fashion & Technology. The "Technologies of the Future" course offers an overview of and insights into Ars Electronica as an apparatus for reflecting

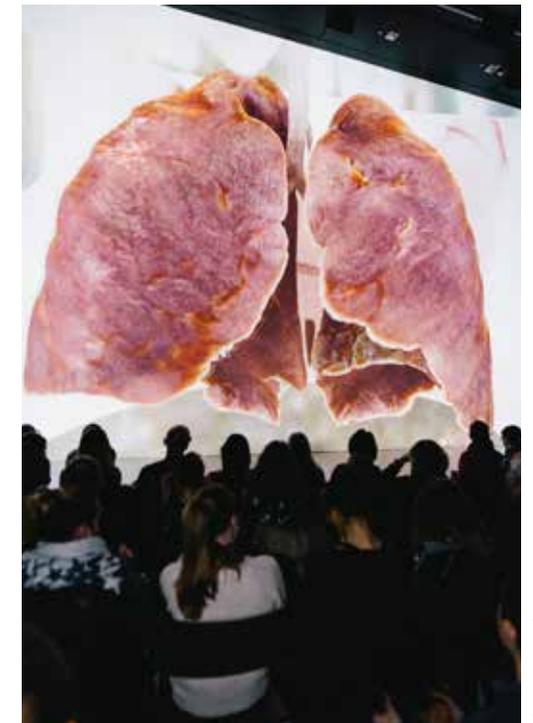
on the future, but, even more importantly, it is a setting for students to try out methods for exploring and understanding the world. The aim is to get young people to see the big picture, to act outside the box, and to develop curiosity for what is happening in other fields.

Another collaborative project of Linz Art University and Ars Electronica is the TIME OUT exhibition series, which enables young media artists in the school's Time-Based and Interactive Media program to show their work in the Ars Electronica Center.

Since winter semester 2014-15, the Time-Based and Interactive Media bachelor's program also offers a course entitled Deep Space. Under the supervi-

sion of program director Prof. Gerhard Funk and in cooperation with Ars Electronica, undergrads can develop their own content for Deep Space 8K that takes full advantage of the facility's laser-tracking system and dual 16x9-meter projection surfaces on the hall's wall and floor. The students at the Upper Austria University of Applied Sciences' Hagenberg Campus were also so fascinated by Deep Space 8K that they created their own applications for it. They developed the Game Changer Suite—a collection of interactive multiplayer games. For the 2017 Ars Electronica Festival, there is a new interactive game in which players bring their whole body into play to virtually dispose of trash with the help of

a robot arm. A collaborative arrangement with the Upper Austrian University of Applied Sciences for Health Professions debuted in 2017. The school succeeded in recruiting Dr. Franz Fellner, head of the Department of Radiology at Kepler University Clinic, to teach its Introduction to Anatomy course. But the classes were not in some boring old lecture hall; instead, they were held in the Ars Electronica Center's Deep Space 8K, where Dr. Fellner could use Cinematic Rendering software together with his considerable oratorical skills to impressively elaborate on human anatomy. And on five occasions the general public was also invited to participate in this extraordinary learning experience.

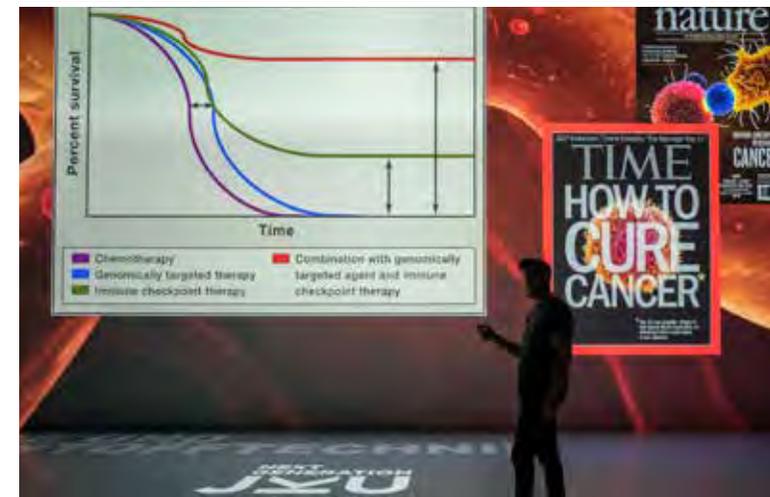




Robert Bauernhansl



Christopher Sommerleitner



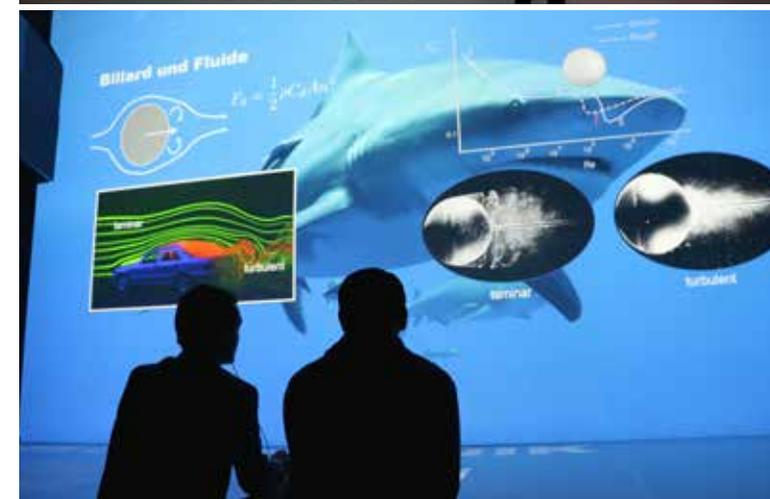
Robert Bauernhansl

NEXT GENERATION JKU Next Generation JKU

Who makes up the next generation of young scientists at Johannes Kepler University Linz (JKU)? Who are the up-and-coming Upper Austrian researchers who are making an international name for themselves in computer science, chemistry, physics and other technical and scientific fields? And what exactly are they working on? They are virtually unknown in their homeland, Austria. Now, it was high time to change that!

To do so, Prof. Alois Ferscha, dean of the Faculty of Engineering and Natural Sciences at Johannes Kepler University Linz, initiated a series of talks entitled *Next Generation JKU*. On five evenings, successful young scientists at work across the technical and scientific spectrum presented their latest findings. Though largely unknown in Austria, this is cutting-edge research by the next generation of brilliant scientists, whose work is already being cited in the foremost international journals in their respective fields. With the help of the state-of-

the-art visualization technology available in Deep Space at the Ars Electronica Center, six science stars elaborated on their socially relevant results in a way that is understandable to laypeople here in Austria. The topics included improved diagnosis and treatment of cancer through the use of big data (Marc Streit, Institute of Computer Graphics), state-of-the-art approaches in cancer immunotherapy (Ian Teasdale and Wolfgang Schöfberger, Department of Chemistry and Polymer Engineering Technology), recent insights and new research approaches in theoretical physics (Robert Zillich, Department of Theoretical Physics), industrially significant multiphase processes such as the production of polyethylene (Simon Schneiderbauer, Department of Mechatronics) and innovative procedures for using computer software to confirm mathematical theorems such as the Kepler conjecture (Christoph Koutschan, Johann Radon Institute for Computational and Applied Mathematics).



Magdalena Sick-Leitner

Schools Program

Catalyzing education and enabling learning should not only be left up to schools; this is high on the agenda of society as a whole. Accordingly, institutions that reflect current thinking on social issues—cultural organizations, for instance, must also bear this huge responsibility, and it is incumbent upon them to take this into account in formulating their mission and working towards achieving it. Thus the Ars Electronica Center—the Museum of the Future—also sees itself as the School of the Future. In full cognizance of the significance of this duty, the Ars Electronica Center is doing its bit for progressive access to education.

We are aware that we live at a time in which there is a pervasive feeling that hardly anything has permanence and long-term reliability, and in which new digital technologies, scientific findings and the possibilities opened up by them literally cry out for new methods that make schooling a learning process that is in tune with the times for young people and can enable them to optimally acquire the values and skills they need to get along in the

contemporary world. As a Museum of the Future that eschews implicit hierarchizing in its dealings with science, art, technology and their social consequences, the Ars Electronica Center offers our students an extraordinarily fertile substantive setting for encounters at the exciting nexus of these three domains. With our state-of-the-art themes and the pioneering mindgames developed from them, we as a museum can connect with youngsters and their reality in an insightful, nurturing way, and help them get beyond a narrow-minded perspective to see the big picture. We accompany pupils as they explore phenomena that are multidimensional, complex and ambivalent, and impart sufficient information to them to use their self-motivated freedom to act to form their own opinions.

We are delighted to open our doors to school classes with over 40,000 pupils each year, to expose them to our themes and enable them to avail themselves of the rich educational offerings designed to motivate them to reflect about everyday life now and in the future.



Martin Hieslmair



Magdalena Sicks-Leitner

AEC Ambassadors and Continuing Professional Education for Teachers

The question that we in the museum's educational division face on a daily basis—namely, how educational strategies can function sustainably—not only entails consideration of pupils; teachers are part of this equation too. If we want our youth to be well-prepared for the future, then we have to regard updating teaching methods as equally important as reaching pupils. Our educational mission thus also encompasses continuing professional education for teachers. Our approach is: We make them conversant! Familiar with topics, technologies and developments that digital non-natives such as our teachers did not grow up with. By reducing this gap between teachers and their material, we impart a self-confident approach to teaching and a knowledge basis that teachers can utilize in their class-

room instruction and develop further. This contact is very important to us. Developing continuing professional education offerings that deliver exactly what teachers really need obviously calls for a process of reciprocal feedback. We achieve this with our ambassadors—educational opinion leaders who function as multipliers. On one hand, their role is to make the Ars Electronica Center's educational program known in their school; on the other hand, they let us know the needs of their teachers. Our ambassadors are dispersed throughout Austria. In return for their readiness to serve a good cause, we offer year-round benefits such as invitations to the festival and our Ambassadors Day, discounts on bookings and exclusive information.

The cell is swell! Can't you tell?

Grades 1–4, 2.5 h

Cells are not only tiny single-room dwellings; they are also the basic building blocks of all living things. And some are rather spacious. Each cell must perform a particular function—just like the manmade machines we are familiar with. Pupils learn about the interior design of these wondrous chambers and become architects and builders of their own cellular sculptures—perhaps modeled on the cells of their own body; maybe based on their own creative conceptions of how such cells function.



Magdalena Sicks-Leitner

Future Matters: What tomorrow's materials will be like

Grade 5 and up, 2.5 h

Every epoch has its material! In the 1960s, plastic was celebrated as the mother of all miracle substances; today, researchers are working on programmable materials and intelligent fabrics. We dream of stuff that can recognize our needs and adapt on its own to changing situations and other facts and circumstances. In this workshop, pupils do materials R&D in a setting that makes high-end technology available and is also conducive to having fun with creative experimentation.



Christopher Sonnleitner

PhiloLab: Fake or Fact? The Truth . . . more or less

Grade 7 and up, 4.5h

We regard philosophizing—making sense of what transpires in the world, reflecting on phenomena and forming an opinion about them—as an essential objective of education. We would like to contribute to this, so we set up PhiloLab to make contemplation a doable process. We have been focusing on truth this school year since “post-factual” was declared 2016’s Word of the Year and in the wake of this phenomenon’s impact on the media and how they are perceived. It seems as if truth and falsehood have been annulled as categories, and the echo chambers of the information delivery networks have been doing their damndest to make sentiments come across like facts. Is reality merely a feeling? In a diversified sequence of program points and a concluding discussion with media psychologist Martina Mara, pupils are called upon to question information and acquainted with ways that truths can be verified so that substantiated opinions can be formed.



Florian Voggeneder

Kids’ Research Lab

We at the Ars Electronica Center have turned the concept of a laboratory on its head. Our Kids’ Research Lab is a place for research, experimentation, discovery and comprehension. After all, as Albert Einstein realized, “play is the highest form of research.” Accordingly, we have made this our maxim and set up a space that encourages four- to eight-year-olds to engage in understanding-via-play and having fun trying out new things. Amid a mix of new technologies and familiar materials, the very young generation can spend quality time in the Museum of the Future and thereby enjoy their first baby steps into tomorrow.

In *Space Station*, a new feature that opened earlier this year as the spinoff of a temporary exhibition entitled *Spaceship Earth*, kids can take a playful approach to our amazing cosmos. Hidden within various boxes are instructions and experiments to

do with outer space. Our mission is to motivate children at an early age to think scientifically and get acquainted with technology. This is also the point of a project launched by the European Space Agency (ESA): the European Space Education Resource Office (ESERO), whose Austrian bureau is located in the Ars Electronica Center.



Martin Hieslmair

ESERO Austria— Inspiration Outer Space

Austria’s first European Space Education Resource Office opened about a year ago in the Ars Electronica Center. ESERO is a project of the European Space Agency (ESA) and its educational partners in various European countries. Its mission is to integrate space exploration into classroom instruction as a means of fostering young people’s interest in mathematics, computer science, the natural sciences and technology. To achieve this goal, numerous activities have been staged in the past year—first and foremost for teachers, but for pupils too.

Since its establishment, ESERO Austria has hosted twelve continuing professional education sessions for teachers. One of the objectives has been to impart fundamental knowledge of our solar system to teachers and to acquaint them with topics like space exploration and Earth observation; these workshops are also designed to show them the most effective ways to integrate these topics into classroom instruction.

Interesting for teachers and students alike was Community Day in autumn 2016, when the Association of Space Explorers (ASE) brought 100 astronauts and cosmonauts from around the world to Austria. Space travelers Michael Fincke, Oleg Germanovich Artemyev, Kimiya Yui and Nikolai Michailovich Budarin gave accounts of their explorations of the cosmos at the Ars Electronica Center. This was a unique opportunity for pupils to meet real astronauts and to ask them questions. Kimiya Yui gave a speech entitled “Turbocharging Instruction with Outer Space” especially for teachers.

Another highlight for pupils was this year’s Mission X: Train like an Astronaut, an international student competition with the accent on fitness and nutrition. The wrap-up event on May 3, 2017, was held at the Ars Electronica Center. Almost 400 elementary-school pupils from throughout Austria took part; featured guest was “Astronaut” Franz Viehböck. One of ESERO Austria’s highpoints during the 2017-18 school year will be hosting the international



Martin Hieslmair



Magdalena Sick-Leitner

CanSat competition, which is being held in Austria for the first time. This event gives youngsters aged fourteen and over the opportunity to launch their homemade miniature satellites via rocket to an altitude of 1,000 meters. While the satellites are parachuting back to earth, they have to carry out three missions: measuring temperature and air pressure, as well as a scientific-technical task selected by the competitor. The CanSat project enables young people to go through the sequences and phases of a real space mission.

This project is financed by the ESA, the Austrian Ministry for Transport, Innovation and Technology (BMVIT) and Austria’s Research Promotion Agency (FFG).

<http://www.aec.at/esero>

Apprentice Days at the Ars Electronica Center

This was the first year that the Ars Electronica Center hosted Apprentice Days in cooperation with the Federation of Upper Austrian Industry. This two-day program for apprentices at Upper Austrian businesses enabled young people to get a close-up look at the world of Industry 4.0.

A fallacy that is widespread in modern-day society asserts that the only occupations that will remain in our increasingly digitized world will be highly qualified ones open only to graduates of a university or university of applied sciences. It is likewise untrue that young people who have completed an apprenticeship will have dim prospects on the labor market. The only difference from how things used to be is that information technology skills now increasingly constitute a precondition in the crafts and trades too.

In order to prepare apprentices for these changes in the workplace, sixteen of Upper Austria's foremost companies took part in a two-day Industry 4.0 Apprentice Program at the Ars Electronica Center. The various exhibits about the Ars Electronica Center immersed the young trainees in the digital world in an informative, playful way. After all, what Industry 4.0 will actually constitute has not yet been finally determined, and as the skilled workers of tomorrow,

today's young people will have a say in shaping this development.

Posing critical questions is an important part of dealing with technologies, which is why the Out of Control exhibition is a core element of this program. Here, young people confronted such key issues as hate postings on Facebook, cyber-bullying among kids, and digital surveillance. In the FabLab, apprentices discussed leading-edge technologies that are already in use in industry, design, medicine and research—for example, rapid prototyping, the laser cutter and 3D printing—and that could soon be part of individual design and production processes. In the RoboLab, following a brief introduction to the history of robotics, young people got acquainted with social robots such as Paro, the robot seal that responds to its name and reacts to touch, and RoBo-HoN, the world's first mobile robot cellphone.

There were more interesting insights on day two. Many apprentices are already familiar with industrial robots from their own workplace, but at the Ars Electronica Center, they got to attend a workshop that taught them to construct a remote control to hack their mechanical colleagues. So we are looking forward to reports of what tasks these apprentices then got their robot arms to perform on their behalf.



Hiroshi Ishii, Tangible Media Group, MIT Media Lab

RADICAL ATOMS: Materials by Design

On view in the RADICAL ATOMS exhibition from September 7

The biological material structures across nano, micro, meso and macro scales have always been a source of inspiration to engineers and designers. With 3D printing and other advanced digital manufacturing techniques, designers can approximate nature's process of shaping things at micrometer scale. This bottom-up process blurs the boundary between a product and a material, where the function of a product can be specified by material design rather than assembly.

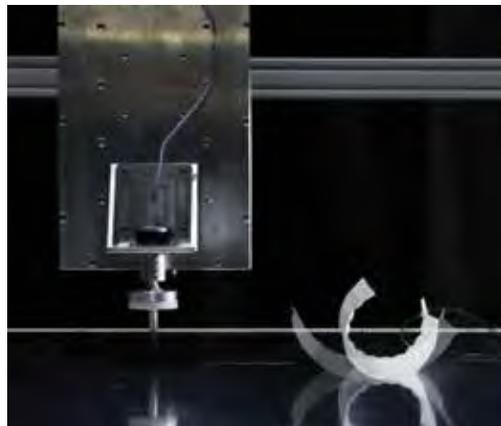
This exhibition showcases some of the research work at the Media Lab that takes the advantage

of a high-resolution 3D printer to produce a series of materials such as hair, foam and hinges, with sensing and actuation capabilities. The ability to programmably assemble materials with tailored architectures at the centimeter, millimeter and micrometer scales enables tunable mechanical, optical and electrical properties. It proposes an inversed way of designing an interactive system, where the input and output is defined by a bottom-up material fabrication process, rather than top-down affordance-, metaphor- and aesthetics-driven design approach.

aeroMorph

The project investigates how to make inflatable origami structures with various materials. With *aeroMorph* a universal bending mechanism is introduced that creates programmable shape-changing behavior in paper, plastics and fabrics. The specially developed software tool generates this bending mechanism for a given geometry, simulates its transformation, and exports the compound geometry as digital fabrication files. A custom heat-sealing head that can be mounted on normal 3-axis CNC machines to precisely fabricate the transforming material is presented. The creators envisage that this technology could be used for designing interactive wearables and toys, and in the packaging industry.

Research: Jifei Ou, Nikolaos Vlavianos, Melina Skouras, Felix Heibeck, Chin-Yi Cheng, Jannik Peters, Hiroshi Ishii
Exhibition: Jifei Ou, Nikolaos Vlavianos, Hiroshi Ishii



Jifei Ou, Tangible Media Group | MIT Media Lab



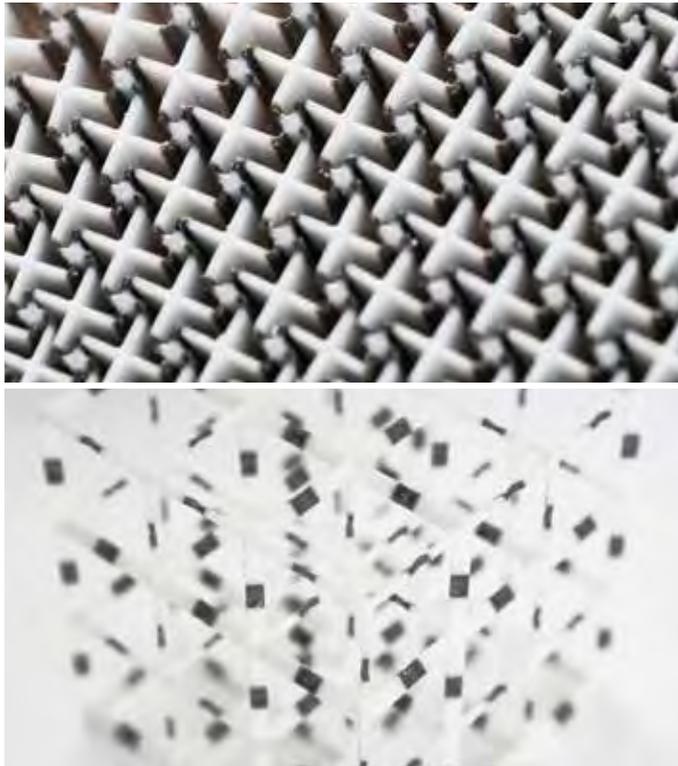
Jifei Ou, Tangible Media Group | MIT Media Lab

Cillia

Cillia is a means of 3D-printing dense hair structures using programmable functions. It is a technical solution and a design innovation of future synthetic fur. Nowadays it seems as if 3D printers can spit out just about anything, from a full-size sports car to edible food to human skin. But some things have defied the technology, including hair, fur and other dense arrays of extremely fine features, which require a huge amount of computational time and power to design and print. *Cillia* has been developed to quickly and efficiently model and print thousands of hairlike structures. Using conventional computer-aided design software would mean drawing thousands of individual hairs on a computer,

translating each hair's contours into a mesh of tiny triangles, and then turning cross-sections of that mesh into layer-by-layer pixelated instructions for the 3D printer to follow—a process that would take hours. *Cillia* bypasses all that with a new voxel-based printing software platform that lets users define the angle, thickness, density and height of thousands of hairs in just a few minutes. This method makes it possible to design and generate hair geometry at 50-micrometer resolution and to assign various functionalities to the fur.

Research: Jifei Ou, Mike Wang, Gershon Dublon, Chin-Yi Cheng, Karl Willis, Hiroshi Ishii
Exhibition: Jifei Ou, Nikolaos Vlavianos, Hiroshi Ishii



Jifei Ou, Tangible Media Group | MIT Media Lab

kinetiX

The project investigates linkage-based structures on the meso scale for designing transformable materials. *KinetiX* introduces a cellular-based material design composed either of rigid plates or rigid bars and elastic hinges. Different combinations of these elements lead to a multitude of shape-changing possibilities and create metamaterials that exhibit tunable mechanical behavior and properties, for example permeability, a negative Poisson's ratio, and others.

A simulation of *kinetiX* structures enables the assessment of a wide variety of design options. This specifies the material and its characteristics, and an applicable mathematical model is derived from it. This model takes the physical properties and design

features of *kinetiX* into account and constitutes the requirements for the software architecture design. Then the model is implemented and multiple configurations of *kinetiX* are simulated in order to define a library of different shape-changing options. This library permits a rapid design approach and proves the versatility of *kinetiX*. In addition, the improvement potential of the model and its implementation are discussed, as well as possible expanding algorithms. One feasible expansion option, for example, is the implementation of an algorithm to generate more complex shape-changing applications.

Research: Jifei Ou, Jannik Peters, Karl Willis, Hiroshi Ishii
Exhibition: Jifei Ou, Nikolaos Vlavianos, Hiroshi Ishii

The Alchemists of Art and Science

Opening on October 25, 2016

Intensified eagerness to engage in interdisciplinary collaboration has been evident in recent years not only among scientists and artists; more and more institutions are following suit as well. In this spirit, CERN and ESO have recently been joined by the ESA, which has opened up its research facilities to artists-in-residence within the framework of the European Digital Art and Science Network, a project subsidized by the EU.

As a member of an extensive network of cultural institutions in Europe and other parts of the world, Ars Electronica is displaying works created in conjunction with these artist-in-residence programs and also staging a series of exhibitions showcasing exciting, innovative projects at the nexus of art and science. New methods of fabrication and of 3D printing, concepts for rapid prototyping, work in the field of 3D animation, and artistic strategies for the visualization of scientific data—the exhibitions cover a broad range of approaches, many of which are still in the prototype stage. The Alchemists of Art and Science, the second installment in this series, spotlights speculative, futuristic visions that have emerged from the amalgamation of artistic and scientific approaches—for instance, wearables that measure cosmic radiation in their immediate surroundings; clothing grown out of fungi; a 3D-printed lamp that you can create at home with an app and a laser scanner, wearable devices designed to reduce your CO₂ output, and concepts for interactive windshields.

WORKS

Stones, Quadrature (DE)
Masses, Quadrature (DE)
RoBoHoN, Tomotaka Takahashi (JP)
Ready to crawl, Hiroshi Sugihara (JP)
Interface I Doku, Ralf Baecker (DE)
Single Stroke Structures, Artist Lab Yasuaki Kakehi (JP)
 Florence, Helene Steiner (DE)
Floraform, Jessica Rosenkrantz (US), Jesse Louis-Rosenberg (US) / Nervous System (US)
MycoTex–Neffa, Aniela Hoitink (NL)
Beyond Prototyping, Jussi Ängeslevä (FI)
Phytowalkers, Artist Lab Yasuaki Kakehi (JP)
Loopers, Artist Lab Yasuaki Kakehi (JP)
Kinematics Dress, Jessica Rosenkrantz (US), Jesse Louis-Rosenberg (US) and Nervous System (US)
Implant, Eric Dyer (US)
CHOZUMAKI, Nelo Akamatsu (JP)
“Can you hear me?”, Christoph Wachter (CH) and Mathias Jud (CH)
Anarchive’6, Masaki Fujihata (JP) and Anne-Marie Duguet (FR)
CIID-Showcase, CIID Copenhagen Institute of Interaction Design (DK)
Obscurity, Paolo Cirio (IT)



Christopher Sonnleitner



Martin Hiestmair



Christopher Sonnleitner

Creative Robotics

Opening on February 9, 2017

The Creative Robotics exhibition showcased industrial robots outside of their natural habitat—the factory floor—and dealt with them as tools of creative expression. In cooperation with KUKA, Linz Art University's Creative Robotics Lab, the Department of Robotics at the Johannes Kepler University Linz, the Robotic Woodcraft research project carried out jointly by the University of Applied Arts Vienna and the Association for Robots in Architecture, RWTH Aachen University's Faculty of Architecture, and the Institute for Computational Design at the University of Stuttgart, we considered new areas of deployment and fields of application of industrial robotic technology. Even the creative economy has increasingly been discovering the multifarious possibilities afforded by these innovations. Here, robotic arms are not being utilized in conventional fashion for mass fabrication but rather as catalysts for innovation in the visual arts, design and architecture.

WORKS

Fluxuri, Marc Printz
Kinetic Weaving, RWTH Aachen University
Robotic Woodcraft, Robotic Woodcraft
Tailored Structures, Martin Alvarez, Erik Martinez
Robot, Doing Nothing, Robotic Woodcraft,
 Emanuel Gollob, supported by Johannes
 Braumann UFG
Self-Balancing Cube, Johannes Kepler
 Universität Linz



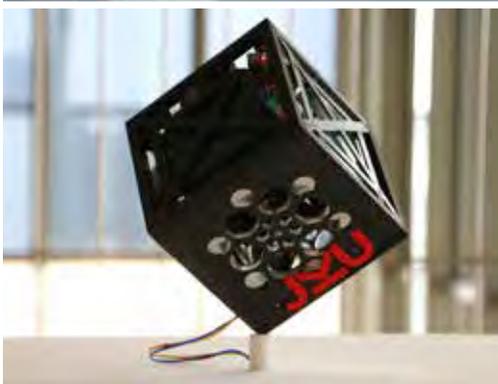
Martin Hieslmair



Martin Hieslmair



Martin Hieslmair



Magdalena Sick-Leitner

Beyond the Lab: The DIY Science Revolution

Opening March 29, 2017

On March 29, 2017, the touring exhibition *Beyond the Lab: The DIY Science Revolution* started at the Ars Electronica Center. It is the centerpiece of the SPARKS project, an ambitious awareness-raising and engagement European project (Horizon 2020-funded) that aims at promoting the concept of Responsible Research and Innovation (RRI) among citizens and other stakeholders in 29 European countries (28 member states of the European Union and Switzerland).

Beyond the Lab tells the stories of a growing number of DIY scientists around the world who are busily hacking, experimenting and inventing in the field of healthcare. In addition to seven personal science stories, the three works produced by artists-in-residence at the Ars Electronica Futurelab last year are shown: *Agent Unicorn* by Anouk Wipprecht (NL), *BeBots* by Jakob and Lea Illera (AT) and *The Institute of Isolation* of Lucy McRae (UK).

WORKS

The Institute of Isolation, Lucy McRae with
 Lotje Sodderland
Agent Unicorn, Anouk Wipprecht
BeBots, Jakob Illera and Lea Illera
The DIY antibiotics hunters, Pieter van Boheemen
The lab in a box, Philipp Boeing and Bethan
 Wolfenden
The expert patient, Sara Riggare
The online innovation hub, Pedro Oliveira
 and Helena Canhão
The diabetes hacker, Tim Omer
The mosquito mapper, Doreen Walther
The campaigner for clean air, Shazia Ali-Webber



Florian Voggenreder



Magdalena Sick-Leitner



Magdalena Sick-Leitner

TIME OUT .07

Timebased and Interactive Media meets Ars Electronica Center

TIME OUT .07

Opening on May 23, 2017

Linz Art University and Ars Electronica have been working together closely for many years now. One collaborative project has been the TIME OUT exhibition series, which enables young media artists in the school's Time-Based and Interactive Media program to show their work in the Ars Electronica Center. This BA program offers comprehensive and highly professional approaches to the theory, technology and design of digital media. It is geared towards students interested in gaining in-depth skills and wide-ranging experience in the areas of video, audio, installation, interface and interaction. In this program, the accent is on providing students with plenty of creative latitude to express themselves using the means afforded by audiovisual technology, to experiment with digital media and to bring their own ideas to fruition.

TIME OUT.07 featured nine interactive installations that the students installed in the museum themselves and personally presented at the exhibition's opening.

WORKS

- Coming Home*, Lisa Bickel
- E + F - K = 2*, Fabian Erblehner
- A Light-Driven Standstill*, Katharina Gruber
- How to Infiltrate a Group of Friends*, Sarah Hiebl
- Greetings*, Clemens Niel
- REFRAMING*, Katharina Pichler
- All of Us*, Marlene Reischl
- Wachstropf*, Domas Schwarz
- Eyes to the Ground*, Dominik Galleya



Martin Hieslmair

What would Ted Kaczynski's daughter do . . . ?

Opening on June 21, 2017

The *Marianne.von.Willemer. Prize for Digital Media* provides financial support directly to female artists. It honors women who use digital media as an artistic tool and means of expression. This prize is meant to single out for recognition innovative works of art characterized by the use of or the explicit reference to digital media. Kathrin Stumreich is the recipient of the 2016 *Marianne.von.Willemer.Prize* in recognition of her work *What would Ted Kaczynski's daughter do . . . ?* The jury was delighted by its sense of humor, its critique of media and its take on an ambivalent society of technophobic users and true believers in technology.

Chrystal Tesla, the figure created by Kathrin Stumreich, is the artist's response to issues of

surveillance, anonymity and identity in a reality dependent on digital media. Tesla's fictional backstory is loaded with allusions to the history of media and culture; her form is a reference to the stylized self-depiction of digital natives. Deploying the array of devices and DIY implements that Stumreich has placed at her artistic protagonist's disposal, Chrystal Tesla fends off what is purportedly a system of control.

WORKS

- 2.4 GHz Weaving*, Kathrin Stumreich
- Audio Watch surveillance*, Kathrin Stumreich
- 650 nm Laserspy*, Kathrin Stumreich



Magdalena Sick-Leitner

VRLab

Virtual reality, augmented reality and mixed reality, total immersion in virtual worlds and superimposing data onto our reality—for several years now, everybody has been talking up these concepts and ideas once again. The enthusiasm that accompanied the dawn of this new high-tech age in the 1980s and 90s is back, with the technology deployed in today's data glasses (head-mounted displays) finally seeming to be able to live up to the visions that preceded it. VR, AR and MR have become a playground of multifarious pursuits: the gaming sector and film industry, applications in the educational field and tourism

market, works of art and architecture, the creative economy, performance and the theater. The VRLab in the Ars Electronica Center's Main Gallery showcases the latest VR, AR and MR technologies. In addition to applications by filmmakers and animators as well as artistic approaches, the VRLab relates the history of virtual and augmented reality's development. What did eighteenth-century spatial illusions look like, how did we progress from the stereoscope to the Oculus Rift, and in which directions will VR and AR be advancing in days to come? The VRLab provides insights into these questions.

Can Buyukberber (TR) Morphogenesis



Morphogenesis is the biological process that causes an organism to develop its shape. As a virtual-reality piece, *Morphogenesis* consists of continuous transformation of fundamental geometrical patterns and uses them as the building blocks of immersive spaces. It embodies the systems that produce the

complexity we encounter in the living world. Exploring the idea of geomorphology, mathematics and understanding the world, *Morphogenesis* requires audience to be sentient, not just receivers. It invites the viewer to a poetic and sensational world, where space becomes infinity, the primal sense of the immaterial world is experienced and the process of creation is re-evaluated.

The Ars Electronica Animation Festival screens a selection of the most outstanding animated works honored by the Prix Ars Electronica jury in recognition of their substantive and stylistic quality. This lineup impressively gets across how the genre itself has flourished of late and the extent to which it now pervades our everyday life.

Sebastian Maurer (AT), FH Hagenberg (AT) Advent VR

Assume control over a drone, stranded on an alien planet. Discover the local flora and fauna, find out what your mission was and why it failed. *Advent VR* shows that every cloud has a silver lining.



Sebastian Maurer

Netural GmbH (AT), Responsive Spaces GmbH (AT), Amago GmbH (AT), WGD Donau Oberösterreich Tourismus GmbH (AT)

Donau Augmented 360

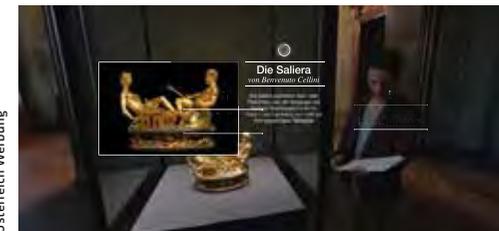
People who travel have things to tell. Or accounts that can be experienced virtually. *Donau Augmented 360* was created by Netural (a digital agency), Responsive Spaces (a multimedia producer), Amago (a filmmaker) and WGD Donau Oberösterreich (an inbound tourism promoter). The assignment: to prepare tourist information for virtual-reality glasses so that it is a useful enhancement for analog travel impressions. For the prototypes, the Danube Basin was filmed from a bird's-eye view with 360-degree cameras and the footage was supplemented with



Responsive Spaces

real-time information especially for tourists—i.e. points of interest, opening hours and recommendations of upcoming events.

Österreich Werbung (AT) Austria 360° KHM interactive



Österreich Werbung

Österreich Werbung has used HTC Vive technology to develop an interactive virtual-reality tour of Vienna's Kunsthistorisches Museum. This project is one of Europe's first virtual-reality documentaries with user-determined storytelling, and superbly demonstrates the possibilities of interactive video documentary in virtual reality. The interactive ele-

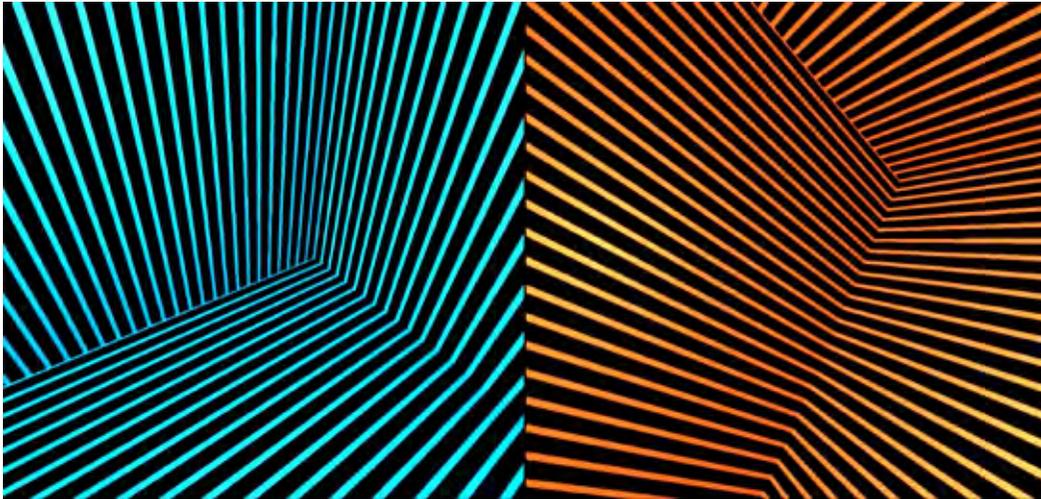
ments enable visitors to use eye control to navigate through the museum and access additional information about the works of art they are looking at. High-resolution 360-degree video sequences are combined with a 3D audio narration, which provides an immersive experience in text and image as well as with spatially variable sound. Users can select from among three narrative strands. They can thus determine the storyline themselves as they move about among the works of art. A complete round trip through all the museum's galleries and collections of antiquities as well as an exclusive behind-the-scenes look at the conservators' workshop—Österreich Werbung's VR production delivers total immersion in the collection of Vienna's Kunsthistorisches Museum.

Google (US) Tilt Brush

Google's *Tilt Brush* puts an excellent VR painting and modeling program into users' hands. Teaming it up with Vive lets you render and design in three-dimensional space. Manipulating the controller in the form of a paintbrush proceeds intuitively and precisely, and produces impressive digital sculptures.



HTC Vive and Google Tilt Brush, Ars Electronica



Memo Akten

Memo Akten (TR/UK)

Fight

“We see things not as they are, but as we are.”

Fight is a virtual-reality artwork in which the viewer's two eyes are presented with radically different images, resulting in a phenomenon known as binocular rivalry. Presented with rival signals, the conscious mind “sees” an unstable, irregular, animated patchwork of the two images, with swipes and transitions. The nature of these irregularities and instabilities depends on the viewer's physiology. The act of looking around allows the viewer to probe which sections of the signals become dominant or suppressed—a reminder that seeing (and in broader terms perception in general) is an active process, driven by movement, expectations and intent. The picture we see in our conscious minds is not a direct representation of the outside world, or of what our

senses deliver, but is of a simulated world, reconstructed according to our expectations and prior beliefs.

Even though everybody is presented with exactly the same images in this work, your conscious visual experience will be different to mine. I cannot see what you see, you cannot see what I see. And what we both see is different to what is actually presented. We are all unable to see the entirety of the “reality” before us. The work is part of a broader line of inquiry about self-affirming human biases, our inability to see the world from others' point of view, and the resulting social polarization.

Commissioned by STRP
Score: Rutger Zuydervelt (Machinefabriek)
Producer: Juliette Bibasse
Assistant: Rob Homewood

Kitchen Budapest (HU)

Training 2038

Human Data Collection for Artificial Intelligence

Since the first industrial revolution, automation has been one of the primary instruments of increasing productivity, that is replacing human workforce with task-performing machines. The thermo-mechanical models of the early industrial age have now evolved by into more complex electro-computational networks, where scripted interactions are staking out an ever-growing number of domains and specialist fields. Under algorithmic capitalism, automation (robotics with automated thought—AI) are disrupting a large segment of industry and life as we know it: from the self-driving cars reinventing transport, chatbots reinventing friendship, unmanned drones reinventing war, synthetic bodies/persons reinventing human rights, to e-government reinventing politics.

In contrast to the perceived obfuscation in much of the computational protocols today, *Training 2038* stages a scenario where people are given a voice to provide feedback on systems that are just taking shape. In the safe space of a private VR experience, an extensive survey is underway in the form of a dialog played out between an embodied conversational bot and a human user. With no moral conscience, how would an automated decision tree behave?

Kitchen Budapest is Gábor Pribék (HU), Iván Rohonyi-Demkó (HU), Jonathan Ravasz (HU), Filip Ruisl (SK), Richárd Nagyfi (HU), Szilvi Németh (HU), Attila Nemes (HU), Patrik Makrai (HU), Judit Varga (HU), Orsolya Forster (HU), Benjamin A. Balla and Healium Decoration (HU)
Supported by Telekom Group Hungary



Kitchen Budapest



Tristan Schulze

Kunsthau Graz, Tristan Schulze (DE)

[[Ghost]]

The *[[Ghost]]* project is based on the creation of two artificial neural networks, each inhabiting a different art institution. Both “ghosts” will be fed and trained by online text information coming from the Kunsthau Graz and Ars Electronica, and above all from the participation of their human audiences. There will be two interconnected public web applications to interact with and train each ghost. On top of that, each ghost is connected to the media façades of the Kunsthau Graz and the Ars Electronica

Center. Each façade is used to project the current status and the developments of the AI in the form of visual patterns and brief text information into public space.

A collaboration between Ars Electronica Center and Kunsthau Graz
 Project team: Tristan Schulze (artist and designer), Elisabeth Schlögl (assistant curator, Kunsthau Graz), Dr. Barbara Steiner (director, Kunsthau Graz)

Anette Friedel (AT), Erika Jungreithmayr (AT)

Outside–Inside

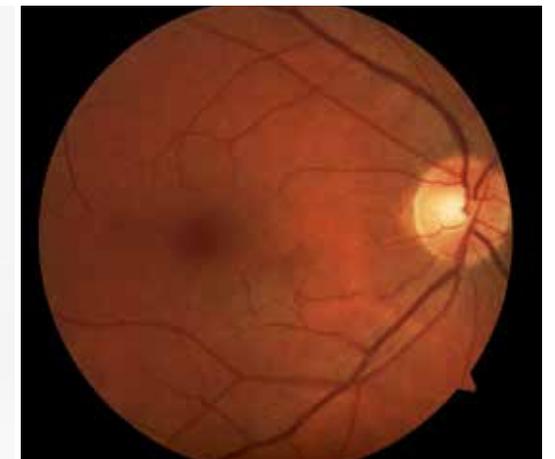
A person’s outer appearance, which can be deliberately modified, is juxtaposed to their fragile, immutable inner beauty. A human being’s exterior is characterized by age, cultural influences, social background, facial expressions and many other factors, and people can change how they look, “beautify” themselves, to a certain extent. The interior, what’s hidden, what’s actually invisible, the finely layered structures—what a person cannot change and what their distinctiveness and individuality ultimately consists of—the human being who, despite the technologies, cannot be measured, copied, multiplied—is enduring.

How do I see myself? Who or what influences what I look at? The retina, with its millions of neurons, separates the significant from the unimportant and thereby exerts a powerful influence on human data processing. Our body thinks proactively. What does it mean to be a body? This is one of the core issues being raised now by the ongoing development of artificial intelligence. There would be no new technologies if there were not also, somewhere, a human being—there it is, plain and simple, reduced to the essence.

Supported by Kulturland Oberösterreich, Procine–professionelle Bildtechnik, RIKA Innovative Ofentechnik



Anette Friedel



Ars Electronica Center, Erika Jungreithmayr

Deep Space 8K

A sensational, internationally unique experience has awaited visitors to the Ars Electronica Center since August 2015. A sixteen by nine meter wall and sixteen by nine meter floor projection, laser tracking and 3D animations have been the specialities of the Deep Space 8 K since 2009. An all-out upgrade of the Deep Space venue's technical infrastructure will enable audiences to enjoy projections in 8K resolution and thus worlds of imagery in a never-before-achieved quality. Full HD and 4K—that's yesterday's news! 8K is what's happening now, and that standard is set by the latest update to Deep Space 8K at the Ars Electronica Center. A visit to Deep Space 8K promises to be extraordinary, fascinating, impressive, breathtaking.

Victoria Vesna (US), Charles Taylor (US), Takashi Ikegami (JP), Hiroo Iwata (JP), Reiji Suzuki (JP)

Bird Song Diamond

Bird Song Diamond is a site- / habitat-specific interactive installation based on long-term research (2011-present), involving multifaceted, interdisciplinary perspectives—uniquely connecting the nodes of evolutionary biology, artificial intelligence and life, spatial sound, mathematics and mechatronics. The Deep Space 8K version features bird songs from Austria and Japan—reflecting the unique relationship of these two cultures at Ars Electronica. Inspired by the thousand-cranes story, it evolves into a million birds and drones that address the complex relationship of machine, human and animal through multi-dimensional sound, video, and origami-based designs.

Audiences are engaged by attempting to mimic bird songs and participate as a group with male to female vocalizations. The collective behavior influences the flocking, images and sound—all working in real time.

The interaction produces three different dimensions or scenarios: looking at what birds find interesting—worms, seeds and nests; influencing the flocking; and witnessing how the birds and drones see us—in collective gatherings such as demonstrations and celebrations.

<http://www.birdsongdiamond.com>

Victoria Vesna (artist, UCLA), Charles Taylor (evolutionary biologist, UCLA), Takashi Ikegami (physicist, University of Tokyo), Hiroo Iwata (engineer, University of Tsukuba), Reiji Suzuki (computer science, Nagoya University), Itsuki Doi (PhD candidate, Ikegami lab), John Brumley, Hikaru Hakatori (PhD candidates, Iwata lab), Naoki Chiba (master's student, Suzuki lab)



Victoria Vesna

Maki Namekawa (JP), Cori Olan (AT)

Interludium A, Isang Yun 3 Etudes for Piano, Philip Glass

Two birthdays constitute the background to the selection of these pieces—the 100th birthday of Isang Yun, the Korean composer who died in 1995, and Phillip Glass's 80thth. *Interludium A* was created in 1982, two years after the democracy movement in Gwangju was crushed. This was a matter of profound concern to Isang Yun, who, in the late 1960s, had himself been victimized by the political despotism of the military regime in power at the time.

"A composer cannot view the world in which he lives with indifference. Human suffering, oppression, injustice . . . all that comes to me in my thoughts. Where there is pain, where there is injustice, I want to have my say through my music." – Isang Yun, 1983
The real-time visualization of this piece has its

point of departure in visual associations with the sheet music, and rises up into a complex geometric structure, the individual elements of which are then infused with dynamic movement by parameters derived directly from the live sound of the piano—like a huge high-rise complex or construction plans for a futuristic urban machine that, with passages becoming softer and softer, descends into a dark nocturnal mood, from the depths of which tonal colorations and elements evocative of Asian calligraphy repeatedly emerge. Three of Philip Glass's *20 Etudes for Piano* will be performed as a sort of teaser for the big solo concert on Monday. (Also see page 146)

Piano: Maki Namekawa
Visuals: Cori Olan



Frederick Baker (AT/UK), Marcel Karnapke (DE)

Pitoti Prometheus

Pitoti Prometheus is a first in VR: ancient rock art that literally comes alive at 360 degrees. It is the film with the longest production time in history. The artwork dates from 3000 BC, and the post-production was finished in AD 2016. The figures that rise from the rocks are called *Pitoti*, “little puppets” in the local Lombard dialect and UNESCO-protected world heritage from the Alpine valley of Valcamonica. The story starts as a myth. The young demigod Prometheus rebels. Encouraged by his lover Minerva, he decides to bring humanity to life: “They may be bound here by their lifelessness, But they are free and I feel their freedom!” And so Prometheus becomes the inspiration for VR. He releases humanity from its age-old chains, just like

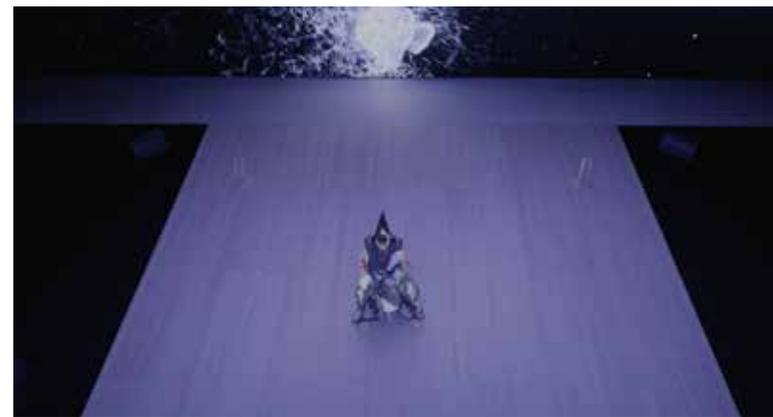
VR, which liberates viewers from the four-sided screen.

The film ends in a documentary format. The animated *Pitoti* celebrate their daily life: dancing, plowing and hunting—the people, the birds and the animals—until the Romans conquer.

Pitoti Prometheus is a McDonald Institute for Archaeological Research, Cambridge University production for the European Union’s Seventh Framework Programme for the 3D-Pitoti Consortium: Bauhaus University Weimar, Centro Camuno di Studi Preistorici, Graz University of Technology, St. Pölten University of Applied Sciences, University of Cambridge, University of Nottingham. In collaboration with and by permission of the Ministero dei beni e delle attività culturali e del Bell arte.



Frederick Baker, Marcel Karnapke (Cambridge University-3D-Pitoti)



Daito Manabe (JP), Mansai Nomura (JP)

Sanbaso

Sanbaso is an 8K documentary featuring a novel performing art by renowned Japanese artists. The stage is based on an ancient divine dance, the *Sanbaso*, praying to nature. The actor Mansai Nomura was born into an artistic family who inherited the *Sanbaso* from their ancestors and has been exploring its organic beauty with his own expression. The media artist Daito Manabe sought to analyze its beauty and visualize it using extremely high-resolution images as a background to the stage. The 8K production was made by the NHK group, a public media corporation with the largest TV network in Japan. In 2016 it started an 8K test

broadcasting service including live sports, science and culture documentaries, news shows etc., and will expand 8K broadcasting in 2018. NHK is also interested in exploring new experiences like Deep Space 8K, beyond the TV viewing experience.

Performance and stage direction: Mansai Nomura
 Visual and technical direction: Daito Manabe (rhizomatiks research)
 Sound design: evala (port, ATAK)
 Lighting design: Takayuki Fujimoto (KINSEI R&D)
 Stage design/producer: Daisuke Moriuchi (NHK)
 8K production and presentation: Tetsuji Kawashima, Jun Ochiai (NHK), Tatsushi Tachibana (NHK Enterprises), Yoshikatsu Date (NEP infinity)

Ouchhh (TR)

iOTA

Can machines totally replace humans, or is there a need for just the right combination of human and artificial intelligence—hybrid intelligence? We will turn our real-time onstage performance into a human vs. machine battle by adding machine learning to the new version of *iOTA*. So we are going to witness a unique AV performance battle between real performers and artificial intelligence performing as an artist on stage.

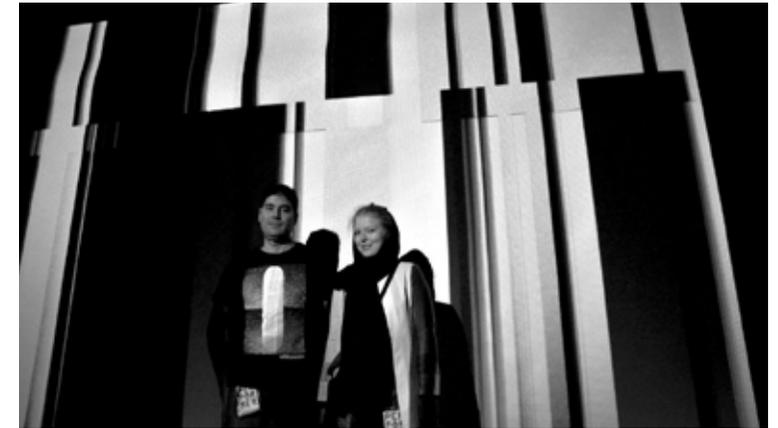
In mathematics *iota* (*i*) denotes an imaginary unit or number; it can be used for the inclusion map of one space into another. Light is the single element which can be perceived by the eye. *iOTA* is an LED installation inspired by light physics and research

into the origins of geometry. Corresponding to the focus of the observer, the nature of light and its different phenomena can be seen beyond the perceptivity of the human mind, and attempts to translate them into a unified, non-spatial form. *iOTA* was realized on the 126 m² LED screen at Zorlu Performing Arts Center. The installation was part of Sonar +D showcase at Sonar Istanbul Festival 2017.

Producer: Ouchhh Studio
New media artists and directors: Ferdi Alici, Eylul Duranagac
Creative coder and AI artists: MASOM (Kivanc Tatar and Philippe Pasquier)
Sound design and music: Mehmet Ünal from AudioFIL



DENİZ BIRGI



Tarihan Rafiiee

SPECTRO DUO (PL/IR)

NOIZE Etudes

NOIZE Etudes is a live multimedia performance focusing on micro-sounds caused by binary operations in multiple layers of music coding. In general, with their sound, the *Etudes* drag you inside the code, giving you the feeling of being lost between the numbers. That feeling grows when you experi-

ence the sounds being transcribed into the binary video projections, the unlimited uncountable pattern of blacks and whites.

SPECTRO DUO is Martyna Kosecka (PL) & Idin Samimi Mofakham (IR)

Tadej Drojlc (UK)

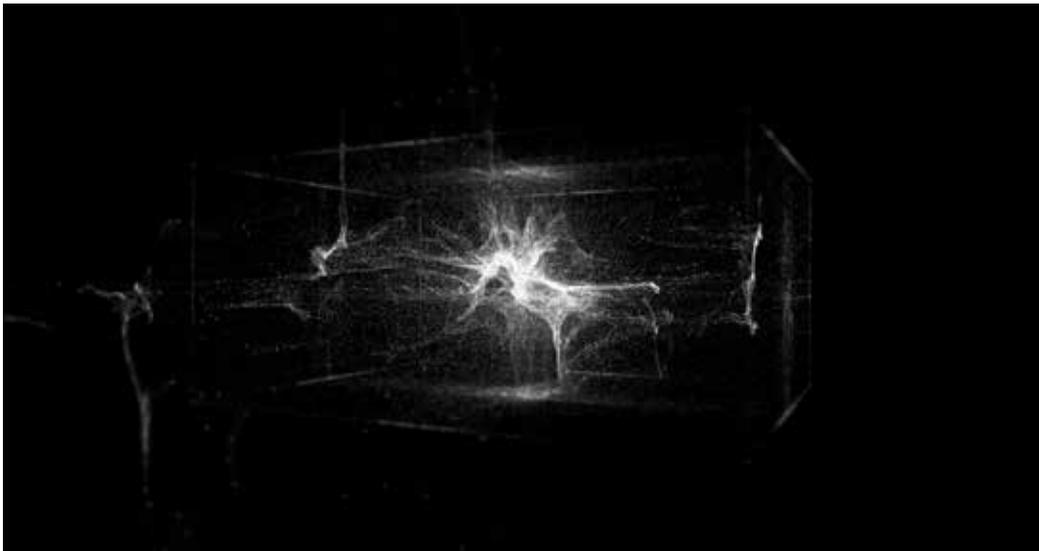
Capillaries Capillaries

Capillaries Capillaries is an audiovisual composition based on a non-hierarchical and bi-directional relationship between sound and image in real-time. The piece does not represent a visualization of music or sonification of an image but rather a tangle of audiovisual interactions.

The work explores the idea of an audiovisual time object where shape, time and sound interact with one another. The main focus of the piece is the structures that emerge from the force field that pulls such objects towards two opposite extremes—tidy pre-composed order or generative chaos. The situation reflects the id-ego-superego model, which

represents the conceptual background. Just as the ego is established in between the two groups of conflicting forces that constitute, distort, constrain or disperse our subjectivity, so too is the material of *Capillaries Capillaries*. Throughout the piece we observe the behavior of one and the same material from different perspectives.

Special thanks go to: Dr. Alex Harker and Prof. Pierre Alexandre Tremblay for being absolutely amazing PhD mentors; Centre for Research in New Music (CeReNeM), University of Huddersfield, for awarding me a Denis Smalley Scholarship in Electroacoustic Music; the Ministry of Culture Slovenia for awarding me a scholarship for post-graduate studies abroad.



Tadej Drojlc

VOID (TR)

ABYSMAL

Perception is the procedure of acquiring, interpreting, selecting and organizing sensory information. Perception presumes sensing. In people, perception is aided by sensory organs. In the area of AI, the perception mechanism puts the data acquired by sensors together in a meaningful manner. Machine perception is the ability of a computer system to interpret data in a manner that is similar to the way humans use their senses to relate to the world around them. Inspired by the brain, deep neural networks (DNN) are thought to learn abstract representations through their hierarchical architecture. Using an artistic approach to interpret the learning mechanism of an AI-based projection-mapping technique, we challenge the dominant perception system of an artificial intelligence as practiced today, which is purely objective and reductionist.

Direction and animation: VOID (www.bevoid.co)

Directors: Yusuf Emre Kucur, Bahadır Dağdelen

Producers: Evren Erbasol, Baris Serdar

Concept development: Selay Karasu

Project manager: Selay Karasu

A/V Artists: Yusuf Emre Kucur, Bahadır Dağdelen, Gokhan Dogan, Kerem Akgun



VOID

Narrator's Lowdown (AT)

A Flurrytale

Four artists, three countries, two art fields, one topic. Reality vs. fantasy—these opposites have always been dividing people. But does one's personal reality correspond to the mass understanding of it? What in fact influences the individual or mass definition of reality and imagination? Four young artists bring together their observations from their past and present surroundings, and as permanent "victims" of the media they further translate these conclusions on stage through movement and image. The constant visual storm and the rapid tempo of our time are also taken as impulses for the movement language and visual outlook of the piece. From still and rigid to fluent and wild, the imagery of reality and fantasy moves through the piece like

a hologram that is fluid in time and space. During the performance the artists explore what happens if these opposites, reality and fantasy, are pushed into each others like two holograms, becoming together as one.

Concept: Narrator's Lowdown (Elias Buttinger, Weng Teng Choi, Anni Taskula, Paul Vincenth Schütz)
 Performers: Elias Buttinger, Yejin Han, Anni Taskula
 Choreography: Elias Buttinger, Weng Teng Choi, Anni Taskula
 Visuals: Paul Vincenth Schütz
 Special thanks to: The Wolf
 Supported by: RedSapata TanzFabrik, Bulareyaung Dance Company, Linz Verändert

Winner of the "Best Dance Piece" at the Taipei Fringe Festival 2016



Paul Vincenth Schütz



Magdalena Stick-Leitner

Dr. Pamela Rose (UK)

Hisn al-Bab

This presentation invites the audience to experience the archeological site *Hisn al-Bab*. It is little known but nevertheless played a significant role in Egyptian history, both with respect to its geography and its chronology. In historical terms, it was active at the very end of Roman rule and the Early Medieval Period, long after the pharaohs. At this time the border region between Nubia and Egypt was a political hotspot. It comes as little surprise then that *Hisn al-Bab*, the site at the heart of our project, saw the building of several successive forts. The ruin is as spectacular as its setting, opposite the Temple of Philae high up on the eastern shore of the river south of the low dam at Aswan, its walls preserved to a height of eight meters. In addition to the visual experience of a unique and, until recently,

completely unstudied monument, we will present the results of several seasons of excavations. These help to understand the daily life of the inhabitants of the fort.

Modern technology gives us the opportunity to visit and present a site that is remote in location and also inaccessible to tourists. The exact three-dimensional documentation of the ruin is a prerequisite for conservation and protection, and also provides the means to introduce the site to a wider international public, thus ensuring its future survival.

The project is financed by the FWF Austrian Science Fund. The scanning was carried out by the Technical University, Vienna: Prof. M. Doering, T. Mitterecke, I. Mayer, G. Styhler-Adin.

DI René Mathe (AT), Ars Electronica Futurelab (AT)

The Virtual Reconstruction of the Synagogue in Linz

In the Pogrom Night in November 1938, a mob acting on orders of the Nazi regime broke into the Linz Synagogue—like so many other Jewish houses of worship that night—ransacked it and set it ablaze. All that remained of the synagogue was a burnt-out ruin.

In conjunction with the work on his master's thesis at the Technical University of Vienna, René Mathe created a virtual reconstruction of the Linz Synagogue. His aim was to enable people today to experience that center of Jewish religious life. Now his work has made it possible for the Ars Electronica Futurelab to produce a 3D visualization that lets visitors to Deep Space 8K take a virtual tour of the Linz Synagogue. The reconstruction is supplemented by high-definition photographs of ceremonial objects—the curtain covering the ark in which Torah scrolls are kept, a pointer used when reading the parchment

scroll, and a decorative plaque that adorns it in the ark—as well as a Jewish marriage certificate. All are from the collection of the Jewish Museum of Vienna and were photographed by famed artist Lois Lammerhuber. The photographer Florian Voggeneder from Linz visited the new Linz Synagogue and photographed the Bima, the Rimonim, the Shofar and the Toramantel.

Dr. Danielle Spera (Director of the Jewish Museum Wien), Dr. Anna Mitgutsch (author and board member of the Jewish Community Linz), Gerfried Stocker (Artistic Manager Ars Electronica Linz), DI René Mathe (architecture graduate, University of Vienna), DI Herbert Peter and Prof. Bob Martens (architects and specialists in virtual reconstruction) and Lois Lammerhuber and Florian Voggeneder (photographer) presented the virtual reconstruction of the old Linz Synagogue for the first time at a Deep Space Live special on November 15, 2016.



Martin Hieslmair



Christiane Miethge (DE), Nils Otte (DE)

HOMO DIGITALIS—How much longer will we still actually be human?

Will we all, at some point, have virtual friends, enjoy sex with robots more than making love to a real person, and hack our own body? *Homo Digitalis* is a Web series about the ultimate future question: What is the digital revolution doing with us human beings?

The protagonist Helen Fares begins her search at the Ars Electronica Futurelab, gets acquainted with virtual friends, learns to steer a drone with her brain and to hack her own DNA. Encounters with experts in the US, Japan and Britain provide additional international context to the posed question: What insights does Helen derive from her journey through futuristic technologies? Are we *Homo sapiens* evolving into a new species: *Homo Digitalis*?

Homo Digitalis is simultaneously a scientific experiment. In cooperation with the Fraunhofer Institute, BR, ARTE and ORF developed a playful test: How long do you still have as a human being? Find out with our *Homo Digitalis* Chatbot or at <http://www.homodigitalis.tv>

Directors: Christiane Miethge, Nils Otte
Host: Helen Fares
Camera: Kyrill Ahlvers, Tenzin Sherpa
Sound: Gidon Lasch, Nils Otte
Editors: Tim Sprado, Daniel Bluhm
Animation and graphics: Anna Hunger, Sven Schulz
Illustrations: Benny Nero
Programming: Bernd Paulus, Phuoc Le, Lena Fischer
Producer, Web series: Andreas Martin
Producer, online test: Miriam Mogge
Production director: Laura Sages
Creative director: Christiane Miethge
Scientific director: Kathrin Pollmann
Team Ars Electronica Futurelab: Christopher Lindinger, Martina Mara, Maria Pfeifer, Roland Aigner, Clemens Francis Scharfen, Peter Holzkorn, Michael Platz, Nicole Grüneis, Peter Freudling, Erika Jungreithmayr, Manuel Selg
Producers: Dietmar Lyssy, Marcus Uhl

Editor, BR: Thomas Sessner
Editors, ARTE: Katja Ferwagner, Katja Dünnebacke, Aurélie Marx
Editor, ORF: Robert Glashüttner, Siegfried Steinlechner

Produced by Bilderfest GmbH and BR—Bavarian Broadcasting; co-produced by ARTE and the ORF—Austria Broadcasting Company.

Thanks to Fraunhofer Institute, IAO and the Ars Electronica Futurelab

Dr. Manuela Macedonia (IT/AT)

Grasping

Joint research project by the Ars Electronica Center, Johannes Kepler University Linz, and the Catholic University of the Sacred Heart, Milan: “Intelligent Machines that Make Humans Learn Foreign Languages”
Participating researchers: Manuela Macedonia, Astrid Lehner, Erika Jungreithmayr, Claudia Repetto

For adults, learning a foreign language is a task associated with great difficulty and often crowned with scant success. This series of scientific experiments conducted by Dr. Manuela Macedonia and her staff at Johannes Kepler University Linz in cooperation with the Ars Electronica Center and the Catholic University of the Sacred Heart, Milan, investigates learning a language in a virtual setting. Users train in a virtual-reality environment implementing procedures based on the principles of learning psychology and neuroscience—for example, foreign-language vocabulary. The training is imparted ubiquitously—that is, independent of a particular time and space, and personalized.

In *Grasping*, the second experiment in this series, participants are immersed in a 3D underwater realm in Deep Space 8K at the Ars Electronica Center. Test subjects see virtually projected everyday objects and

touch them with their hands—that is, they literally grasp them (in both senses of the word). This specific action supports the brain in memorizing the foreign language’s term for the object. This series of experiments is intended to make a long-term contribution to developing learning environments for mobile devices.

Johannes Kepler University Linz: Dr. Manuela Macedonia, Michael Holoubek
 University of Vienna: Mag. Astrid Elisabeth Lehner, Bakk.
 Catholic University of the Sacred Heart, Milan: Dr. Claudia Repetto
 Ars Electronica Center: Mag. Erika Jungreithmayr
 Ars Electronica Futurelab: Clemens F. Scharfen
 Ars Electronica Museum Technology: Thomas Kollmann, Florian Wanninger
 Ars Electronica Solutions: DI. Mag. Ali Nikrang, Poorya Piroozan, MSc.



Magdalena Sick-Leitner



Florian Voggeneder

Florian Voggeneder (AT)

Austronomy

Austrian astronaut Franz Viehböck’s lift-off to the MIR space station on October 1, 1991, was accompanied by a euphoric celebration of this country’s giant leap into the cosmos. 25 years later, Florian Voggeneder boldly goes on a photographic mission to document the implications of this miniature Space Age. Obscure artifacts

and unworldly landscapes, space enthusiasts and research facilities converge in a narrative at the cusp of fiction and folklore that explores the possibility of an Alpine space program. In Deep Space 8K, the artist elaborates on his project’s progress to date and participation in scientific space simulations.



Voichiro Kawaguchi

Voichiro Kawaguchi (JP)

Paradise “Growth” in Zero Gravity

Artists have long been searching for new methods of expression and performance media to embody their artistic ideas or sentiments. Whenever a new presentation method becomes available it is thoroughly tested as to whether it is adequate to express the artist's creative ideas or sentiments. This continuous cycle has been repeated many times, with recent developments in digital technology accelerating the process. This continuous development enables artists to verify a wide variety of new artistic methods of expression, and as a result, many new possibilities, including three-dimensional, interactive and multimodal approaches may be pro-

posed. In the circumstances, Kawaguchi proposes high-quality computer graphics with approximately 8K resolution as an artistic expressionistic method and media for presenting artworks. The 8K-resolution display system was originally developed for a new television system called ultra-high-definition television (UHDTV). The effects of its wide field of view have been verified by physiological and psychological evaluation methods. There is conclusive evidence to suggest that the UHDTV system has potential not only as a future television system but also as a new artistic form and a medium for displaying art.

Atsushi Tadokoro (JP)

Disenchantment Space

In an artificial-intelligence society, a code is hidden from people and becomes recognized as a sort of magic. Even without understanding the meaning of the code we perceive it as a form of magic, which produces new results by using enormous quantities of data and broad parameters. Through his work Atsushi Tadokoro wants to unravel this magic by reversing the relationship between the code and the human being. It is an attempt to expose the inner surface of the concealed code in a hard shell. *Disenchantment Space* transforms Deep Space 8K into a huge programmable space. Participants who enter Deep Space are transformed into objects that constitute the program.

The objects will behave as program codes that generate sounds and images while interacting with each other. The image generated may not necessarily be a beautiful thing.

But that is the result of behaving as code. Participants will be able to intuitively understand the inside of the code by moving around the space as part of the code.



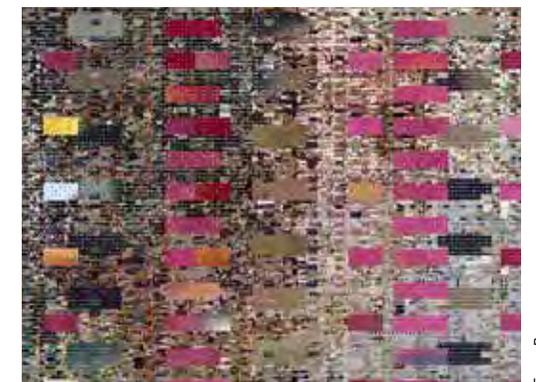
Atsushi Tadokoro

Jürgen Hagler (AT)

Experimental

This program impressively demonstrates new and innovative approaches in current digital filmmaking at the interface of art and science—e.g. nature and bio-tech studies, morphogenesis, experiments with architecture, and perception.

Experimental is presented in the framework of Ars Electronica Animation Festival, curated by Jürgen Hagler (AT). In the program works of the following artists will be shown: Quayola (UK), Andy Lomas (UK), Hugo Arcier (FR), Boris Labbé (FR), Casey Reas (US), Maxime Causeret (FR) and Reinhold Bidner (AT).



Casey Reas

HYUNDAI MOTOR GROUP (KR)

VH Award

The *VH Award*'s purpose is to discover promising but relatively unknown Korean artists creating media art. It seeks to support the art-making process of these young, talented media artists but to also help them gain international recognition.

To guarantee a fair evaluation, all award winners will be selected by celebrated curators from both Korea and other parts of the world. This will also facilitate the creation of fruitful, global connections between potential award winners and well-known curators.

In addition, the *VH Award* will introduce a new genre of media art to the public. This centers on innovative ways of communicating information that ultimately promote a more tightly-knit field of art.

In order to showcase Korean media art in an optimal manner conducive to attracting global attention, the finalists will have the opportunity to display their works of art through the spectacular media wall located at the Hyundai Motor Group University-Mabuk Campus.

Hwayong Jung (KR)

Mantra

Mantra is a digital panorama that represents a hyper-realistic landscape with the collapse of body language and sound generated from a digital object. Seungmu, a traditional Korean dance as well as a Buddhist ritual dance, is a mixture of flowing movements based on a rhythmic structure in the complexity of the transformation in intense, minimalistic expressions. It expresses human anguish and agony in dynamic and sensitive movement accompanied by traditional melodies.

Hyungkyu Kim (KR)

Hear the Wind_Across the Borders

Hear the Wind_Across the Borders portrays four symbolic sites where the Republic of Korea's political, economic and historical contexts intersect from a contemplative viewpoint through the 2016 "axis of time." By using 360-degree camerawork, the artist captures the landscape of "time and space," which humans have not been able to possess, in a single screen, and establishes a new visual experience that existing cameras and technologies cannot realize.

Sung Rok Choi (KR)

Stroll, Scroll and Sight

Stroll, Scroll and Sight narrates a human story of overcoming sufferings. This journey is described from multiple viewpoints that are invented from media history. From a first-person and a second-person perspective, audiences become God, gamer and a virtual "I." The artist induces the audience to experience the relationship between human, art and technology with their eyes, ears and bodies. Through these diverse interpretations, the artist unfolds a meditative story of a human being.

Je Baak (KR)

A JOURNEY

A JOURNEY adopts the element of virtual reality from an RPG game, and yet eliminates its fundamental quality of achieving its goal through given "missions." The symbols applied with the artist's methodology create disparate worlds, and they guide the audience to travel around the creations. The poetic journey encountered in various metaphors will finally be complete as a narrative once the audience fills in the remaining blanks.



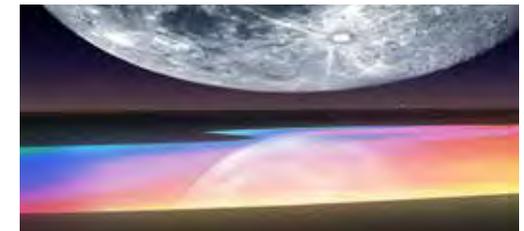
Mantra, Hwayong Jung (KR)



Hear the Wind_Across the Borders, Hyungkyu Kim (KR)



Stroll, Scroll and Sight, Sung Rok Choi (KR)



A JOURNEY, Je Baak (KR)

Max Hattler (DE)

Expanded Abstractions

Abstract-animation artist Max Hattler presents a cross-section of his work in special versions created for Ars Electronica Center's Deep Space 8K. Hattler's 2005 abstract War on Terror classic *Collision* shines in never seen before, super-high-resolution detail, while *Heaven and Hell* (2010) the looping diptych inspired by Augustin Lesage's spiritualist visions realizes its fully trippy potential on Deep Space's sixteen-meter-wide screen. *III=III*, a stereoscopic animation exploring binocular rivalry, which was first shown at the Animamix Biennale 2015/16 in Hong Kong, connects to Max Hattler's presentation at this year's Expanded Animation Symposium. *Expanded Abstractions* is rounded off with the UHD world premiere of *Divisional Articulations*, Hattler's 2017 audiovisual collaboration with composer Lux

Prima, where fuzzy analog music and geometric digital animation collide in an electronic feedback loop of repetition and distortion, and spawn arrays of divisional articulations in time and space.

Full credits and further information on the displayed artworks: <http://www.maxhattler.com>



Max Hattler

Quantum Reboot (AT), Playful Interactive Environments (AT)

ARTUR: Autonomous Robot Playspace

Although robots and autonomous systems are increasingly common within the domains of industry and science and they are now slowly but steadily conquering the backyards and roadways of urban civilization, the vast majority of humankind has very little experience of actually interacting with such technology.

Enter *ARTUR: Autonomous Robot Playspace*: an interactive environment featuring a full-scale, three-dimensional virtual robot. Developed specifically for Deep Space 8K in the Ars Electronica Center, *ARTUR: Autonomous Robot Playspace* utilizes laser tracking and mobile devices to facilitate a playful group-based interaction between a simulated robotic arm and a large audience. The project, a cooperation between the research group *Playful Interactive Environments* and the developer collective *Quantum Reboot*, provides a game-based environment to collectively explore the perception of autonomous robots in our society.

Playful Interactive Environments (PIE) is a research group within the Digital Media Department of the University of Applied Sciences Upper Austria.

Andrea Aschauer (AT), Michael Bauer (AT), Jeremiah Diephuis (USA), Roman Divotkey (AT), Roland Fraunberger (AT), Lorenz Krautgartner (AT), Georgi Kostov (BG), Daniel Rammer (AT), Manuel Wieser (AT)



Playful Interactive Environments

Europagymnasium Baumgartenberg (AT)

Eurogym Space Debris

Help us clean up Deep Space! Having fun with space junk? *Eurogym Space Debris*, a game developed by high-school students at Europagymnasium Baumgartenberg, makes collecting cosmic garbage a competitive challenge. Each player is issued with a spaceship; then they see who can gather the most rubbish floating around in an asteroid belt. The project's mission is to raise awareness of the growing problem of space debris, though not by inducing a state of collective melancholy; the approach here is gaming fun produced by a program developed especially for Deep Space at the Ars Electronica Center. Maybe future players will find a solution to this very real problem. It remains to be seen whether

the creators and the players aren't indirectly contributing to the space-junk debacle!

Sixth-year students taking an elective in computer science: Jonas Dierneder, Johannes Dorfwith, Paul Langeder, Maximilian Leitner, Lukas Oppenauer
Coach: Gerald Landl



Lukas Oppenauer

Fashion & Technology (AT)

FAT #2

Humanistic and artificial intelligence embrace one another in a robotic dance in which the boundary between the physical and digital worlds becomes vague. Designs by Fashion & Technology undergrads form the interfaces showcased in Deep Space 8K. In this show the ethical limits and questions raised by technology today become blurred. Are all of us ultimately data?

The show consists of three interlinked and interwoven elements: a gigapixel and video *mise-en-scène* of students' designs, a performance by a human and a robot in the real space of Deep Space 8K, and a sound performance in which fashion is deployed as an instrument.

Fashion & Technology, University of Art and Design Linz



Günter Parth

OMAI (AT), u19 - CREATE YOUR WORLD (AT)

Best of Animation Lab-Tagtool

Drawing and sketching—with *Tagtool* you can animate your ideas very easily and quickly. Paint and animate live: *Tagtool* transforms your tablet into a live instrument for spontaneous visual expression. Paint with light, create animated graffiti or tell improvised stories. *Tagtool* can be used for jams and performances.

The Open Lab, an interactive and open workshop at u19 CREATE YOUR WORLD invites festival visitors to learn about the software, where you can create impressive visuals of your sketches and drawings. The new version of the software is presented at the Ars Electronica Festival for the first time.

The outcome of the OpenLab at u19 CREATE YOUR WORLD will be shown in this presentation in Deep Space 8K. As it was also a part of the CREATE YOUR

WORLD TOUR 2017 in Malta, where more than 200 students could test the tool at the Esplora Science Center in Kalkara, the best works from those workshops will be presented as well.



OMAI

Ars Electronica Futurelab

Ars Electronica's think tank, R&D division and in-house laboratory works together with partners in industry and research on the prototypical implementation of pioneering concepts of both a technical-scientific and an artistic nature. The project results achieved thereby represent an invitation to as wide-ranging an audience as possible to reflect on the future thus outlined and to get involved in the discourse about it. After all, an exchange of views on the interrelated facts and circumstances operational in these sketches and what they imply for the future of society (or societies) is the focal point of these works.

This is the context in which to understand this year's activities and concepts—the design of innovative processes and their implementation in art and science. Together with private-sector clients and research associates, we carry out projects that bespeak the objectives described above and are part of our mission to enable people to grasp the impact of future changes in our society and our technosphere. Some of the projects described here emphasize artistic facets, others technical elements, and still others social aspects; what they all have in common is that they are situated at the nexus of art, technology and society—for instance, urban mobility, the future of work, new approaches to education or individual research endeavors. At the same time, the selection of Ars Electronica Futurelab projects elaborated on here is also indicative of the increasing importance of novel fields of activity in our intercultural exchange with Japan and Australia, and provides a preview of new (research) initiatives at the laboratory.

SAP Data Space Berlin

Data, especially “big” data may appear to have become a commodity that is gathered, hoarded and analyzed to anticipate our desires and actions; but data may simply be framed as collections of information coded to facilitate their processing.

In fact, “it takes some consideration to find an activity that does not involve data.”¹ As such, data can take a variety of shapes and functions, and become

material for reasoning and calculation as much as for art or design. In the *SAP Data Space Berlin*, the Ars Electronica Futurelab explored this variety of digital transformations by creating an inspirational tool for creative meetings (the *Data Room*) and a generative visualization for the products customers order in the fully digitized *Data Kitchen* cafe.

<http://dataspace-berlin.com>

¹Freeman, J. (2015): *A Concise Taxonomy for Describing Data as an Art Material*. IEEE VIS2015 Conference Paper, (June), 22–29.

Data Room

Creativity is just connecting things.

Steve Jobs

Finding ideas means to connect experience, knowledge and speculation. Focused research and serendipitous inspiration are combined to synthesize the new. In the *Ideation Room*, an environment in which walls and a table are all high-resolution, interactive displays, the user supplies the building block of an idea as a text or image element, and launches a chain of association from it: an algorithm scours data sources and web services for images, terms and articles that might relate to the element supplied. Some of the results are, in turn, immediately used as launching points for further automatic associations, growing the wealth of related elements into a tree structure; the users, too, can spark new association chains on any of the elements returned. In this way, a network of semantic connections is created—some of them obvious, some surprising. During the whole process, the users collect and sort content on the virtual surfaces of the table, until, finally, a visual topology of the unfolding of thoughts and discussions will have materialized—a document of ideation through a dialog between humans and machines.

Data Kitchen / Food Wall

In the *Data Kitchen*, ordering and serving food and drink is thoroughly digitalized and automated; only the preparation is left to the—more creative and diligent—human hand. The visitor's order becomes an unambiguous flow of information, at the end of which the ordered product materializes in a futuristic light tunnel (the *Food Wall Box*). This magic is complemented by the abstract visualization of the order: on the front of the *Box*, a transparent high-resolution display, shapes generated from the ingredients in the order's products move and dance in moiré patterns; the contrast between light and dark, transparent and opaque, highlights the colorful splendor of the meals.

The algorithms that generate the shapes interpret the data “inside” the food: ingredient names become angles, word lengths become dimensions. Similarly, the guests' avatars are generated from their nicknames: polygon meshes that are constantly re-triangulating themselves, abstract and yet, in time, recognizable. As pure information, only the nickname and the box-identifier remain on the display—a visual link underlining the combination of data-driven, analytical automation with a return to the joy, creativity and diversity of cooking.



Data and its Purpose

In the *Data Kitchen*, automation gives time back to humans while the presentation takes the straightforward perspective that everything can be regarded as data, and data can be re-shaped and transformed into any type of aesthetic experience. In the *Data Room*, this idea is taken a step further, arguing that any idea can be deconstructed into building blocks that may lead to other ideas, by feeding it into a

system that taps vast amounts of such elements. Ultimately these experiments show approaches to map the unknown into languages we understand aesthetically or intuitively, and to use this to empower and enrich human creativity. “Big” data may be used to optimize, target and understand; but it may also inspire, fascinate and elevate us.

Text and photos: Peter Holz Korn / Ars Electronica Futurelab

MANUACT

Gesture Research as Interactive Experience

How can gesture research be presented so that it is comprehensible by everyone? How do you identify natural gestures for specific applications, what are the origins of such gestures, and how can they best be used in future interfaces? In cooperation with the Chemnitz University of Technology, we aim to get to the bottom of these and other questions.

The background: In conjunction with an interdisciplinary research project entitled Hands and Objects in Language, Culture and Technology: Manual Actions at Workplaces between Robotics, Gesture, and Product Design (MANUACT), Chemnitz University of Technology has commissioned an R&D project in which the Ars Electronica Futurelab is a scientific associate supporting the project with the

development of installations and exhibits on the subject of gesture research.

The two institutions are collaborating on a gesture glossary, performing research on means of controlling virtual worlds via gestures, and developing playful installations to get across gesture-research parameters in an effective way.

The further we go into the digital age, the clearer it becomes that, in human-machine communication, gestures will have a growing influence on our everyday life. Accordingly, gesture research is helping to come up with new forms of interaction and thereby to design interfaces to be as intuitive as possible.

Text: Marianne Eisl / Ars Electronica Futurelab



Michael Mayr / Ars Electronica Futurelab

insight | out



Otto Saxinger

insight | out, a work of media art by the Ars Electronica Futurelab, is a portrait of Oberbank AG Linz rendered on a fragmented frieze made up of eight video screens. The medium itself thus evokes the multiplicity of influences that flow into this portrait—the values that this long-established financial institution represents, the names of the European regions in which Oberbank is present, customers and staff members going about their business in the facility, and, finally, environmental phenomena such as the sun's position and the wind's strength.

Visually, the image is characterized by particles, the movements and flows of which engender a linear aesthetic akin to a pen-and-ink drawing or a brushstroke, with the lines' thickness varying over time. The particles have divergent mutual affinities—keeping their distance and seeking proximity. They obey the law of the swarm, attraction and repulsion, depending upon their distance from one another and the factors that influence them. The red particles are attracted by visitors and/or by writing. Individuals interacting with each other are registered by a tracking system and “drawn” by the particles. The letters in the lines of writing that appear are “filled” by the red particles and thereby made visible. A few “lead particles” see to it that all of the particles are evenly distributed; the other particles follow them to their respectively assigned areas of the space to be drawn.

The particles have been conceived as an emergent element in the sense of “The whole is greater than the sum of its parts.” They constitute a metaphor for the interplay of diverse factors and influences, such as the people (users), monetary flows and transactions that characterize a bank.

The magnitudes derived from the building's central control system, such as the position of the sun and brightness, minimally change the image's coloring over the course of the day—in the morning, bluish; in the evening, reddish. The wind strength measured imparts short-duration impulses that “blow” the particles in the corresponding direction. This is a metaphor for being situated in and acting in the midst of a local culture at a specific location.

People in the lobby are registered by the system and positioned in the space depicted in the installation, where customers and staff members can visually experience their influence on the particles and the system as a whole. The visualization swarms about the interacting individuals—a person appears to be both a driving force of and a source of resistance to the current in the ongoing flow of the “aesthetic of capital.”¹

Text: Stefan Mittlböck-Jungwirth-Fohringer / Ars Electronica Futurelab

¹ Kriesche, Richard, “Die Kunst, die Freiheit und ihr Wert,” in Ranzenbacher, Heimo (ed.), *FIN/2 Liquid Music* (2017).



Florian Voggenreder

Into the Future of Work

The digitization of our world has arrived in everyday life in the workplace—not just as a tool to simplify and automate certain job sequences, work processes or assembly steps, but in an all-encompassing way. Entire business models—and thus social models too—are in the process of being revolutionized. The digital revolution has top priority among carmakers as well. Accordingly, Audi is currently in the midst of transforming its brand into a digital premium car company. The challenge that the Ingolstadt, Germany-based manufacturer now faces is integrating all the people directly involved

in this transformation process and heightening their awareness of exactly what this entails. This is where the Ars Electronica Futurelab's current collaborative project with Audi comes in. The mission is clearly defined: engaging in gentle confrontation, raising awareness, providing information and fostering individual reflection on digitization at Audi. The didactic concept of the Central Technology Training Summer 2017 was designed to offer participants insights into the company's future while also conveying to them the resulting consequences for their own personal job situation.

Shadowgram

On the first day of training, a Shadowgram invites the participants to “take a position” on various issues to do with digitization, and to do it personally in the truest sense of the word. The questions not only prompt an individual encounter with this subject matter, but doing it via Shadowgram also makes it possible to evaluate the points of view and expectations of each individual participant.

The Open Space

On the morning of the second day of training an exhibition curated by Ars Electronica Export is a surprising new addition to the Audi Training Center II lobby. As selected artistic and scientific exhibits impressively document: there's digital, and then there's DIGITAL. By enabling this shift in perspective, the exhibition delivered inspiration while also providing an unconventional yet individualized approach to global technological and socioeconomic developments in the area of digitization.

The Guided Room

The centerpiece is *The Guided Room*. This moderated as well as digital installation in the plenum of Audi Training Center II was designed by the Ars Electronica Futurelab in cooperation with Audi's international training division. During sessions facilitated by a moderator, participants are totally immersed in the world of Audi as it was previously and as it is newly emerging now. An interactive timeline visualizes the brand's innovations in chronological order. The culmination of this excursion is interaction configured as a cascade. On the basis of a digital floor projection, all participants as a group interactively process this virtual representation of the Audi Strategy 2025. This smoothly segues into a collective grand finale in which the individual Shadowgrams and quotes from each individual trainee produced in the Day 1 session are featured on the big screen.

Text: Martin Schulze-Beerhorst / Audi AG, Horst Hörtnner / Ars Electronica Futurelab

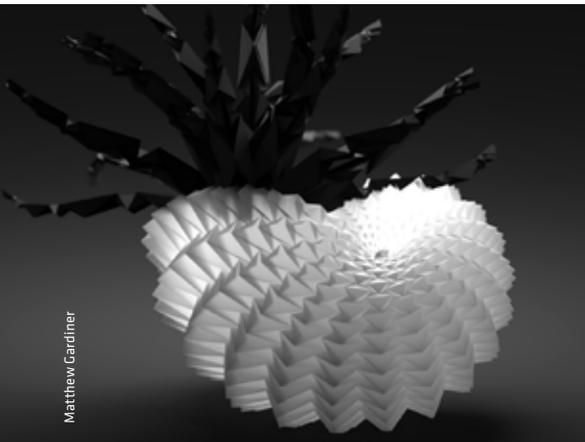


Florian Voggenreder

Material Intelligence: folding a new nature

"The obsidian flake and the silicon chip are struck by the light of the same campfire that has passed from hand to hand since the human mind began."

George B. Dyson, *Darwin among the Machines, The Evolution of Global Intelligence*, 1997



Matthew Gardiner

We see one of the roles of artists as being able to explore and present works that enable the public to engage, connect to and critique developments within science and technology. Concerning currents debates, the astrophysicist Martin Rees has suggested that the present Anthropocene epoch, a human-influenced age, could mark "a one-off transformation from the natural world to one where humans jumpstart the transition to electronic entities that transcend our limitations and eventually spread their influence far beyond the Earth." Since Samuel Butler's 1863 essay "Darwin among the Machines", people have theorized on the future of humanity and its relationship to its mechanical creations and AI, often represented in a *Matrix*-style take over, where the machines control us. As artists, counter to this, we consider how we redefine what our world means to us, and the concept of "mother nature" as one that includes us, as well as the artifacts and machines we create. Our *ORI** research framework explores this through the natural language of folding, in which *material intelligence* (MI) takes precedence.

Coral reefs, one of the most bio-diverse ecosystems of our age, are exhibiting the fastest visible

degradation as a result of human expansion. We are inspired by scientific developments in AI and MI that are working to counteract, repair and even replace damaged and dying reefs. COTbots, RangerBots and CoralBots, autonomous underwater robotics with swarm intelligence, are enabling a level of reef care not possible by humans alone.

Targeting predators, tracking bleaching and recording species of coral, these bots are also assisted by the continued advancements in soft robotics and MI. New research into artificial reef structures considers environmental factors. Projects such as modular artificial reef structures (MARS) and Fabien Cousteau's 3D-printed calcium carbonate coral are bio-compatible, showing how MI and digital fabrication could assist nature to repair itself.

What does it mean to make art in this age of artificial and material intelligence? With artificial intelligence and material intelligence, we can create artificial nature, which we assert should be considered as being as awe inspiring as natural nature itself. Our current research into new fabrication techniques and the development of soft *oribotic* actuators, created as an artistic language, could contribute to these scientific developments. Our prototype printer, Niwashi, has been made for fabricating complex, folded geometries. We are no longer constrained by material properties: we fabricate materials where we need them, creating rigid and flexible areas on strong textiles. This process will allow us to artistically explore coral-like, and biomimetic aquatic entities that live and breathe in a highly organic way; potentially with biocompatible materials that could filter and process pollutants in the fluids. The beauty of this research lies not only in new geometries that expand and contract, but rather with the objective to exist as part of future natures, artificial and natural.

Text: Matthew Gardiner, Rachel Hanlon / Ars Electronica Futurelab



Rachel Hanlon

Hello Machine—Hello Human

Hello . . . ? Can you talk to me . . . ? When technologies reach obsolescence our relationship with them changes, but what never changes is our need to reach out to others, connect and share. But what if no one is on the other end of the line? Who is there to hear us? AI has made sure there always is! A "speech race" is upon us. First we had interactive voice response systems, now with natural language interface systems we have our new "weavers of speech," these modern day "voices with a smile" are changing the way we communicate with our phones. Siri, Alexa, Bibxy, Cortana and Google Assistant (shall we call her GAbby?) are all vying for your attention, but what will our budding relationships with these Boy/Girl Fridays blossom into? *Hello Machine—Hello Human*, touches on the playful moments that are shared between man and machine, and seeks to connect

with you by inverting this relationship, by asking what can you do for her. *Hello Machines* are situated across the globe in ever-changing locations and time zones. Picking up the receiver rings the other *Hello Machines*, creating space for spontaneous voice visiting. They provide a way in which the viewer can interact with re-animated, technically obsolete telephone systems, utilizing present-day advances in telephony. Their aim is to open up a dialog between the technologies' original ideas and meanings, and what makes up the "thingness" these devices now possess, by unraveling its historical and societal content that contains traces of our identity.

Text: Rachel Hanlon / Ars Electronica Futurelab
Hello Machine—Hello Human was developed within the Ars Electronica Futurelab, and forms part of Rachel Hanlon's PhD research through Deakin University, Australia.

Ars Electronica Tokyo Initiative

Since 2014, Hakuodo and Ars Electronica have been collaborating on their joint project Future Catalysts. To further expand their activities, the two institutions have launched a mission-driven innovation community called the Ars Electronica Tokyo Initiative (AETI). “Initiative” means pioneer, leadership, and taking the first step. AETI will assume the mission: “What might we be able to do to create a better Tokyo, and furthermore the whole of

Japanese society?” and will aim to co-create ideas that will form the future society, with artists, innovators, companies and government and take action to implement the ideas in the real society. With “Create for Tokyo Together” as its slogan, the team will work on innovation-generation and draw future society scenarios through the “art thinking” skills of Ars Electronica and Sei-katsu-sha approaches, the Hakuodo way of thinking.

Tokyo as a Laboratory for the Future

Tokyo is a future city that embraces the world’s highest level of human skills, state-of-the-art technology and economics. If we were to regard this city as a laboratory, what kind of creation, exploration or activity would it bring about? By examining the issues that Tokyo, this historically large-scale human test-bed, is facing, we are looking for ideas and knowledge that should be shared throughout the world. Tokyo is now preparing for the major global event of the Tokyo 2020 Olympic Games. At the same time it is on a search to find how to change society so that human beings can live as human beings. Looking for a better work-life-balance, the best way to utilize public space, to promote citizen participation and to create a new culture that can coexist with diversity. We are not only focusing on the year 2020 but afterwards, and we are going to empower citizens’ creativity under the mission of “Create for Tokyo Together”.

Missions for Tomorrow by Art x Industry

What we mean by the word “art” is not a decorative presence that we appreciate. Art has the power to question and criticize society, to give participants the opportunity to analyze the reality from a different perspective and provide the opportunity to create discussions. At the same time, it has the power to insist on the importance of implementing

our human viewpoints and desires rather than just applying the state-of-the-art to designing products and services. What kind of communication will evolve out of this latest technology? What kind of new rules should we establish? AETI is going to act as the catalyst between the artists, entities and society to find the questions that we may face in future society and to take action as our mission.

Art-Thinking Program for Shaping Better Society

Companies have gigantic power to shape society. They are now called on to ask themselves what they should do to pay society back. The Art-Thinking Program led by the AETI questions common-sense, resets new tasks that will not arise from traditional company contexts, and creates innovation by multiplying company culture, history and future vision, just like artists do. If “art thinking” (raising questions about the unknown, cross-questioning the stereotype and expanding possibilities) is going to find hidden potential two decades ahead, “people thinking” (thinking about how we can create a better, human-friendly society together with the people) will find the needs a decade ahead and will expand its flexibility through “design thinking” (expanding new possibilities in the actual world by addressing creative solutions).

Text: Rena Tanaka (Hakuodo Inc.), Hideaki Ogawa (Ars Electronica Futurelab)



Ars Electronica Tokyo Initiative, Hitoshi Motomura



Hakuodo, Ars Electronica

SPAXELS RESEARCH INITIATIVE

SPAXELS (space elements)¹

The name Spaxels evokes its origins—its derivation from the term pixels—but, above all, it brings out a fundamental difference from them. Each medium manifests itself in terms of a “language,” a special form of expression unique to that medium.

“The medium is the message” is thus both the Spaxels Research Initiative’s programmatic agenda and a challenge that it is facing in diverse ways. For one thing, the task at hand is to discover the Spaxels’ language and to expand that vocabulary; for another, we aim to advance the swarm medium’s infrastructure. Seeing the swarm as a conceptual and behavioral pattern that will soon pervade

society as a whole, opening up new potential on which the Spaxels Research Initiative will intensively focus.

The Spaxels Research Initiative’s members are industrial enterprises, innovation labs and startups that collaborate with the Ars Electronica Futurelab and Ars Electronica Spaxels GmbH—each on issues specific to their respective pursuits.

¹ The name Spaxels is derived from the term pixels (picture elements), and describes the spatially constitutive function of these airborne space elements.

<http://www.spaxels.aec.at>

NTT–SKY COMPASS

A project that illustrates one part of the scope of the Spaxels Research Initiative is the Sky Compass, a collaboration between Japanese telecommunications giant NTT and the Ars Electronica Futurelab. They have both employed drones (or UAVs, Unmanned Aerial Vehicles) in public signage, guidance and the facilitation of traffic.

This was manifested in a series of special demonstrations at the NTT R&D Forum 2017 in Musashino, Tokyo.

The aim of the *Sky Compass* prototype at the R&D Forum was to convey a feeling for the possibilities by means of a first physical demonstration: a number of “scenes” in which up to five drones at a time moved around a space inside the NTT building, performing synchronized dances and reacting to the movement of people in the space.

Research Questions: “Sky Language” and “User Responsibility Design”

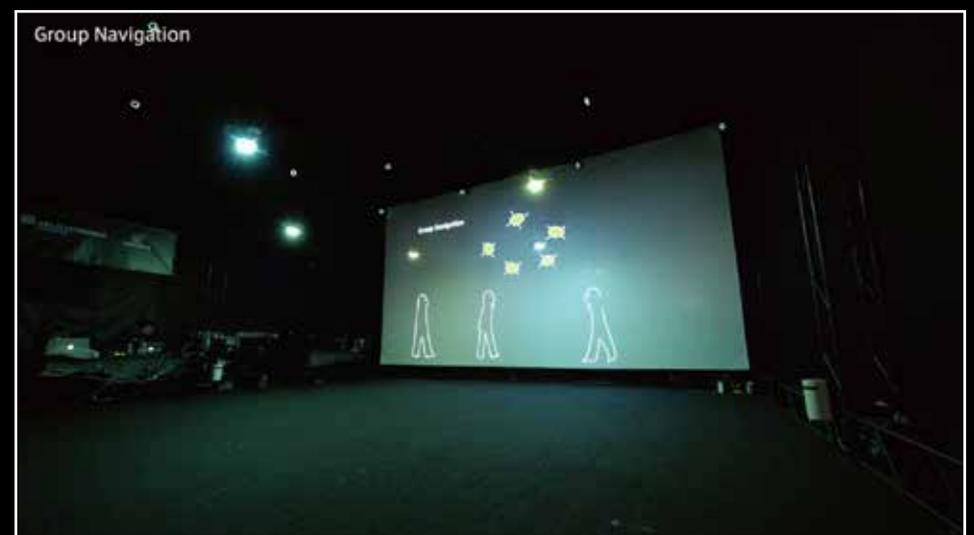
On a personal scale, the *Guide Drone* enters into a one-to-one relationship with its (possibly temporary) owner. As it takes the owner to a destination, it has to negotiate a complex urban landscape; the

user, tethered to the drone via a physical or metaphorical leash, follows it as they would a guide dog, and has some extent of control over it; and as with a dog, they are not free of responsibility—accounting for the distribution of this responsibility between the drone (and its operating authority), on the one hand, and the owner/user on the other will be a crucial design task.

On a group level, drones may form shapes that act as signage in public space; globally, a well-understood symbolic language for traffic and public navigation has been well-established—but how can this be transferred to the dynamic shape (and extended capabilities) of small drone swarms?

Finally, on a city-wide scale, organizing swarms of hundreds (or even thousands) of drones in the sky to display information recognizable from a number of vantage points opens up research questions in the field of spatio-temporal visual design under severe logistical constraints—an area in which the Futurelab, with its successful Spaxels project, can draw on ample experience.

Text: Peter Holzkorn, Horst Hörtnner / Ars Electronica Futurelab



Investigating Future Urban Mobility

If a city is viewed from above, it is a world in motion: trains carry people to and from work, taxis circulate, trucks deliver goods and carry away garbage, pedestrians walk down city blocks, cyclists zip through traffic. In other words, mobility is the bloodstream of our cities and is essential for urban life.

Technological innovations in the form of electrification, connectivity and autonomy are on the horizon. The combination of urban expansion and rapid innovation will inevitably drive significant changes—what will the consequences be for future urban mobility? TUMCREATE Limited—as a research platform, comprised of over 100 scientists, designers and engineers—is investigating how future public transportation in Singapore could be.

Urban mobility needs to be analyzed holistically, so we can understand how the infrastructure and people interface and interact, and the impact it has on ecology and society. TUMCREATE, together with Ars Electronica Futurelab, has therefore developed an Interactive Virtual City (IVC) within Deep Space 8K—a state-of-the-art interactive 3D visualization platform. Using the IVC, future mobility concepts can be simulated, social acceptance of new technologies can be assessed and the impact of new transportation concepts on the infrastructure, such as road, energy grid and vehicle fleets, can be studied. This unique IVC enables interdisciplinary research areas to work directly with each other. For example, we can investigate how traffic simulation results influence vehicle design or how a transportation concept fits into overall Singapore mobility plans and future roadmaps. Furthermore, the 3D immersive and responsive environment of this novel tool is equipped with human-in-the-loop simulation to understand how people react to autonomous vehicles (AV). Human responses to various AV communication strategies can be easily sensed, tested and verified, without necessarily working on prototypes and conducting tests in real-world situations, which are much more time, effort and finance intensive.

This research tool allows us to have an impressive, detailed visualization and to experience the vehicle

concepts, mobility systems and operation strategies “live” as it were, and at city level. This rich visualization makes it understandable and transparent to scientists, students and people from all backgrounds.

TUMCREATE (Technical University of Munich, Campus for Research Excellence And Technological Enterprise) is a research platform for the improvement of Singapore's public transportation, including the deployment of electric and autonomous mobility. Researchers from Technical University Munich and Nanyang Technological University join forces and are funded by Singapore's National Research Foundation as part of the Campus for Research Excellence And Technological Enterprise (CREATE).

<http://www.tum-create.edu.sg>

Text: Rahul Rahul Gujarathi / TUMCREATE



Markus Scholl / Ars Electronica Futurelab

Ars Electronica Futurelab Academy @ QUT 2017

The Ars Electronica Futurelab Academy was created to support students and educators from international partner universities to engage in transdisciplinary practice. Futurelab researchers act as mentors and collaborators, supporting creative exchange with the academy participants. Participants come from a range of backgrounds: from art and design through to science, engineering and technology. Since 2012, collaborations with renowned universities in China, Japan and Australia have resulted in a wide range of exhibits and performances being presented at the Ars Electronica Festival. Some of these project outcomes have gone on to win prestigious awards and accelerated the artists' research and practice trajectories.

In 2017, the Futurelab partnered with Brisbane's Queensland University of Technology for a fourth academy. Drawing on the success of the previous years, the 2017 format took an adventurous leap into uncharted curricular territory and brought together leading QUT educators and researchers, an independent international curator and a host of Ars Electronica Futurelab members to create a first-of-a-kind education experience.

More than 50 participants from across the creative industries, greater university faculties and external local leading creative practitioners engaged in a unique collaborative process. The academy took

them through discipline decontamination and into a journey of collective brainstorming and eventually to new enquiry-driven research models and creative visions. The academy enabled participants both to uncover their discipline-specific ontology sphere and paradigm, while supporting them in discovering new emergent methodologies of practice and creative outcome possibilities. This year's academy developed several creative projects, ranging from technically augmented performances to site-specific intervention prototypes. It also provided the platform for the Guerrilla Knowledge Unit (GKU) initiative, that introduces pre-service teachers to “art thinking” as a basis for the development of curriculum-linked learning outcomes that push current pedagogical norms. GKU is presenting education workshops as part of this year's u19 – CREATE YOUR WORLD program.

Team: Ars Electronica Futurelab: Kristefan Minski, Peter Holzkorn, Horst Hörtner; QUT: Greg Jenkins, Stephanie Hutchison, Matthew Strachan, Yanto Browning; Independent Artist and Curator: Lubi Thomas

Text: Kristefan Minski, Peter Holzkorn, Lubi Thomas / Ars Electronica Futurelab



Greg Jenkins



Jacob Watton, Briony Law

Jessica Cheers

1:1

The *1:1* project is about the relationship between a human and a robot camera—how they grow to be able to imagine each other in complex ways, seeing each other on a 1:1 scale. Incorporating elements of dance, theater, and new technology, this work resides at an interstice between human and Other.

Team: Artists: Jacob Watton, Briony Law, Jaymis Loveday; Cinema Swarm Inventor: Jaymis Loveday; Programmer: Charles Hendon; Producer: Lincoln Savage; Assistant Producer: Quinty Pinxit-Gregg; Researcher: Nicole Robinson; Dramaturge: Kathryn Kelly; Roboticists: Marisa Bucolo, David Hedger and Paco Sanchez-Ray; Project Consultant (dramaturg and choreographic development): Dr. Stephanie Hutchinson

The *1:1* project was realized through the generous support of QUT Creative Lab, Robotronica and QUT Robotics Lab.

Teaching City

Teaching City is an experiential learning framework highlighting urban issues through playful interactions. It offers an antidote to the industrial-age pedagogy of the classroom, subverting the preconceptions of citizens through “knowledge interventions” embedded in urban spaces—the city is the teacher.

Team: Artists: Jessica Cheers, Leah Gustafson, Samantha Glennie; Associate Producer: Quinty Pinxit-Gregg; Technical Support: Matthew Strachan

SynapSense

SynapSense is a performative installation heightening our bodily awareness. Sensorial understanding through enactment is revealed via three modes: explore, calibrate and create. Interaction creates the soundscape—touch enables investigation and sound reflects exploration.

Team: Choreography: Felix Palmerson; Dance: Georgia Pierce, Felix Palmerson, Sophie Barendse, Jayden Grogan, Oscar Connor, Isabella Hood, Matilda Skelhorn, Phillipa Chapman; Visual Design: Peter Lloyd; Music and Sound: Yanto Browning, Cameron Whelan, Greg Jenkins; Technical Support: Matthew Strachan; Artistic Direction: Dr. Stephanie Hutchison; Producer: Quinty Pinxit-Gregg

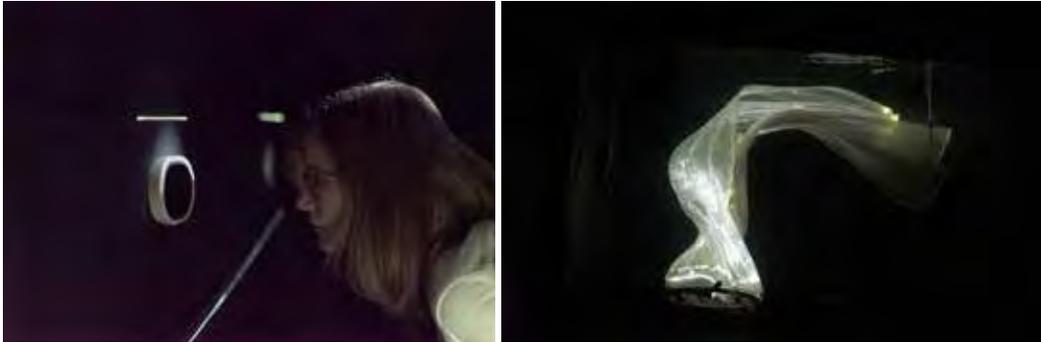


James Dillon

Ars Electronica Australia

The Ars Electronica Futurelab Academy @ QUT started as a collaborative project in 2013 and is now becoming a partnered research product for exporting transdisciplinary experience. Already several universities in Australia and Asia have expressed interest

in connecting to this new initiative and, from next year, we plan to introduce the first cross-institutional program. Moreover, the project signifies the beginning of a much broader and intensive partnership between QUT and Ars Electronica.



Denis Beaubois

Keith Armstrong (AU/UK), with Matthew Davis (AU) & Luke Lickfold (AU)

Eremocene (Age of Loneliness)

A mysterious, internally glowing creature, witnessed from several vantage points moves uncannily in a fluid motion within dense blackness. In a life-like, bio-morphic form, continually fading in and out of perception, enveloping sound, vision and movement are as one. The idea of the “extinction of human experience” expresses our projected fear of everything that will be rendered senseless when ancient, intelligent, biodiverse worlds have descended into permanent darkness. But as one series of conceptions slip into extinction, so others flow on in. *Eremocene* suggests that we might instead embrace artificially intelligent “things” with little need for dated legacies such as excess light or the long-extinguished sounds of biological life. The philosopher and biologist E. O. Wilson calls such possible futures the “Eremocene—our Age of Loneliness.”

Eremocene builds on a ten-year sci-art process around ecological vulnerability and resilience in relation to overheated, increasingly artificially intelligent worlds.

Artistic director: Keith Armstrong
Sound and system designer: Luke Lickfold
Interactive vision designer: Matthew Davis

Supported by The Creative Lab, QUT Creative Industries and Embodied Media

This project has been assisted by the Australian government through the Australia Council for the Arts, its arts funding and advisory body. Thanks to Living Data (Lisa Roberts), UTS Life Sciences (Prof. William Gladstone), UTS Institute for Sustainable Futures (Dr. Tania Leimbach), Prof Greg Hearn, Dr. Peggy Eby, Lawrence English, QUT Tech Services.



BANDAI NAMCO Holdings Inc. (JP), Hakuodo Inc. (JP), Ars Electronica Futurelab (AT)

Pacathon

Pacathon is an open innovation lab for discussing future play and future society through prototypes exploring new utilizations of *PAC-MAN* for people. *PAC-MAN* is a video game algorithm that was released by Bandai Namco Entertainment Inc. (formerly NAMCO LTD.) in 1980. It became a mega-hit not only in its birthplace Japan but across the world and is loved still today by many people. *PAC-MAN* attracted not only the traditional game fans but also a new wave audience of young and old alike who were captivated by the game's simple rules, profound game system, colorful and cute characters design, rhythmical BGM and unique SE and the comical intermission sequences between each level. In many ways, *PAC-MAN* was the first avatar to create a communication bridge between a coded, virtual world and the people. As the hype grew, approximately 400 different types of merchandise were released one after another and *PAC-MAN* became a social phenomenon embedded in the human psyche as a symbolic icon representing game culture and the social impact.

And now, if we regard *PAC-MAN* as a reflection of human social instinct and release it from the game screen into the actual world, what kind of and characteristics will it feature and what will *PAC-MAN*'s new role be in the future?

Pacathon is an open innovation process that was born out of a research project: an adventure to explore what a next generation of *PAC-MAN* could look like. Through the collective minds of the BANDAI NAMCO group, Ars Electronica and Hakuodo, these three collaborators have been carrying out

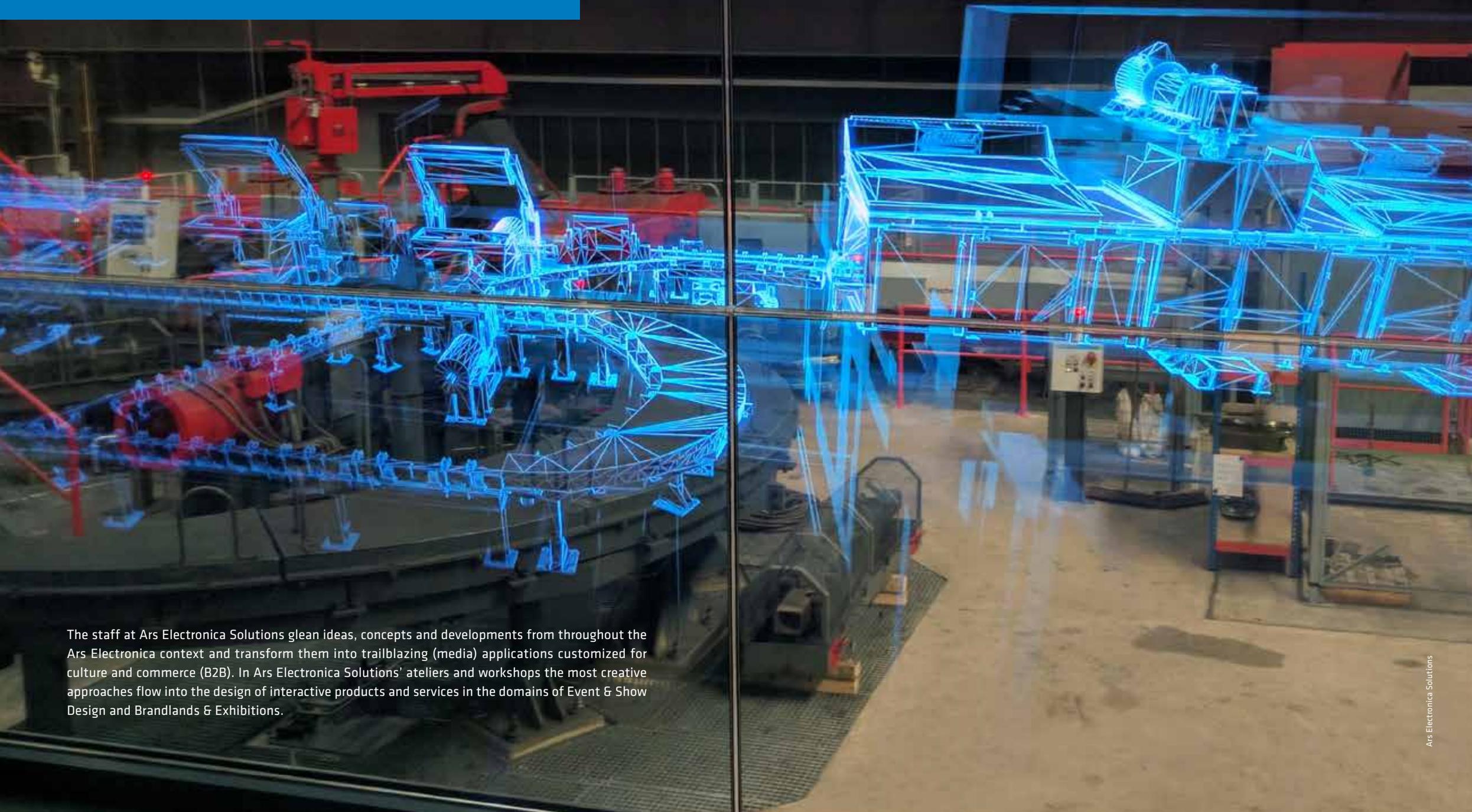
research and workshops since May 2017 to understand the essence of future playing and to unearth the social value of *PAC-MAN* in order to prototype *PAC-MAN*'s future. This project aims to explore the potential of innovative gamification with the Ars Electronica Festival participants through *Pacathon*.

Text: Hideaki Ogawa (Ars Electronica Futurelab), Rena Tanaka (Hakuodo Inc.)



PAC-MAN™&©BANDAI NAMCO Entertainment Inc.

Ars Electronica Solutions



The staff at Ars Electronica Solutions glean ideas, concepts and developments from throughout the Ars Electronica context and transform them into trailblazing (media) applications customized for culture and commerce (B2B). In Ars Electronica Solutions' ateliers and workshops the most creative approaches flow into the design of interactive products and services in the domains of Event & Show Design and Brandlands & Exhibitions.

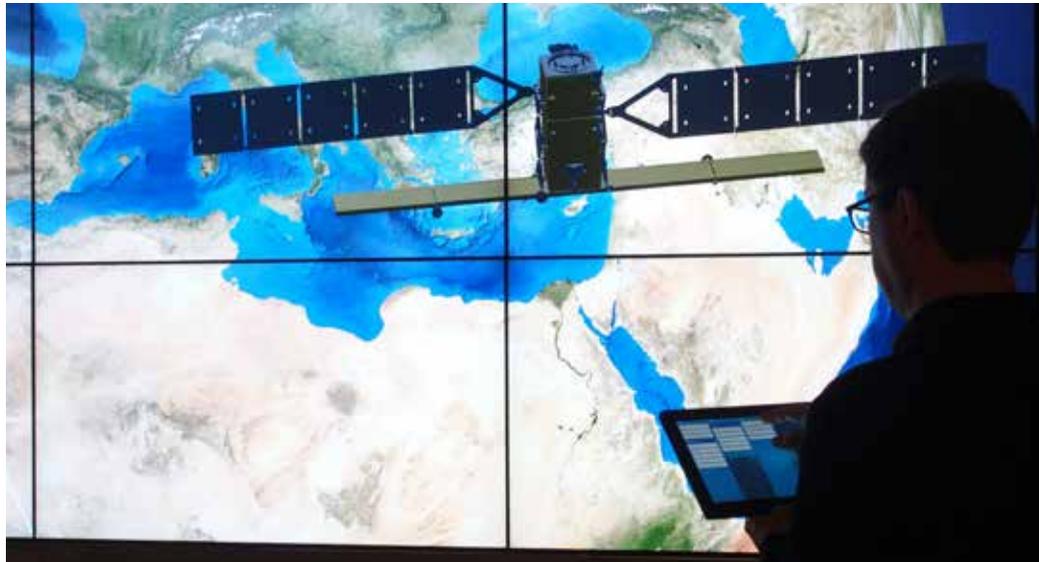
ESA: Hyperwall in Frascati

The Living Planet Symposium in Prague provided a great opportunity for the European Space Agency (ESA) and Ars Electronica Solutions to expand their collaboration. Ars Electronica Solutions was commissioned to create a Hyperwall for the ESA's facility in Frascati, Italy.

The Hyperwall is an application based on Ars Electronica Solution's GeoPulse technology. It offers a wide array of options to impressively display ESA's content (data, satellite images and

videos) on a multi-screen wall (nine monitors). The Hyperwall is operated via tablet. The application enables a user to customize their navigation to the individual needs of a particular audience and thereby effectively present the ESA's mission and programs to a broad spectrum of visitors.

Another joint project in autumn 2017 will carry on the many years of successful cooperation between Ars Electronica Solutions and the ESA's Frascati facility.



Harald Moser



ESA

Harald Moser



Harald Moser

New Attractions at the Vienna Giant Ferris Wheel

Ars Electronica Solutions was commissioned by ArtDeluxe Art and Culture Management to design the new lobby of Vienna's giant Ferris wheel. The two companies collaborated on a holistic concept for the furnishings, media technology and printed matter, which was implemented in January 2017.

The on-screen content is in comics style and features customized characters providing visitors with information about the giant Ferris wheel. The star of the show is the attraction's own mascot, who personally answers family members' questions.

The information is primarily historical and technical. Old archive material is presented in a way that is suitable for all age groups. The here-and-now also pops up occasionally on the venue's four monitors in the form of remote live footage streamed to the lobby from a special camera mounted on one of the cabins. At certain times, the picture screen background image blends in with the print on the wall to give the impression of a homogeneous surface that repeatedly opens up informative windows on fascinating information.



Beehive Malta EU2017

In the first half of 2017, the EU member state Malta assumes the presidency of the Council of the European Union. Airan Berg is serving as artistic director of the cultural program staged in conjunction with Malta's presidency. Its aim is to provide EU citizens with information about the presidency of the Council as well as to enable them to interact with content from the European Union. To accomplish this, the Maltese government selected *Beehive*, one of Ars Electronica's ongoing research projects, as the central installation. *Beehive Malta* has three levels that can be utilized to make content public.

First level: Information on topics, events and programs to do with the Council presidency; government representatives can post relevant content such as dates/times, information, images, videos and texts to this platform.

Second level: Media content edited by "citizen journalists"—each month, citizens of Malta are selected to travel to Brussels to conduct interviews with EU citizens and record statements by passers-by. Third level: General participation by all interested EU citizens; both for iOS and Android, the respective stores will make an app available for download that enables any user to post images (videos or photos) expressing their impression of the Maltese EU Council presidency.

All content will be collected—like bees gathering nectar—and presented on the *Beehive Malta* website (<http://beehivemalta2017.eu2017.mt/>). Using various parameters, website visitors can search for images on particular subjects or locations and filter their selection according to those parameters.

“Adventure Earth,” a Special Exhibition in AUDIOVERSUM Innsbruck

This installation, which successfully debuted at the Ars Electronica Center in 2015, has been running since October 2016 at Innsbruck's Audioversum in a modified form. The special exhibition was adapted for Tyrol in cooperation with Audioversum and with the support of the European Space Agency (ESA) and the German Aerospace Center (DLR). To take optimal advantage of the Audioversum setting, the design and positioning of the installations were tailored to the facts and circumstances of the space. Preparing the Audioversum's visitor support personnel for the Adventure Earth exhibition was carried out by Ars Electronica Center staffers

trained within the framework of the European Space Education Resource Office (ESERO) program. Collaboration with ESERO will continue in autumn 2017. The Adventure Earth" exhibition takes visitors on a journey to the most exciting spots on the face of our planet. Simply touching the installation's multi-touch surfaces provides access to information levels behind the impressive satellite imagery. Questions about the locations depicted, the technical background, sensor technology and visualization, as well as discussions of the big picture forming the context of each image are treated in an interactive narrative structure.



New PALFINGER WORLD in Lengau

The new Palfinger World in Lengau showcases the Palfinger brand in an exciting, innovative way. A 3D cinema equipped with state-of-the-art technology, virtual reality installations and interactive spaces immerse visitors into the fascinating world of Austria's specialist for innovative hydraulic lifting, loading and handling solutions. Linz-based Ars Electronica Solutions played a key role in the conception and implementation of the new Palfinger World. Palfinger stands for efficient, reliable and innovative hydraulic lifting, loading and handling solutions. The recently opened Palfinger World showcases the brand of this global industry leader in a fascinating, innovative way. Now, a custom-built 3D cinema featuring wall and floor projections and active stereo 3D technology, a highly detailed test track with scale models, and a whole series of virtual reality installations acquaint visitors to this facility with the history of what began in 1932 as a family

company, show the milestones of its development, and highlight its diversified range of products. Ars Electronica Solutions played a major role in conceiving and implementing the new Palfinger World. Palfinger World is an 850-m² layout arrayed on three levels of a specially constructed hall at Palfinger's largest production facility in Lengau. The core element of this exhibit is a one-of-a-kind presentation environment that enables visitors to interactively immerse themselves in a virtual experience of the Palfinger brand. 120 m² of wall and floor projections create a three-dimensional virtual experience—a journey through the world of Palfinger products that conveys a realistic feeling of being right on the spot where this high-tech machinery is deployed. "This jumbo-format projection with active stereo 3D technology screening images on 120 m² wall and floor projection surfaces is totally unique," noted Ars Electronica Solutions Director Michael Badics.



70th Anniversary of the Federation of Upper Austrian Industries

In Upper Austria, industry is the driving force behind the economic output of the entire region. The enormous power of industrial production, value added and investment is what makes Upper Austria an important place to do business.

The *Industriellenvereinigung* (IV), the Industrial Association of Upper Austria, celebrated its 70th anniversary in June 2017.

To mark the occasion, the IV commissioned Ars Electronica Solutions to design and produce an interactive installation depicting the IV's four most important themes. The installation was conceived to provide visual highlights accompanying the program of events at the gala celebration, and also to serve as a permanent installation on display at the IV's Linz headquarters. Plus there is a mobile version of the application conveniently designed to take on the road.

The basis of the installation is the depiction of an interactive globe on which geographic inter-relationships, statistical data and diverse media (text, graphics, film, animation) can be displayed.



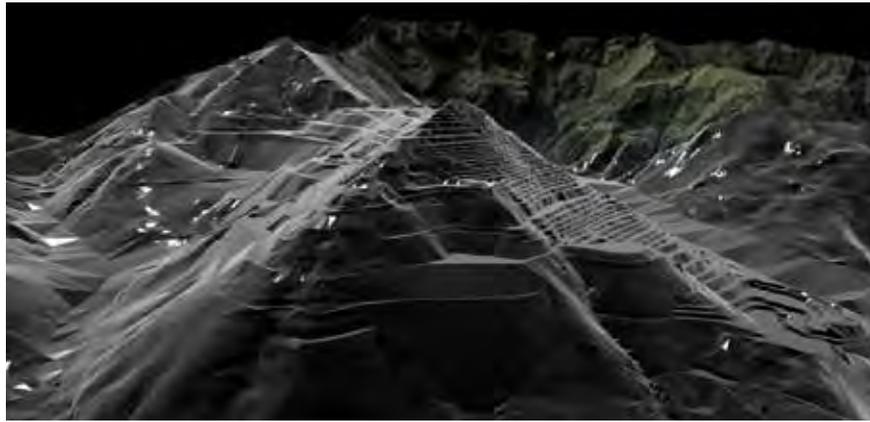
The media elements were editorially prepared and integrated into the installation in such a way that "stories" about the four most important themes can be queried interactively. At the heart of the installation is a content-management system that enables the IV to update and modify the presentation at any time.

SACHER—A Tourism Icon Goes High-Tech

Ars Electronica Solutions signed on to play a starring role in the makeover of Sacher Confiserie and the reconception of the Sacher Eck, the popular cafe in Vienna's only family-owned luxury hotel. A series of highly creative installations shed a fascinating new light on this world-renowned institution.

In the Sacher Eck, a monitor integrated into the architecture provides insights into the bakery dating back to 1832 and a close-up look at the individual steps that go into the creation of an Original Sacher Torte. The showcases on the corner of Philharmoniker and

Kärntner Straße are decorated with a combination of paper cutouts, Torten and LED panels designed to display the unique status of this iconic establishment set amid the Old World splendor of Vienna's inner city. A diorama that is the highlight installation in the Kärntner Straße showcase features fascinating, old-fashioned paper cut-outs depicting typical scenes that play out in the Sacher. Beginning in autumn 2017, this charming mise-en-scène will be enchanting passers-by and inviting them to come inside and partake of a genuine Sacher experience.



Ars Electronica Solutions



Ars Electronica Solutions



VA Erzberg GmbH

Adventure Erzberg

Erzberg, located in Leoben in the Austrian state of Styria, is Central Europe's largest open-cast mine, the most important ore-producing site in the Alps, a symbol of Austrian industrialization and the centerpiece of the historic Iron Road. Ore has been mined at Erzberg for over 1,300 years. The mountain began to take on its current appearance in 1890 with the introduction of stair-step-style open-cast mining. This has made Erzberg a popular tourist attraction.

VA Erzberg GmbH commissioned Ars Electronica Solutions to use digital technology to add depth to the visitor experience at this amazing place. The visitor experience at Erzberg is divided into two phases. Tour participants gather at the downhill visitor center, where a Hauly, a heavy-duty earth mover specially adapted for passenger transport, picks them up for their round-trip through the site. Ars Electronica Solutions conceived and installed a multimedia infrastructure for both the visitor center and the Hauly. "Ars Electronica's contribution to Erzberg's revamped visitor center is a total-

immersion installation that employs computer animation to get visitors in the mood for their live Erzberg experience." (*Kleine Zeitung*, May 19, 2017) The centerpiece of the interactive installation in the downhill visitor center is a visualization of the changes wrought on Erzberg's appearance by open-cast mining. The installation is operated by a touch-screen terminal; content then appears in dazzling 4K resolution.

Depicted on the terminal's screen is a timeline in the form of photos, which enables visitors to intuitively select a desired historical timeframe. Information about that epoch then appears on the touchscreen. The heavy-duty people-movers are equipped with video screens, audio equipment and cameras. At especially interesting points along the tour, visitors can watch videos about what goes on there—for instance, blasting ore deposits. It is also possible to bring up a feed from one of the four on-board cameras to view the ride through this breathtaking landscape from the perspective of one of the Hauly's huge tires.

SILHOUETTE— Media Production for a Conference

For Silhouette, the world-famous eyewear maker, the most important date on the corporate calendar is its annual Global Brand Conference (GBC). This year, the Ars Electronica Center was selected as the venue, and Ars Electronica Solutions was commissioned to produce the event and coordinate all the project participants.

At the top of Ars Electronica Solutions' to-do list was a 3D media production for Deep Space. In order to blend a wide variety of preexisting video material into a fluid Deep Space narrative featuring 3D elements, Ars Electronica Solutions had to occasionally reach deep into its bag of production tricks. An animated, digitized globe makes it possible to see the world of Silhouette from afar before moving in for an in-depth look. To tell more about Silhouette's latest trailblazing development, its innova-

tive Lenslab and the new product line associated with it, visitors are transported into the company's Linz headquarters. To do this, 4K drone footage of the production facility and office complex was shot, transitions from the second to the third dimension were produced, and existing video material received a stereoscopic animated makeover. This delivered an extraordinary virtual experience to those attending the Silhouette GBC. The film's soundtrack was a highlight in its own right. This occasion was the first time that a work produced by artificial intelligence has even been performed in Deep Space. Ali Nikrang, a software specialist and musician, did the programming—the input was a series of parameters, the output was a composition, and the outcome was a harmonious, opulent tonal experience that complemented the film quite nicely.



Ars Electronica Solutions



Parlamentsdirektion / Michael Buchner

Parliament's Temporary Relocation

To permit a much-needed renovation of Austria's 130-year-old Houses of Parliament in Vienna, the daily business of the country's legislature and its institutions is now being done in three temporary quarters. The Visitor Information Center is being housed in a pavilion on Heldenplatz.

For this location, Ars Electronica Solutions has conceived two interactive information walls about "Democracy and Parliamentarianism" and Heldenplatz (Heroes' Square) itself, a place of enormous significance in Austrian history. In addition to screening information, interactive haptic elements and in-depth explanations conveyed on touch-

monitors will create a one-of-a-kind environment for visitors of all ages. The first themed wall provides information about the essential aspects of Austrian parliamentarianism, its origins and most important constituent bodies. Plus visitors can ring a real Parliament bell, see a 360° view of the chambers, and follow as youngsters get an explanation of how democracy works. The second themed wall presents Heldenplatz, Austria's meeting place with destiny. Visitors are invited to trace the history of this square, to experience a time-lapse video of the pavilion's setup, and to examine archeological finds discovered during the excavation phase.



Dave Hakkers

circ responsibility (DE)

The Plastic Lab

Washed up on our coasts in obvious and clearly visible form, the plastic pollution spectacle blatantly emerging on our beaches is only the prelude to the greater story that has unfolded further away in the world's oceans, yet mostly originating from where we stand: the land. For more than fifty years, the global production and consumption of plastics has continued to rise. An approximate eight million tonnes of plastic end up in our oceans every year, which equals one truck of plastic per minute.

The objective of the *Plastic Lab* is to develop an

artificial, caring intelligence that creates a meta open-source database with all kinds of solutions to address the issue of plastic waste. Information on materials science, recycling technology and business models will be made available at no cost, so that entrepreneurs, designers, engineers and innovators around the world can access this information and apply it in their local context. Let's solve the century's challenge of plastic pollution!

The Plastic Lab was initiated by Hans Reitz, Christina Jäger and Ilona Geimer.



Dave Hakkers

Ars Electronica Export

Martin Hieslmair

Since 2004, Ars Electronica has worked together with partners in art and culture, science and education, commerce and industry to produce a diverse array of projects all over the world. The spectrum includes exhibitions and presentations, conferences and workshops, performances and interventions. What these collaborative activities have in common is the inspiration they derive from the ideas and visions of Ars Electronica's worldwide network.

Ars Electronica Export offers partners the possibility to select from a menu of individual options or deciding on a complete package—depending on their particular wishes, interests and resources. It's up to the partner to decide whether existing exhibitions, presentations, conferences and workshops in the form of complete arrangements are the most cost-efficient way to achieve their objectives, or if the way to go is with selections that are curated by Ars Electronica in accordance with thematic, technological or historic criteria and that also flexibly permit the integration of our partner's artistic and technical know-how. Whether one decides on a complete package or customized program of activities—our job is to create just the right lineup of inspiring artistic and scientific projects, to align them on a path that builds on the successes of the past and is conducive to a promising future, and to work together with our partners to get the latest developments at the interface of art, technology and society across to international audiences as a means of initiating a discussion on the ideas of tomorrow today.

Pneuma Fountain, Chico MacMurtrie

Ars Electronica in Berlin 2017

DRIVE. Volkswagen Group Forum, Berlin, Germany
July 21, 2017–October 26, 2017

A project jointly produced by the DRIVE Volkswagen Group Forum and Ars Electronica Linz

This is the sixth time that carmaker Volkswagen and Ars Electronica Linz have worked together on a summer exhibition with a lineup of ancillary events being staged in the DRIVE Volkswagen Group Forum in Berlin. As always, people are the focal point of these inquiries into issues at the nexus of art, technology and society. This year, the discussions spotlight new forms of encounter, relationships and the challenges they entail.

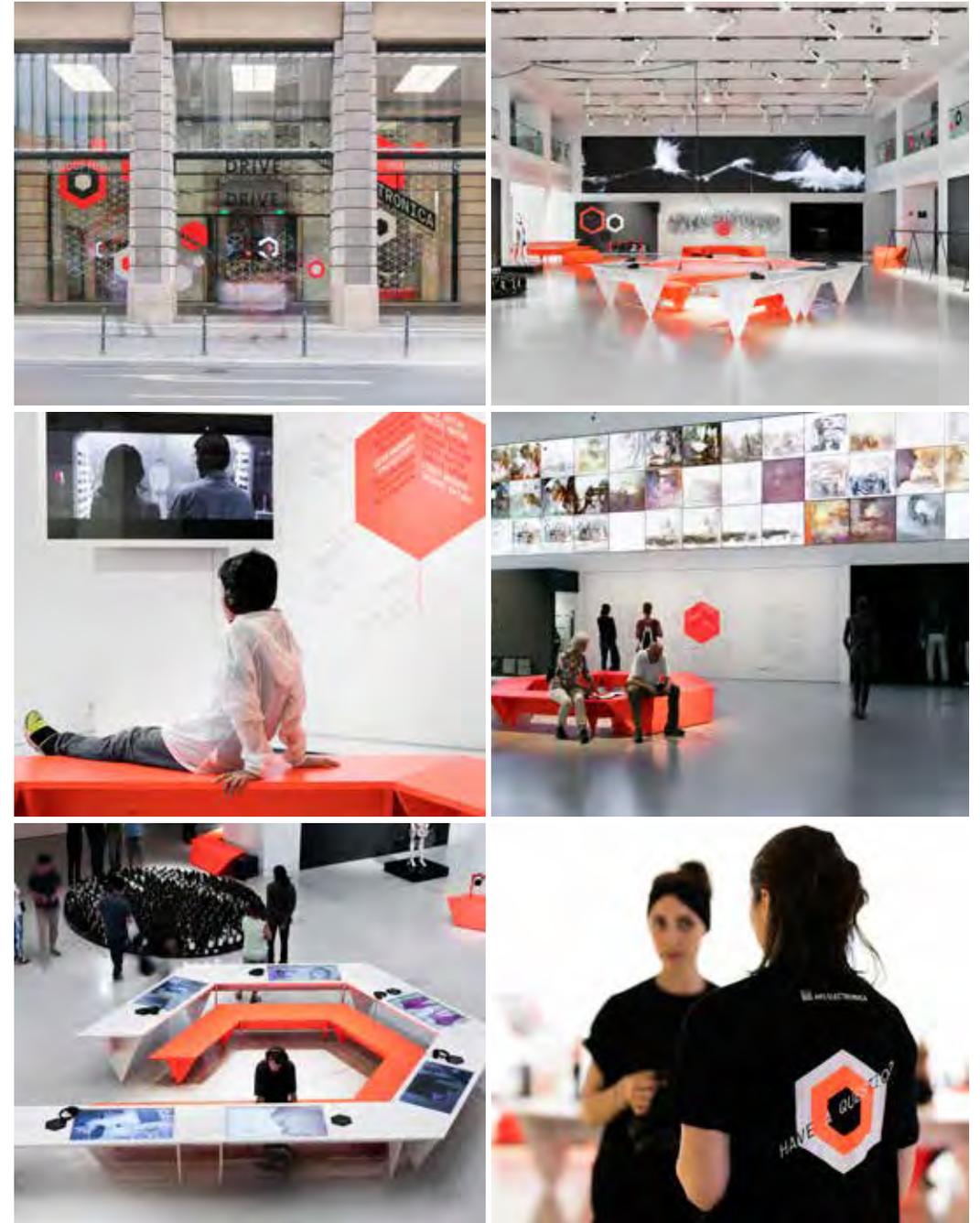
After all, humankind has developed rapidly and thereby engendered a setting for life whose complexity, dynamics and dimensions take some effort to grasp and comprehend. Even if current global challenges are based on the historical elaborations of the concept of industrialization, we can only speculate as to the direction this path is taking us on now. It appears that social development and transformation are lagging behind technological progress—from automation to the digital revolution to self-learning systems. Nevertheless, at this point, due to the self-reinforcing dynamics at work here, the traditional principle of industry and the explosive growth of global population are colliding with their limits. The resulting consequences confront us daily: breakneck urbanization and the concentration of human coexistence, political conflicts and cultural challenges, problems satisfying needs and distributing wealth, and the complexity of energy issues, climate change and dealings with our environment in general.

The upshots of these phenomena are the obvious erosion of humanity and what it means to be a human being, and thus, in times of economically

oriented moral compasses, scant cognizance of a sense of responsibility for others, and little attention paid to or openness towards new forms of human coexistence. Accordingly, we invoke the philosophical discourse that has been permanently attuned to the role of humankind ever since technological progress got underway, has radically maintained it in the focal point of consideration, has critically questioned how we deal with one another and with nature as well as the technical second nature that we ourselves have created, and has been intended to function as a sort of corrective to these developments. What we put forward here is a new culture of encounter, a solution-oriented proposal that might counteract the dilemma of our estranged present. These artistic works are thus designed to initiate discussion.

The exhibition and the accompanying actions, workshops, performances and round-table discussions deal the subject of encounter. They are intended to make us aware or sharpen our awareness of what we as individuals can do, and make “new action” possible, a new ethic in the economic exchange with ecological sustainability, a culture of encounter that makes it possible to reconfigure conventional pairing and to come upon new forms of getting together, coexistence and cooperation.

With: Nelo Akamatsu (JP), Memo Akten (TR/UK), Exonemo (JP), Akinori Goto (JP), Iris van Herpen (NL), Cornelia Hesse-Honegger (CH), Christina Kubisch (DE), Shinseung-back Kimyonghun (KR), Isaac Monté (BE), Quadrature (DE), Daniel Rozin (IL), Mariano Sardón (AR), Maja Smrekar (SI), Yamanaka Laboratory (JP)



HYBRIDS—On the borderline between Art and Technology

Onassis Cultural Foundation, Athens, Greece
November 7, 2016–January 15, 2017

This was the first comprehensive exhibition that Ars Electronica Export has ever staged to showcase artistic positions on this topic: *Hybrids*, designed in collaboration with the Onassis Cultural Centre, Athens, featured sixteen extraordinary manifestations of artistic considerations, positions and processes, artifacts and works, workshops and presentations—hybrids one and all. Hybrid also applied to the exhibition setting, an attempt to create a space that facilitates experiencing precisely these phenomena, one that effectively displays works, enables working

processes, permits participation, and thereby fosters a joint endeavor to gain a better understanding of our world.

With: Moreshein Allahyari (IR), James Bridle (UK), Paolo Cirio (IT/US), Gilberto Esparza (MX), exonemo (JP), Marilena Georgantzi (GR), Anastasis Germanidis (GR), Marinos Koutsomichalis (GR), Manu Luksch (AT), Lauren McCarthy (US), Jon McCormack (AU), Kyle McDonald (US), Julian Oliver (NZ), Anil Podgornik (SI), Afroditi Psarra PhD (GR), Saša Spačal (SI), Klaus Spiess (AT) and Lucie Strecker (DE), Mirjan Švagelj (SI), Danja Vasiliev (RU), Alex Verhaest (BE)



Social Soul by Lauren McCarthy and Kyle McDonald

Andreas Simopoulos, Courtesy of Onassis Cultural Centre-Athens



Martin Hieslmair

Pneuma Fountain by Chico MacMurtrie

Kremsmünster, Austria
June 15, 2017–October 15, 2017

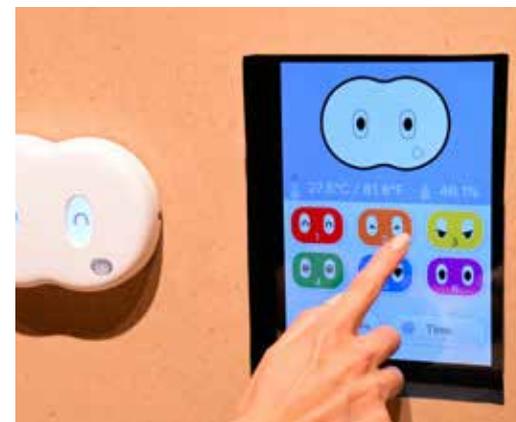
The “Harmonious Triad of Gardens” is the theme of the province of Upper Austria’s 2017 Garden Show in Kremsmünster. One of the featured attractions greets visitors right at the entrance to this year’s venue: *Pneuma Fountain*, a robotic sculpture by prominent American artist Chico MacMurtrie, radiates from the center of the Prälatenhof, Krems-

münster Monastery’s baroque courtyard. The four-meter-tall, sixteen-meter-wide structure was commissioned by the Upper Austria Garden Show in collaboration with Ars Electronica Linz. The project is supported by Kaeser Compressors and Greiner Holding AG.



Ars Electronica in the Knowledge Capital

The “Ars Electronica in the Knowledge Capital” event series in Osaka, Japan, invites business and creative people to be inspired by artistic perspectives with a mix of exhibition, lectures and workshops.



IMPETUS AND MOVEMENT (Vol. 6)

Knowledge Capital Osaka, Japan
August 18, 2016–November 6, 2016

In Vol. 6, the theme of the get-together is “Impetus and Movement.” From August 18 to 20, 2016, the participating artists were Nelo Akamatsu (JP), Yasuaki Kakehi (JP) and Akira Wakita (JP). Ars Electronica was represented by Andreas Bauer, head of the Ars Electronica Center, and Hideaki Ogawa from the Ars Electronica Futurelab.

InduSTORY (Vol. 7)

Knowledge Capital Osaka, Japan
February 9–May 7, 2017

In Vol. 7, the theme of the get-together is “InduSTORY,” where you can witness how industry will change in future. From February 9 to 10, 2017, the participating artists were Kana Nakano and Tomonori Kagaya of Neurowear as well as Prof. Shunji Yamanaka with his Prototyping & Design Laboratory. Ars Electronica was represented by Martin Honzik, head of the Ars Electronica Festival, and Shoko Takahashi from the Ars Electronica Futurelab.

Engineering the Future

Ars Electronica Export at the V&A's Digital Design Weekend
September 24–25, 2016



Jochen Zeirzer

A Weekend in London. Last year's Digital Design Weekend took place on Saturday and Sunday, September 24 and 25, 2016, in London. Participants included the Austrian Cultural Forum, the Victoria and Albert Museum and Ars Electronica Linz, which



jointly presented six recent projects by young media artists from Austria.

With: Yen Tzu Chang (TW/AT), Linda Kronman (FI) and Andreas Zingerle (AT), Dawid Liftinger (AT), Verena Mayrhofer (AT), Stefan Tiefengraber (AT), Jochen Zeirzer (AT)

European Forum Alpbach 2016— Best of Art & Science

Alpbach, Austria
August 25–27, 2016



#ART TEC, the new exhibition program at the Alpbach Technology Symposium, visualized the pioneering potential of linking technological development and scientific procedures with artistic creativity. The Best of Art & Science exhibition, realized in cooperation with Ars Electronica Linz and



Florian Voggeneder

art:phalanx GmbH, is an impressive example of how exciting and innovative interdisciplinary projects at this interface can be.

With: Jonas Bodingbauer (AT), Nick Ervinck (BE), Soichiro Mihara (JP), Christa Sommerer (AT) and Laurent Mignonneau (FR/AT), Patrick Tresset (FR/UK), Akira Wakita (JP)

Meet the Future

Ars Electronica Linz at Audi Training Center Munich

Ars Electronica Export was asked to develop an exhibition setting for the Audi training center. The exclusive setting is designed to inspire the ongoing training, presentations and talks when thinking about future and mobility. The main question and topic of the setting is the way the consumer of the future has impact and influence on their surroundings and on products.

With: Jussi Ängeslevä (FI) et al., National Institute of Advanced Industrial Science and Technology (AIST), Tomotaka Takahashi (JP), Ars Electronica Futurelab (AT), Jessica Rosenkrantz (US), Jesse Louis-Rosenberg / Nervous System (US)



Florian Voggeneder

Anouk Wipprecht

Vienna, Bildraum 07
August 24–September 9, 2017

Ars Electronica Linz and Bildraum 07 are hosting an exhibition of works by fashion-technology artist Anouk Wipprecht. The Dutch designer presents her innovative art at the interface of fashion, technology and science. By using fashion as a new kind of interface, her interactive designs aim to create technology-based dialogs with the body or the surroundings of the wearer. Anouk Wipprecht's creations include wearables and robotics, integrate microprocessors and sensors and take on current research subjects in the field of neurosciences.

Anouk Wipprecht's declared aim is to use EEG devices and neuroscientific approaches to create designs and learning systems for therapeutic interventions that raise self-awareness and quality of life. Within the Sparks residency at the Ars Electronica Futurelab, Anouk Wipprecht developed *Agent Unicorn*, 3D-printed headsets in the form of unicorn horns, designed for children with ADHD

(attention-deficit hyperactivity disorder). A prototype is exhibited at Bildraum 07 alongside other works by the artist.

Bildraum 07 is a cultural facility in Vienna operated by Bildrecht GmbH and is already hosting the third exhibition in collaboration with Ars Electronica Linz.



Local Androids

Biographies

vtol: (RU) is the alias of the Moscow-based media artist and musician Dmitry Morozov whose projects focus on technological art, robotics, sound art and science art. He also designs and creates experimental musical instruments and modular synthesizers. He regularly holds workshops and lectures on technological practices in art. <http://www.vtol.cc>

Lucas Abela (AU) is a free-noise musician known for ecstatic performances with shards of glass vibrated orally to create oddly controlled, strangely musical cacophonies. Recently he has turned his attention to large-scale stochastic instruments built for musical play, devised to switch roles between audience and performer in line with a philosophy that noise is more rewarding to play than observe.

Harshit Agrawal (IN) is an artist and HCI researcher who builds tools and art systems to study how technology can blend with and enhance human creative expression. He studies this from a machine intelligence, human augmentation, cultural integration and human-machine collaboration aspect. He enjoys creating novel experiences for people to engage with creative uses of technology, opening up new channels of wonder and reflection.

Memo Akten (TR/UK) is an artist working with computation as a medium, exploring the collisions between nature, science, technology, culture, ethics, ritual, tradition and religion. Combining critical and conceptual approaches with investigations into form, movement and sound, he creates data dramatizations of natural and anthropogenic processes. Alongside his practice, he is currently doing a PhD at Goldsmiths University of London in artificial intelligence and expressive human-machine interaction. His work has been shown and performed internationally, featured in books and academic papers. In 2013 Memo Akten received the Prix Ars Electronica Golden Nica for his collaboration with Quayola on *Forms*.

Hanada Al Refai (SY), born in Syria, is a mathematician and activist. She was working as a teacher in Damascus, Syria, when the revolution began. She began engaging herself in political activities for women's rights and for the democratic opposition against the regime of Assad and was imprisoned and dismissed from her job. Since 2015 she has lived in Austria and is still active as a political activist and as a helper and teacher for refugees.

Jamie Allen (CA/CH) is a researcher, artist, designer and teacher, interested in what technologies teach us about who we are as individuals, cultures and societies. He likes to make things with his head and hands. He lives in Europe, works on art and technology projects, writes a bit, and tries to engage himself with and create institutions that are generous and collaborative, acknowledging that friendship, passion and love are central to aesthetic, research and knowledge practices.

Refik Anadol (TR) is a media artist and director born in 1985, who currently lives and works in Los Angeles, California. He is a lecturer and visiting researcher at the UCLA Department of Design Media Arts. He works in the fields of site-specific public art with a parametric data-sculpture approach and live audiovisual performance with an immersive installation approach. In particular his works explore the space between digital and physical entities by creating a hybrid relationship between architecture and media arts. Embedding media arts into architecture, Refik questions the possibility of a postdigital architectural future in which there are no more non-digital realities.

Todd Anderson-Kunert (AU) has an interdisciplinary arts practice that engages with releases, performance and installation, all with a variety of temperspatial considerations. His work draws upon psychological themes, often seeking inspiration from emotions and contexts that words can often fail to describe.

Keith Armstrong (AU/UK) is an experimental artist profoundly motivated by issues of social and ecological justice. His engaged, participative practices provoke audiences to comprehend, envisage and imagine collective pathways towards sustainable futures. For over twenty-three years he has been specializing in collaborative, experimental practices with the emphasis on innovative performance forms, site-specific electronic arts, networked interactive installations, alternative interfaces, art-science collaborations and socially and ecologically engaged practices. Keith's research asks how insights from scientific and philosophical ecologies can help us to better invent and direct experimental art forms, in the understanding that art practitioners must also seek to act as powerful change agents, provocateurs and social catalysts.

Alex Augier (FR) is an electronic musician based in Paris. His work focuses on hybrid digital aesthetics in a musical and transversal perspective, including sound, visual, formal and spatial elements. These elements interact with the stage space, himself, and mainly take the form of singular audiovisual performances. He promotes an overview of the creative process where design, programming and technology are an integral part of the artistic project. His works have been presented at international festivals, including Scopitone (Nantes/FR), Elektra (Montreal/CA), Media Ambition Tokyo (Tokyo/JP), L.E.V (Gijon/SP), Festival de la Imagen (Manizales/CO), Open Source Art (Gdansk/PL), KinoBeat (Porto Alegre/BR), Athens Arts Digital (Athens/GR), Nemo (Paris/FR) etc.

Je Baak (KR) graduated from Seoul National University and Royal College of Art in UK. He has held five solo exhibitions in London and Seoul. Baak was awarded the Grand Prize of Joongang Fine Arts Prize in 2010 and he won the Grand Prix of the First VH Award in 2016. Many of his works are now held by the major museums collection in Korea. He is currently an assistant professor of the department of entertainment design, Kookmin University, and involved in many projects with companies such as Hyundai, SPC and LG.

Frederick Baker (AT/UK) is an award-winning filmmaker. He directed *Pitoti Prometheus* as a Senior Researcher Associate at Cambridge University (UK), where he works with the McDonald Institute for Archaeological Research and the Centre for Film Studies. His personal immersive film practice is *Ambient Cinema* (*Art of Projectionism*, Czernin Verlag 2007). **Marcel Karnapke** (DE) studied at the Bauhaus University Weimar and was the Cambridge University stereographic engineer on *Pitoti Prometheus*. He currently lives in Berlin as a media developer and is the founder of the start-up CyberRäuber, developing formats and applications for VR in theaters: Das Mannheim Experiment, Mannheim National Theatre.

Adam Basanta (CA), born in 1985, is a Montreal-based sound artist, composer and performer of experimental music. His work covers sound installations, electroacoustic and instrumental composition, site-specific interventions and laptop performance. Across disciplines and media, he interrogates the intersections between conceptual and sensorial dimensions of listening, instabilities of instrumentality, and the means with which site and space can be articulated.

Guy Ben-Ary (AU) born in Los Angeles, is a Perth-based artist and researcher. He currently works at SymbioticA, an artistic laboratory dedicated to the research, learning and hands-on engagement with the life sciences, which is located within the University of Western Australia. Recognized internationally as a major artist and innovator working across science and media arts, Guy Ben-Ary specializes in biotechnological artwork, which aims to enrich our understanding of what it means to be alive.

Matthew Biederman (US/CA) has been working across media and milieus, architectures and systems, communities and continents since 1990. He has served as artist-in-residence at the Center for Experimental Television on numerous occasions, CMU's Create lab, the Wave Farm and many more. His works have been featured at the Lyon Biennale, Istanbul Design Biennale, the Tokyo Museum of Photography, Elektra, Mutek, Montreal Biennale (CA), Biennale of Digital Art (CA), and the Scape Biennale (NZ) among many others.

boredomresearch (UK) is a collaboration between British artists Vicky Isley and Paul Smith, internationally renowned for creating artworks which explore extended time frames. boredomresearch have a deep and long-lasting fascination in the mechanics of the natural world, which they explore using contemporary technology. boredomresearch's work opens channels for meaningful dialog and engagement between public and scientific domains.

Andres Bosshard (CH) is an independent sound artist and musician. Since 2005 he has been a lecturer at the Zurich University of the Arts ZHdK. For more than 35 years his international artistic work has focused on interventions in public spaces, like the *Klangturm* for the Swiss national exhibition. He is also involved in a ten-year cooperation with the urbanist Trond Maag, responsible for the development of acoustic quality of public spaces in Switzerland at the Federal Office for the Environment (FOEN).

David Bowen (US) is an award-winning studio artist and educator whose work has been featured in numerous group and solo exhibitions nationally and internationally. Bowen's work is concerned with aesthetics that result from interactive, reactive and generative processes as they relate to the intersections between natural and mechanical systems. He is currently an associate professor of sculpture and physical computing at the University of Minnesota, Duluth.

Terence Broad (UK) is an artist and machine learning researcher based in London. He works at the forefront of technological developments in machine learning, exploring both the perceptual capabilities and limitations of these techniques. He graduated in 2016 from the Creative Computing Masters programme at Goldsmiths, University of London. His work has been exhibited internationally at venues including the Whitney Museum of American Art, Art Center NABI, and the Barbican.

Carol Brown (NZ) is a choreographer, performer and dancer based in New Zealand. Her work takes place at the intersections between choreography, architecture, technology and sound. Carol regularly presents her work through her company Carol Brown Dances, which was founded in London at The Place theater. Brown's work is research-led and experimental. She is an associate professor in dance studies at the University of Auckland and directs Choreographic Research Aotearoa. <http://www.carolbrowndances.com>

Chris Bruckmayr (AT) is a sound artist, who produces and releases dark techno music under the name *raum.null* on the vinyl-only label Belgrade dubs / Belgrade. He has performed with *Fuckhead & raum.null* at the Ars Electronica Festival 2014-2016 and at the Heart of Noise festival 2016, and is creative producer at Ars Electronica Spaxels GmbH.

Didi Bruckmayr (AT) born 1966, lives near Linz/Austria. He is a performance artist, singer, actor, producer, award-winning multimedia artist, scientist and dancing fool, touring the clubs and international festivals since 1985. Frequently working for contemporary opera and theater.

Can Buyukberber (TR) is a visual artist working on immersive audiovisual experiences that are embodied both in physical and digital spaces. His practice consists of experiments with different mediums and display technologies, such as projection mapping, virtual reality, geodesic domes and digital fabrication methods. Driven by an interdisciplinary thinking that extends to art, design and science, Buyukberber's work often focuses on human perception, exploring new ways of non-linear narratives, geometrical order, synergetics and emergent forms.

Yen Tzu Chang (TW) is a media artist who has been living and studying in Linz, Austria, since 2014. She has a bachelor's degree from the new-media art department at Taipei National University of Art. Since 2011, she has been working in various fields, including interdisciplinary art and experimental performances based on sound installation.

Dan Chen (TW/US) is an interactive-experience designer, technology investigator, and improvisational engineer. He has several degrees, including an MAS from MIT, an MFA in digital media from RISD and a BFA in communication design from UConn. He has over seven years of design experience and now works at Johnson & Johnson as Senior Interaction Designer. Previous positions include Senior Interaction Designer at IDEO, product designer, and developer at The Economist Group and Morningstar Inc. In 2016 he was invited as a speaker at TEDx Vienna on the future of intimacy.

I-Chun Chen (TW) received a doctoral degree from Taipei National University of the Arts. She is best known for her artistic practice in video art, experimental animation/video, interactive art, multimedia art, and painting, focusing on folk stories and social issues about the industrial areas, marginalized or lower-middle-class areas. The idea of her artworks is to weave a giant map of the history of rural villages and industries that shows individuals' experiences between reality and illusion.

Adrian David Cheok (AU) is director of the Imagineering Institute, Malaysia, and Professor of Pervasive Computing at City University London and a founder and director of the Mixed Reality Lab. Previously he was professor at Keio University, associate professor at the National University of Singapore, and Mitsubishi Electric, Japan. He is a researcher in mixed reality, human-computer interfaces, wearable computers, pervasive and ubiquitous computing. He has a PhD in engineering from the University of Adelaide.

Alessio Chierico (IT), an artist with a theoretical background in contemporary art, design theory and media studies, graduated from the Interface Culture department of the Linz University of Art. In the last ten years of activity he has had more than 60 exhibitions, and he regularly contributes to academic publications and conferences. In 2014 Chierico won the Lab Award and in 2008 the Milano in Digitale.

Sung Rok Choi (KR) graduated from Hongik University and obtained an MFA in fine art from Carnegie Mellon University. He has explored contemporary landscapes generated by technology as well as narratives through digital animation and video. In addition, witnessing an increasingly digitalized world, Choi has continued to explore the kinds of beings humans are perceived as and focused on changes in the relationship between continuously developing technology and humans.

circ responsibility (DE) is a creative agency for social creativity and entrepreneurship based in Wiesbaden, Germany, founded by serial entrepreneur Hans Reitz. They created *The Plastic Lab*, which was initiated by Hans Reitz, Christina Jäger, a long-time associate at Grameen Creative Lab with strong expertise in the field of social business, and Ilona Geimer, partner at circ and former senior executive at BASF SE with comprehensive experience in the chemical industry. Each of them brings in extensive international networks and contacts in various disciplines.

Cod.Act (CH) is **André Décosterd** (CH), a musician and a composer who specializes in computer programming of musical applications. He studies composition systems specific to electroacoustic and contemporary music, in particular algorithmic composition. And **Michel Décosterd** (CH), who is an architect and a plastician. Self-taught, he developed a thorough knowledge in mechanical engineering and machine construction through personal research and learning. He develops and builds kinetic devices.

Derek Curry (US) is an artist-researcher whose work addresses questions of agency in automated decision-making systems. His artworks have replicated social media surveillance systems and communicated with algorithmic trading bots. He received his MFA from UCLA and is completing his PhD in media studies at the State University of New York at Buffalo. He is currently an assistant professor at Northeastern University in Boston. <http://derekcurry.com>

CyberRäuber (DE) is an art and tech collective from Berlin, merging theater and VR (vtheater.net). They are Marcel Karnapke (DE) and Björn Lengers (DE). Kay Voges (DE) is a German theater and opera director and the current theater manager and director of Schauspiel Dortmund. His *Die Borderline Prozession* was shown and celebrated at this year's Theatertreffen in Berlin, the federal awards of German-speaking theater.

Mischa Daams (NL) is an artist who composes for the senses while researching the space in between the physical and virtual. Mischa Daams' artistic practice consists of experiential environments, performances and films in which simple choreographies convey complex behavioral patterns in diverse media such as kinetic motion, moving images, light and sound.

Jip de Beer (NL) is an artist who operates on the border of art and computer science. He is fascinated by automation and attempts to optimize his artistic work (flow) with programming. His work usually involves a Web browser and tends to be generative, interactive and highly visual.

Daniel de Bruin (NL) is a Dutch designer who graduated at the HKU, University of the Arts in Utrecht. In his work, de Bruin explores his role as a designer situated in an age where computers and machines are taking over manual labor. He is fascinated by technological progress and its effect on modern society. His work includes the impressive *Neurotransmitter 3000* installation and the world's first mechanical 3D printer *This New Technology*, which both push the boundaries between man and machine.

Markus Decker (AT) lives and works in Linz. Markus Decker's interests capture the topics of information processes and theories about the entropy in feedback systems and in natural phenomenon. His working methods are closely connected to the field of free/libre open-source ideas in the context of art. With an interdisciplinary approach he has been collaborating on an informal basis with various groups and artists since the 90s. www.firstfloor.org/ae

Gil Delindro (PT), born in 1989, is a unique presence among a new generation of sound and media arts. He has distinguished himself by the research on organic elements and ephemeral and intangible processes in nature. His transdisciplinary practice is based upon film, installation, sound performance and site-specific/field research, facing themes such as animism, time, decay, acoustics and geology.

Dimitri della Faille (BE/CA) born in 1973, is an artist and a scholar based in Ottawa, Canada. He holds a PhD in sociology and is a tenured professor of international development at Université du Québec en Outaouais. As an experimental musician, Dimitri has been active since 1997 and has extensively toured Asia and Latin America. In 1998, he founded the independent record label Disques Hushush, from which he has released about 25 CDs and vinyls by experimental and noise artists from Europe, Asia, Latin America and North America.

Maren Dey (DE) is project manager for the European Theater Lab and has been working as a project and communication manager in the arts for over twenty years. Among other positions, she was editor at the German TV channel ZDF, and PR manager for international arthouse films and several international film festivals in Germany. As a marketing director of the Dresden State Theater she returned to her initial goal, the theater. From 2011 to 2016 she was head of communications at Schaubühne Berlin. She holds an MA in theater, film and literature studies.

Lily Díaz-Kommonen (FI/VE/PR) is professor of new media at Aalto University. Her research projects include Illuminating History, Through the Eyes of Media, Digital Facsimile of 1550 Map of Mexico, which received first prize in the 2004 Nabi Digital Storytelling International Competition of Intangible Heritage, an interactive VR installation of the Pavilion of Finland at the 1900 World Fair in Paris, and an interactive VR installation of Vrouw Maria, awarded a Special Mention by the jury in the research category of the 2015 Europa Nostra digital cultural heritage competition.

Marco Donnarumma (DE/IT) born in Naples in 1984, is an artist and scholar based in Berlin. Working with biotechnology, bio-physical sensing, as well as artificial intelligence and neuro-robotics, Donnarumma expresses the chimerical nature of the body with a new and unsettling intensity. His artworks are at once intimate and powerful, oneiric and uncompromising, sensual and confrontational. He is renowned for his focus on sound, whose physicality and depth he exploits to create experiences of instability, awe, shock and captivation.

Tadej Droljc (UK) is an interdisciplinary artist who is currently doing an audiovisual research at the Centre for Research in New Music (CeReNeM) at the University of Huddersfield, where he was awarded the Denis Smalley Scholarship in Electroacoustic Music and where he is currently teaching and pursuing a doctorate. In 2017 Tadej won a Most Promising Video Artist Award at the Madatac festival in Madrid.

Anna Dumitriu (UK) is a British artist whose work fuses craft, technology and bioscience to explore our relationship with the microbial world, biomedicine and technology. Dumitriu has an international exhibition profile including the Picasso Museum in Barcelona, the Science Gallery in Dublin, the Museum of Contemporary Art, Taipei, and The V&A Museum in London. Her work is held in public collections, including the Science Museum, London, and the Eden Project, Cornwall, UK.

Jake Elwes (UK), born in 1993, studied fine art at Slade School of Art (2013-17) and SAIC, Chicago (2016). Recent exhibitions include AI: Myth and Reality, at the Leverhulme Centre for the Future of Intelligence, Cambridge, and Art, Robotics & AI, at QUAD, Derby (UK). Upcoming shows include Digital/Real-How Art Surfs between Worlds, Bern (CH) and Bloomberg New Contemporaries 2017, Newcastle and London.

Michel Erler (DE) is a designer exploring the potentials challenges and contexts of emerging technologies through speculative design fictions. Having studied interaction design at the London College of Communication, he was among others short-listed for the Tate IK Prize. Currently he is undertaking his MA at Sci-Arc, critically engaging with California's design and entertainment industry.

Euclid (Masahiko Sato and Takashi Kiriya) (JP) are professors at Tokyo University of the Arts Graduate School of Film and New Media. Sato is also visiting professor at Keio University, Faculty of Environment and Information Studies. Masahiko Sato and Takashi Kiriya started producing exhibits for new experiences utilizing media technology under the Euclid label in 2006. Sato has been defying the boundaries of genres and media with his own unique methods and concepts developed through research and scientific experimentation. Kiriya conducts research in media technologies.

Fabrica (IT) is a communication research center based in Treviso, Italy, part of the Benetton Group. Established in 1994, Fabrica offers young researchers from around the world a one-year scholarship in disciplines such as design, visual communication, photography, interaction, video, music and journalism. The Fabrica team are: Coralie Gourguechon (FR), Monica Lanaro (IT), Angelo Semeraro (IT), Isaac Vallentin (CA).

Claudia Falkinger (AT) is a communication and innovation enthusiast. She studied in Vienna and Utrecht and holds a master's in communication management. In recent years she has been working with innovative companies, given lessons on virtual reality and chatbots at the University of Vienna and has been organizing an international community conference series and ideas platform dedicated to local and international knowledge transfer.

Behnaz Farahi (US/IR) is a creative designer and technologist working at the intersection of fashion, architecture and interaction design. Trained as an architect, she explores the potential of interactive environments and their relationship to the human body. Her goal is to enhance this relationship by following morphology and behavior principles inspired by natural systems. Currently she is an Annenberg Fellow and PhD candidate in media arts and practice at the USC.

Cedrik Fermont (CD/BE/DE), aka C-drik, Kirdec, is a composer and musician who has been working in the field of noise, electronic and experimental music since 1989. Born in Zaire (DR Congo) he grew up in Belgium, where he studied electroacoustic music, and now resides in Berlin (Germany). C-drik runs Syphe, a platform including a label, a radio show, a database and concert organization mostly dedicated to electronic, sound art and noise music from Asia and Africa. He is also a member of various bands such as Axiome and Tasjiil Moujahed. C-drik has performed in more than 50 countries in Europe, North Africa, Asia and North America and given various talks and lectures about his research in African and Asian contemporary music.

Anette Friedel (AT) has been a freelance photographer for 30 years. Her work as an artist focuses on people—their diversity, their history, their individuality. She seeks to capture the connection, to perceive something of the human essence, despite the fact that, or perhaps precisely because, the moment of taking a picture is fleeting.

Anna Friz (CA) is a sound and radio artist, curator and media studies scholar. She is Assistant Professor of Sound in the *Film and Digital Media Department of University of California Santa Cruz*. She is a steering member of the artist collective *Skálar | Sound Art | Experimental Music* based in eastern Iceland, and a contributor to ORF Kunstradio since 1999. Rodrigo Ríos Zunino (CL/EC) is a sound artist, media artist, musician and producer based in Chile, inspired by the intersections of science and ancient traditions.

g.tec medical engineering GmbH (AT) is developing developing brain-computer interfaces (BCI) that provide people with disabilities with the chance to communicate, control devices, play and write by thought, and to regain their ability to move.

Matthew Gardiner (AU/AT) is an expert in the field of oribotics, having coined the term, and pioneered the fusion of origami, folding and robotics with his generations of oribotic artworks. Gardiner's artistic contexts include team-based research and individual artworks with experience extending across aesthetic and experience design, digital manufacturing, expert-level origami and writing code. Gardiner is project lead for *ORI**.

GayBird (HK) is a leading contemporary sound artist from Hong Kong with a prolific and award-winning background in music producing and multimedia performance. GayBird's work explores the realm of music creation and electronic performance. He creates unique instruments with an emphasis on new sounds from complex electronic systems and places his instruments in a highly stylized performance landscape.

Slavko Glamočanin (SI) started in the computer demo scene, where he was most active in making music, and co-created the first Slovenian breakbeat compilation *Monkorama*. He continued with programming and exploring the media and he created a programming platform for this. After one-way video/effects he went on to interactive projects, motion capture, Kinect and OpenGL visualizations. Main interests: synesthesia, systems, interactive.

Stefan Glasauer (DE) is a neuroscientist and professor at Ludwig-Maximilian University and Senior Scientist of the Center for Sensorimotor Research at the Department of Neurology. His research interests are rooted in the cybernetic tradition and evolve around the attempt to understand the central-nervous principles behind perception and action that govern the control of sensorimotor processes. His methods reach from the theoretical frameworks of computational neuroscience and probabilistic systems theory to experimental approaches such as psychophysics, virtual reality, motion tracking, and brain imaging.

Emanuel Gollob (AT), born 1991 in Graz, is studying industrial design at the University of Applied Arts. Since 2017 he has been working independently at in the intersection of performance art, exhibition design and interactive installations. One of his artworks is currently exhibited at the Austrian Expo Pavilion in Kazakhstan.

Akinori Goto (JP), born in 1984, is an artist and a designer based in Tokyo. He is a graduate of Musashino Art University College of Art and Design Department of Visual Communication Design. Currently he is developing pieces that combine cutting-edge technology with classic methods and media to capture connections and relationships that cannot be seen with the human eye.

Jennifer Gradecki (US) is an artist-theorist who aims to facilitate a practice-based understanding of socio-technical systems that typically evade public scrutiny. Using methods from institutional critique, tactical media, and information activism, she investigates information as a source of power and resistance. She holds an MFA from UCLA and is a PhD candidate in visual studies at SUNY Buffalo. She is currently a visiting professor at Northeastern University in Boston. www.jennifergradecki.com

Tobias Gremmler (DE) is a media artist and designer, currently based in Hong Kong. His work ranges from interactive installations and performances to video and product design. He worked as guest professor and lecturer at universities in Europe, the US and Asia, and was involved in a variety of academic and industrial research projects. As an author, he has published several books on digital media and design.

Dr. Karin Guminski (DE) works as a senior lecturer and researcher at the LMU, and as the head of the art and multimedia bachelor's program. For many years she has supervised multimedia projects that connect art, design, technology and media informatics.

Jürgen Hagler (AT) is an associate professor in the Digital Media Department at the Upper Austria University of Applied Sciences (Hagenberg, Austria) and is in charge of computer animation and animation studies. He became the program coordinator for the digital arts master's degree in 2009. Since 2008 he has been actively involved in *Prix Ars Electronica* and in 2009 he became curator of the *Ars Electronica Animation Festival*.

Rachel Hanlon (AU/AT) is a researcher at the *Ars Electronica Futurelab* whose art practice examines how found materials, in particular cultural "objects" that were once significant to a generation simply as technological devices, may transcend their intended purpose and be used to evolve (transform) into another "thing" altogether. Her research is located within the parameters of media archaeology, utilizing the methodology of ethnography and practice-led creative research.

Max Hattler (DE) is a new-media artist, who works primarily with abstract animation, video installation and audiovisual performance. His work explores the relationships between abstraction and figuration, aesthetics and politics, sound and image, and precision and improvisation. He studied at Goldsmiths and the Royal College of Art and holds a doctorate in fine art from the University of East London. He is an assistant professor at the School of Creative Media at the City University of Hong Kong.

Falk Heinrich (DK), is associate professor and head of Research Laboratory of Art and Technology (Relate) at Aalborg University. He researches within art theory and the integration of artistic and academic methodologies. He works as a professional theater actor and director and installation artist.

Joseph Herscher (NZ) specializes in making comical chain-reaction machines. His videos have been viewed by over 30 million people online. He grew up in New Zealand and now lives in New York, where he creates eccentric machines for film, television and art festivals around the world. He is also a public speaker and has told his inspirational story at international design and business conferences.

Satoru Higa (JP) is a programmer and visual artist. He performs a wide range of creative activities such as installation, stage production, VJing, live performances, utilizing advanced programming techniques such as real-time 3D graphics and computer vision and experience related to a wide variety of projects. He started *labospace backspacetokyo* in 2015.

Kathy Hinde's (UK) work grows from a partnership between nature and technology expressed through audiovisual installations and performances that combine sound, sculpture, image and light. Drawing on inspiration from behaviors and phenomena found in the natural world, she creates work that is generative, that evolves, and that can be different each time it is experienced. Kathy received an *Oram Award* in 2017.

Oliver Hödl (AT) works as a postdoctoral researcher and artist with a focus on human-computer interaction and interface and interaction design in music. He is affiliated with the *Cooperative Systems research group* at the University of Vienna and the *Institute for Design and Assessment of Technology* at the Vienna University of Technology. In research, he focuses on studying user experiences, art-based research approaches and using HCI-related qualitative and quantitative research methods. His newly developed music instruments and interactive concerts have led to performances throughout Europe, the US and Australia. Furthermore, he has worked on projects around game design, urban mobility, safety and disaster solutions, and healthcare IT.

Horst Hörtner (AT) is a media artist and researcher. He is an expert in the design of human-computer interaction and holds several patents in this field. He started work in the field of media art in the 1980s and co-founded the media art group *x-space* in Graz, Austria in 1990. Hörtner was a founding member of *Ars Electronica Futurelab* in 1996 and since then he has been the director of this atelier/laboratory. He holds the position as a *Conjoint Professor* at the University of Newcastle, Australia. In his research Hörtner focuses on swarm behavior. Together with an interdisciplinary team of experts he has been developing *Spaxels®* performances since 2012. *Spaxels®* (=space+pixel) are visual elements positioned freely and dynamically in space. They use drones with an LED lighting system combined into a beautiful organic swarm of airborne lights.

Martin Howse (UK/DE) is occupied with an investigation of the links between the Earth (geophysical phenomena), software and the human psyche (psychogeophysics) through the construction of experimental situations (performance, laboratories, walks and workshops), material art works and texts. He is also the creator of the *ERD modular synthesizer series*.

Daisuke Iizawa (JP) is an interaction designer and PhD student in emerging design and informatics at the University of Tokyo, Japan. His doctoral work explores the design space between humans, artifacts and artificial intelligence.

Takashi Ikegami (JP) is professor and chair, at the Department of General Systems Sciences, University of Tokyo. He specializes in artificial life and complexity, and has been known to engage on the border between art and science. His research investigates life indicators such as autonomy, sustainability and evolvability, through attempts to build viable synthetic life forms using computer simulations, chemical experiments and robots.

Dragan Ilić (RS/AU/US), born in 1948, is an artist who lives and works in New York and Belgrade. In 2009, he founded the experimental performance space *ITS-Z1*, a platform for the intersection of art and science, hosting acclaimed artists such as *Stelarc*. Ilić's work has been featured on TV, in galleries and museums, including: *Documenta*, *PS 1 MoMa*, the *Center for Cultural Decontamination* in Belgrade, *Queens Museum of Art*, and, in April 2010, at the *Museum of Science in Boston* as a part of *National Robotics Week*. He is represented by *GV Art London*.

Zbit Ishii (JP), born in 1984, studied at the Department of Mathematical Sciences, Graduate School of Science and Engineering, at Yamaguchi University. He founded *buffer Renaiss Co, Ltd.* in 2010. He is involved in various projects in advertising, entertainment and stage production. He works mainly on network, back-end systems, mobile applications, LED control etc. The *Omohide Breaker* and *Anti Tagging* apps are recognized as masterpieces of his work.

Hiroshi Ishii (US/JP) is the Jerome B. Wiesner Professor of Media Arts and Sciences at the MIT Media Lab. He joined the MIT Media Lab in 1995, and founded the *Tangible Media Group*, which he currently directs. Hiroshi's research focuses upon the design of seamless interfaces between humans, digital information and the physical environment. His team seeks to change the "painted bits" of GUIs to "tangible bits" by giving physical form to digital information. In 2012, he presented the new vision *Radical Atoms* to take a leap beyond *Tangible Bits* by assuming a hypothetical generation of materials that can change form and appearance dynamically, becoming as reconfigurable as pixels on a screen.

Hiroo Iwata (JP) is professor at the Faculty of Engineering, Information and Systems at the University of Tsukuba and President of the *Virtual Reality Society of Japan* (2016, 2017). His research is focused on developing projects with virtual reality and robotics. Launched *Device Art* project in 2004 and exhibited work at the *Emerging Technologies at Siggraph* every year from 1994 to 2007. Iwata developed and directed a PhD program in *Empowerment Informatics (EMP)* in 2013.

Margarete Jahrmann (AT) is an artist, curator and researcher in activism, games and arts, with an international record of exhibitions and conferences. Since 2006 she has been professor for game design at the University of Arts Zürich. She is founder of the *Ludic Society*, an arts research association on the topic of play and pataphysics, with a record of urban game interventions and international festival appearances.

Julian Jauk (AT), born in Graz, Austria, in 1992, has been studying architecture at the Graz University of Technology since 2011 (currently finishing his master's thesis) and philosophy at the University Graz since 2014. Since 2015 he has been working as a student assistant at the Institute of Architecture and Media at the Graz University of Technology, where he has been involved in the realization of several projects. He has been associated with projects presented at the Ars Electronica Festival since 2013.

Werner Jauk (AT) is a musicologist/psychologist, scientific media artist and professor of musicology at the University of Graz (KFU), working on music and media/art, with the focus on music as a role model for media arts. Studies in perception, cybernetics and experimental aesthetics led him to bridge the gap between science and arts. He has published many scientific papers and exhibited installations as a scientific artist at international festivals such as Ars Electronica, Cynetart, liquid music, art+science Belgrade and the Biennale di Venezia.

Thomas J. Jelinek (SE/AT), born in Stockholm, is a director and transdisciplinary operating concept-artist, dramaturge and curator. He mainly works on the construction of laboratories for discourses, contextual performance processes and medial as situative Spaces-installations. Artistic director of Nomad.theatre and LABfactory. Co-founder of formations as the transdisciplinary art-group Messing-network or the performance company Liquid Loft. Selection of awards: Best Play, Danube Festival Krems/Best Short, Kunststücke-Preis ORF; with Liquid Loft: Golden Lion of the Biennale di Venezia 2007.

The **JST ERATO Kawahara Universal Information Network Project** is researching and developing next-generation technology with a team from different backgrounds in mechanical engineering, information, and communication, robotics, LSI technology and design.

Hwayong Jung (KR) lives and works in Seoul and New York. He specializes in digital media and studied in computer art, design and engineering. His focus is reinterpreting classical art and design methodologies via new technologies in order to open new ways of creation and visual experiences. His interdisciplinary range embraces sculptures, video and interactive installations.

Erika Jungreithmayr (AT) is an artist and a project director who has initiated numerous international art and culture projects. She has dedicated her life to questions of knowledge transfer and mediating people's encounters with art. Since 2009, she has been responsible for content of the Ars Electronica BrainLab.

Eduardo Kac (BR) is internationally recognized for his groundbreaking work in contemporary art and poetry. In the early 1980s, Kac created digital, holographic and online works that anticipated the global culture we live in today, composed of ever-changing information in constant flux. In 1997 he coined the term "Bio Art", igniting the development of this new art form with works such as his transgenic rabbit *GFP Bunny* (2000) and *Natural History of the Enigma* (2009). In 2017, Kac created *Inner Telescope*, a work conceived for and realized in outer space with the cooperation of French astronaut Thomas Pesquet.

Rodion Kadyrov (RU) is an IT specialist focusing on systems analysis. He is a PhD student at the National Russian Nuclear University MEPhI. His professional field of interest is in developing learning systems for automatic control of cyborgized bio objects. His artistic interest lies in experimental music and sound art. He explores acoustic phenomena and the relationships between digital and physical properties of sound.

Dr. Brigitte Kaiser (DE) was the director of the municipal museum in Neuötting (1997–2000) and completed her PhD on exhibition design in 2005. Since 2009 she has been working as a lecturer in curatorial practice at the LMU in Munich and as a freelance curator.

Marian Kaiser (DE) is a media theorist, dramaturge, and author. He studied cultural studies, literature, philosophy, and South East Asian studies at Humboldt University in Berlin and is currently working on a monograph *Madness, Culture, Theory*, on psychiatric scenes and media between Europe and Asia around 1900 and their impact on twentieth-century theory. He has published widely, among other topics, on digital film, counter-culture, and madness. He also works as a film author, performer and project manager somewhere between academia, culture and art. In cooperation with Dimitri Kaufman he runs The Category, a 21st-century scriptorium. He regularly collaborates with artists for books and events, e.g. Olaf Nicolai, Hannah Hurlitzig, Thomas J. Jelinek and James Hoff.

Yasuaki Kakehi (JP) is a media artist and a HCI researcher. He works as an associate professor at Keio University, Japan. His research interests include augmenting the physical world with programmable matter and enhancing human creativity. His works have been presented at exhibitions, including ICC Open-Space, ACM Siggraph and the Ars Electronica Festival and have received many awards.

Sugano Kaoru (JP) has been the executive creative director and creative technologist at Dentsu Inc. since 2002. He specializes in technology and communication and works in a variety of fields, including research and development and advertising campaigns for clients globally. His celebrated works include *Sound of Honda / Ayrton Senna 1989*, and he has won various prestigious advertising, art, and design awards internationally including a Prix Ars Electronica Honorable Mention.

Amy Karle (US) engages questions about what it means to be human and creates representations of our internal states. As an artist and designer, Karle is also a provocateur and a futurist, leveraging technology to create work that catalytically examines material and spiritual aspects of life, opening future visions of how technology could be utilized to support and enhance humanity.

Yoichiro Kawaguchi (JP), born in Tanegashima Island, is a CG artist and professor of the University of Tokyo. He started in 1975 and is recognized as a pioneer and a world-wide authority of CG art by the self-organizing "Growth Model" method and now working for 8K resolution display. He was the representative artist of Japan in Biennale di Venezia in 1995 and received the ACM Siggraph Distinguished Artist Award for Lifetime Achievement in 2010 and the Medal with Purple Ribbon in 2013.

Fares Kayali (AT) is a researcher, educator and designer living and working in Vienna, Austria. His research interests are situated in informatics, didactics, arts and HCI with a broad spectrum covering game design and gamification, healthcare technology, music computing and interactive art, as well as teacher education and game-based learning. Fares completed his habilitation (post-doctoral thesis) in Game Design and Education at the University of Applied Arts Vienna and works as a senior post-doctoral researcher at the Institute of Design and Assessment of Technology at the Vienna University of Technology. There he is co-founder of the Positive Impact Games Lab (<http://piglab.org>) and principal investigator of the game-based learning project "Sparkling Games" and the art-based research project "Breaking the Wall-Playful interfaces for Music Audience Participation".

Ira Kemelmacher-Shlizerman (IL) is an assistant professor at the Allen School of Computer Science and Research Scientist at Facebook. She received her PhD in computer science and applied mathematics at the Weizmann Institute of Science. Ira works in computer vision, graphics and learning, focusing particularly on modeling people, and virtual and augmented reality. She received the Google faculty award, her work *Moving Portraits* was selected for the cover of the communications of the ACM, Research Highlights, and tech transferred to Google.

Togo Kida (JP) graduated from the Design | Media Arts Department of UCLA and then moved to Tokyo and joined Dentsu as an accounts executive. He has worked across all media for various accounts. He became one of the core members of the Dentsu Lab Tokyo, which was launched in 2015. Currently, Togo is working as creative technologist on number of key projects at the lab. His works have been recognized at Cannes Lions, CLIO, CLIO Health, One Show, London International Awards, Spikes Asia, Sabre Awards, Ars Electronica, Japan Media Arts Festival, and Tokyo Interactive Advertising Award. He was also named as one of the *Leading Global Thinkers of 2016* by *Foreign Policy* magazine.

Hyungkyu Kim (KR) works as a director of music videos, films and advertisements. He mainly focuses on the narratives, relationships and forms viewed through a camera, and is interested in contemplating the views, locations and implications of a camera based on time. Recently, he has been studying video works that use 360-degree camerawork and flattening with multiple cameras. He won the Grand Prix of the Second VH Award in 2017.

Nicolas Kisis Aguirre (PE) is currently pursuing his master's degree in art, culture and technology at MIT. He holds a professional degree in architecture, and has previously followed studies in economics, environmental studies, and digital fabrication. He is currently focused in researching the potential of sound and technology as it is relevant to different notions of power and public space.

Kitchen Budapest (HU) was founded in 2007 by a collective of media artists, theoreticians and coders from miscellaneous backgrounds. As one of the first media labs in Hungary, KiBu saw its primary mission as to instigate digital literacy and DIY techniques on the local scene. Ever since, KiBu has been actively present as an internationally recognized innovation lab with young researchers and developers forming its team. KiBu incorporates three functions: research and development (prototyping, testing, service design, UX/UI design), education (next generation programs) and industry collaboration.

Yuri Klebanov (IL) graduated from the Royal College of Art and Imperial College London in 2016 with an MA and MSc in innovation design engineering. Currently he is working as a design and technology researcher at the RCA-IIS Tokyo Design Lab in collaboration with Professor Yoichi Sato-computer vision laboratory at the Institute of Industrial Science, the University of Tokyo.

Volkmar Klien (AT) grew up in Vienna and spent his childhood immersed in the city's rich musical life with all its glorious traditions and engrained rituals. Working from this background Volkmar Klien today strives to extend traditional practices of composing, producing and listening far beyond the established settings of concert music. He works in various areas of the audible and occasionally inaudible arts, navigating the manifold links in between the different modes of human perception, the spheres of presentation and the roles these play in the communal generation of meaning. He is a professor for composition at the Anton Bruckner Private University. <http://www.volkmarklien.com>

Mario Klingemann (DE) is an artist working with algorithms and data. He investigates the possibilities that machine learning and artificial intelligence offer in understanding how creativity, culture and their perception work. An important part of this investigation is his work with digital cultural archives like the British Library's, the Internet Archive's or the Google Cultural Institute collection, where he is currently artist-in-residence. He is a regular speaker on international art, design and media conferences, winner of the 2015 British Library creative award and his works have been shown at the Residenzschloß Dresden, the Centre Pompidou, Paris and the MoMA, New York.

Gene Kogan (US) is an artist and a programmer who is interested in generative systems, artificial intelligence and software for creativity and self-expression. He is a collaborator within numerous open-source software projects and leads workshops and demonstrations on topics at the intersection of code and art. Gene initiated and contributes to ml4a, a free book about machine learning for artists, activists and citizen scientists.

Peter Koger (AT) is a video artist, visualist, programmer and animation designer who operates on interaction and as a universal media craftsman, mainly in the field of video and performative art. Since 1999 he has been a lecturer at the University of Applied Art, Institute of Fine and Media Art. He is founding member of different initiatives to promote visualist's arts. Co-organizer and active participant at the Equaleyes series. Founding member, co-director and technical director of the Mediaopera.

Johannes Kretz (AT), born 1968 in Vienna, studied composition and pedagogy at the music academy Vienna and mathematics at the University Vienna. He is co-founder of NewTonEnsemble Vienna, of the international composers' group Prisma, of ikultur.com and of aNOther festival Vienna. Kretz is a teacher of music theory and composition at the Vienna Conservatory. Since 2008 he has been head of ZIMT (Center for Innovative Music Technology) of the University for Music and Performing Arts Vienna and since 2013 dean of department of the Institute for Composition and Electro-Acoustics.

Uli Kühn (AT) lives and works in Vienna as a sculptor, media artist and musician. He is also a lecturer and research assistant at the University of Applied Arts Vienna. His work is situated on the border between music, media art, performance and experimental digital film production and has been shown at venues including Diagonale Graz, Ars Electronica, Filmfest Dresden, Soundframe, Lames, Ö1 Kunstradio, Triennale Linz LENTOS, Moozak.org, and Urban Art Forms.

Sam Lavigne (US) is an artist and programmer based in Brooklyn. Brian Clifton (US) is a data scientist at BuzzFeed News. Francis Tseng (US) is co-publisher of the *New Inquiry* magazine and teaches at the New School.

Alexia Lechot (CH) is a Swiss media and interaction designer who graduated with honors from the University of Art and Design in Lausanne, Switzerland. She does research and experiments in between design and technology, about the relationship between humans and robots. Her works have been published internationally in *Wired*, *creativapplication*, *Dailymail*, *Arduino*, Gizmodo.com, Gizmodo.jp and *laughingsquid*.

Rosangella Leote (BR), PhD, is a multimedia artist/researcher producing at the intersection of art, science and technology. She has a post-doctorate from Universidade Aberta (Uab Lisbon), a PhD in communication sciences (ECA/USP–São Paulo) and is a member of international scientific committees. She develops technoperformance arts, sound sculptures, interactive objects and videos. Her recent research has been based in the neuroscience, on focusing multimodality and multisensoriality, also seeking to develop low-cost assistive interfaces for the arts.

Xin Liu (CN) is an artist, engineer and researcher at the MIT Media Lab. Mixing scientific research with personal narratives, she examines human body and its technological evolution. Xin has shown her work at MFA Boston, Sundance/TriBeCa Film Festival, the Walker Art Center, OCAT Shanghai and Eyebeam. Xin has also worked for Microsoft Research NYC\Asia and Google ATAP. <http://www.xxxxxxxxinliu.com>

Pedro Lopes (PT) transfers his research in human-computer interaction into the arts by reversing concepts such as “control” or “user” through of electrical muscle stimulation. He received the VIDA16 Incentive award for his work *Ad Infinitum*, first shown at the Science Gallery Dublin. This work was carried out in collaboration with Robert Kovacs (RS/HU), a mechatronics engineer and artist who works with large-scale structures, contrasting with today’s over-miniaturization hardware tendency. Alexandra Ion (AT) is a researcher who engineers novel materials that consist of many small cells, which when moved in concert perform mechanical functions, hence creating material machines. David Lindlbauer (AT) is a researcher creating interfaces that can change their physical and optical appearance and the surrounding environment by changing their transparency. Patrick Baudisch (DE) is the chair of the Human Computer Interaction Lab at Hasso Plattner Institute. His research focuses on interactive fabrication and mobile-force feedback.

He-Lin Luo (TW) is an interactive artist from Taiwan and a graduate of the School of Arts and Technology, Taipei National University of the Arts. He is a professional in computer programming and kinetics machines and has earned many interactive-art awards.

Dr. Manuela Macedonia (IT/AT) is a scientist at the Faculty of Engineering and Natural Sciences, Johannes Kepler University. The substantive focus of her work is on development and neurocognitive testing of systems that accompany people through various types of learning processes. In her basic research at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, Dr. Macedonia investigates multisensoric enrichment of linguistic information and its effects on memory.

Daito Manabe (JP), born in 1976, lives and works in Tokyo. In 2006, Manabe launched *Rhizomatiks*, a company specializing in web, interactive and graphic design as well as architecture and media arts. Since 2015, he has been working with Motoi Ishibashi on *Rhizomatiks Research*, spearheading research and development projects. In 2011, *particles*, which he created in collaboration with Ishibashi, received an Award of Distinction in the interactive art category of the Prix Ars Electronica. He also received an honorary mention for *Perfume Global Site* at Ars Electronica in 2012 and has been the recipient of nine awards at the Japan Media Arts Festival.

Ippolit Markelov (RU) is a Moscow-based scientist/artist researcher with a PhD in biology. He was a founder of the science-art group 18 Apples in 2014. His artistic works have been shown in exhibitions and festivals in leading Russian modern-art venues of. Within the 18 Apples projects Ippolit searches for answers to deep philosophical questions using artistic, neuroscience and bioengineering methods.

Ruth Mateus-Berr (AT) is an artist, researcher, social designer and professor at the University of Applied Arts Vienna. Her conceptual artwork engages with contemporary global challenges such as environmental, social and political issues. Recent works engaged in environment, dementia, ageism, health, urban change, democracy, racism, right-wing populism, migration, postcolonial criticism and innovative strategies on different perspective taking, interdisciplinary collaboration, audience participation and participatory and collaborative projects.

Kenric McDowell (US) has worked at the intersection of culture and technology for twenty years. His résumés includes work for R/GA, Nike, Focus Features, HTC Innovation and Google. Kenric McDowell currently leads the Artists + Machine Intelligence program at Google Research, facilitating collaboration between Google AI researchers, artists and cultural institutions. He has spoken about art and interdisciplinary collaboration at the MacArthur Foundation, Serpentine Gallery, Eyebeam, UCLA IDEAS, Nabi Art Center, and the Google Arts & Culture Lab in Paris. Kenric received his MFA from the International Center of Photography-Bard in New York City.

Maki Namekawa (JP) is a leading figure among today’s young artist, bringing contemporary and classical music by leading international composers to audiences attention. As a soloist and a chamber musician Maki Namekawa performs regularly at international venues such as Suntory Hall Tokyo, Carnegie Hall in New York, Cité de la Musique in Paris, Barbican Center in London, Musikverein in Vienna, PianoFestival Ruhr, Rheingau Festival and Musik-Biennale Berlin. In 2014 a double-CD of the complete Philip Glass Piano Etudes performed by Maki Namekawa was released by OrangeMountainMusic, reaching number 1 in the iTunes Classic charts and recently receiving high praise by the BBC Magazine. <http://www.makinamekawa.com>

Narrator’s Lowdown (AT) is a group of Linz-based artists coming together from different cultural and geographical backgrounds. The group includes one photo artist and three dance artists each with different backgrounds in contemporary dance, break-dance, ballet and hip hop. The artists deal with their own characters in a continuous communication with different environments, to dig deeper into the essence of their own fantasy worlds.

Gerald Nestler (AT) is an artist, researcher, author and curator who explores the derivative condition of contemporary social relations and its paradigmatic financial models, narratives, and processes. He combines theory with artistic means such as video, installation, performance, text, code, sound, speech and conversation to map out the counter-fictions and renegade imaginations of an “aesthetics of resolution.”

Pamela Neuwirth (AT) lives and works in Linz. With a background in sociology she has been working as radio editor, freelance journalist and mortician. Currently she works in a literature archive. Interested in crossover, she collaborated with artists in the fields of technology and surveillance, architecture and fascism, art brut and psychiatry or quantum physics.

Pit Noack (DE) is sound artist, electroacoustic musician and programmer, who produces sound installations and electroacoustic music. He often combines vintage audio components with current digital tools such as Raspberry Pi, Sonic Pi and Processing and uses old hi-fi systems and cassette recorders in his live performances (solo and ensemble) as musical instruments.

nothing more (AT/NL) is a loosely connected group sharing an interest in working together, FLOSS approaches for artistic production and questioning economies. Currently involved are: Niek Hilkmann (NL) a traveling polymath based in Rotterdam, Joak or Joseph Knierzinger (AT), who works on different alogisms in Vienna and Guangzhou and Michael J. Muik (AT) a sound poet/artists with presence in Vienna and Unterlimbach.

Yoichi Ochiai (JP) is a media artist and assistant professor at the University of Tsukuba, where he is head of the Digital Nature Group. He founded his own startup called Pixie Dust Technologies Inc. as CEO in order to apply his technologies and vision in society. He holds a PhD in applied computer science from the University of Tokyo. He works on new inventions and research through a mixture of applied physics, computer science and art. He has a strong interest in post-pixel multimedia and is conducting research towards his vision called Digital Nature, an alternative perspective of nature and humanity in the post ubiquitous computing era.

Lucy Ojomoko (RU) is a molecular biologist and graduate of Moscow State University. She is a PhD student at the IBC RAS and guest researcher at RUB, Germany. Since 2014 she has actively participated in development of gene therapy treatment for various diseases. Lucy is currently deeply involved in biohacking philosophy and working on realization of several biohacking projects dealing with fundamental concepts of life, and as result creating principal new forms of life.

Jifei Ou (欧冀飞) (CN) is a PhD candidate at the MIT Media Lab, where he focuses on designing and fabricating transformable materials across scales (from μm to m). His works have been published in numerous academic conferences; interviewed in the media. He is also deeply involved in the manufacturing community in Shenzhen in order to facilitate the real-world application of his research.

Ouchhh (TR) is a creative new media studio with expertise in animation, motion graphics and public art. They integrate art, science, and technology in every work they create. They have offices in Istanbul and Los Angeles, and partnerships in Vienna, Barcelona and Berlin. Ouchhh considers each project as a challenge and takes a fresh and unique approach to all their work. From Google to CERN to Nike to *Cosmopolitan* to *Wired*, their collaborators transcend all industries and all continents. Their works have received multiple accolades and awards in the international arena. Ouchhh is also the recipient of a number of awards, including FELIS and Crystal Apple, the ADC Awards and International Design Awards IDA in Los Angeles.

Sarah Petkus (US) is a kinetic artist and roboticist from Las Vegas, Nevada, whose area of focus is in developing mechanical and electronic systems as characters, capable of reacting to environmental stimulation with unique, self-defining behavioral quirks.

Špela Petrič (SL) is a Slovenian hybrid-media artist and former scientific researcher currently based between Ljubljana and Amsterdam. Her practice is a multi-species collaborative endeavor, a deviant composite of natural sciences, wet media and performance. She tries to envision artistic experiments that enact strange relationships in hopes of enriching our adjacent possibilities. Much of her recent work has focused on plant life.

Quantum Reboot (AT) is a developer collective based in Upper Austria that focuses on creating technology solutions for games and interactive installations. **Playful Interactive Environments** (AT) is a research group within the Digital Media Department of the University of Applied Sciences Upper Austria and focuses on the design, development and evaluation of innovative games and interactive installations.

qujOchÖ (AT) operates at the interfaces of art, politics, society and science. qujOchÖ is diverse, heterogeneous, untaggable and completely undisciplined. qujOchÖ works with everything and nothing, shows, builds, installs, intervenes, discusses, connects, rants and raves. qujOchÖ makes everything out of conviction and love.

Lewis Rapkin (US) started his filmmaking career in 2008 directing the indie documentary about underground music *Live From Tokyo*. He has since spent the past decade working as an editor, producer and/or composer on award winning documentaries for HBO, VICE, PBS, Discovery and the BBC among others.

Theresa Reimann-Dubbers (DE/UK) is a student of new media at the Berlin University of the Arts (UdK). She previously studied at Parsons Paris and is now living and working in Berlin while completing her bachelor's degree under Joachim Sauter and Jussi Ängeslevä. www.theresareimann-dubbers.com

Marlene Reischl (AT), born in 1985, is currently studying time-based and interactive media at the University of Art and Design in Linz. Keeping her work mostly minimalistic and abstract, she likes to play with details, forms and structures at the fuzzy borders of analog and digital. She works with a variety of media, including light, sound, video and installation.

Tobias Revell (UK) is course leader of MA Interaction Design Communication at the London College of Communication and senior lecturer in Critical and Digital Design. He is a founding member of the research consultancy Strange Telemetry. He is one half of Haunted Machines, a research and curatorial project curating the 2017 Impakt festival in Utrecht, NL. He is currently doing a PhD at the Department of Design at Goldsmiths, University of London.

Anna Ridler (UK) is an artist and researcher who works with drawing and machine learning. She is particularly interested in finding the human-scale stories in large, often quantitative sets of data and using new technologies to translate them clearly to an audience in interesting and exciting ways. She has degrees from the Royal College of Art, Oxford University and University of Arts London.

Markus Riebe (AT) was born in 1955 in Gmunden, Upper Austria, and studied at Linz Art University. Since 1986, he has maintained an atelier for computer-supported art and digital media in Gallneukirchen near Linz. His artistic productions in the series entitled "digital/analog," "D/A-Wandler," "Avatare," "Territorien" and "Form/Code/Maps" have appeared at the Siggraph ArtShow/Chicago, TISEA/Sydney, ComputerArt/Broadcast and the Ars Electronica Festival. He has been featured in solo exhibitions and contributed to group shows in Austria and abroad.

Uwe Rieger (DE) studied physics and architecture in Germany. He was the co-founder of the interdisciplinary group Kunst und Technik e.V. and the architecture office XTH-berlin. His work on reactive architecture is based on mixed reality concepts. Since 2006 he has been associate professor for design and design technology at the University of Auckland, where he has established the arc/sec Lab for Digital Spatial Operations. <http://www.arc-sec.com>

Robert Riener (DE) studied mechanical engineering at the Technical University of Munich, Germany, and the University of Maryland, US. Riener has been a member of the Department of Health Sciences and Technology since 2012 and its chair since 2016. Riener's research focuses on the investigation of the sensory-motor interactions between humans and machines. This includes the development of user-cooperative robotic devices and virtual reality technologies applied to neurorehabilitation. Riener is the inventor and initiator of the Cybatlon.

Kristen Roos's (AU) work explores a fascination with the outside—what lies beyond standard perception, cognition and experience. This fascination has informed a body of work with transmission, audible and inaudible frequencies, electromagnetism and tactile vibration. Roos has created site-specific installations, sound design for dance and performance internationally. His writing on sound and radio art appears in the *Radius GRIDS* booklet published by Half Letter Press (Chicago 2015), the Errant Bodies publication *Radio Territories* (Berlin, 2007) and the New Star Books publication *Islands of Resistance: Pirate Radio in Canada* (Vancouver, 2010).

Dr. Pamela Rose (UK) is scientific researcher at the Cairo branch of the Austrian Archeological Institute. She is a very experienced field archeologist and ceramicist, and has worked extensively over many years in both Egypt and the Sudan. She has also published many articles on aspects of Egyptian and Nubian archeology. Since 2012 she has led the research project at Hisn al-Bab (Aswan) as part of a larger investigation into the nature of cross-border relations between Egypt and Nubia in the late Roman and early medieval periods.

Saint Machine (Marilena Opreescu Singer, b. 1979) (RO) is a multimedia artist and curator who studied literature and art history. Her previous projects such as Now (2016), Feed Me (2014), Playground for Animation (2009), Urban Art Festival (2007-2009) and 1200°C (2005) experiment with the superposition of spaces: real-virtual, inside-outside, physical-imaginary, natural-artificial.

Jorge Sánchez-Chiong (VE/AT) aka JSX, born 1969 in Caracas, is of Cuban-Chinese origin. He has been living as a composer and turntablist in Vienna since 1988, where he was commissioned to write and play a great number of works for major New Music ensembles, orchestras and festivals. He co-operates with artists from the experimental theater and dance performance scene, DJs and noise musicians as well as video and improvisation artists.

Tristan Schulze (DE) works as an artist, designer, musician and teacher in national and international contexts. In 2009 he received his diploma as an interaction designer at the Bauhaus Dessau. Since 2008 he has taught at several German art and design institutions and worked in the field between art and design. In his current artistic practice he focuses on the field of digital media art. He currently lives in Leipzig, Germany. <http://tristanschulze.de>

Domas Schwarz (AT) was born in Linz in 1991. During his study program at the University of Arts in Linz, he experimented with graphic and motion design and produced music videos, time-lapse films, light installations and media sculptures. Domas has lived in Linz since 2016, studying time-based media and working as a freelance artist in his Kessl atelier in Linz.

Steven Seitz (US) is a professor in the Department of Computer Science and Engineering at the University of Washington. He received his BA in computer science and mathematics at the University of California, Berkeley in 1991 and his PhD in computer sciences at the University of Wisconsin, Madison, in 1997. Following his doctoral work, he spent one year visiting the Vision Technology Group at Microsoft Research, and subsequently two years as an assistant professor in the Robotics Institute at Carnegie Mellon University. He joined the faculty at the University of Washington in July 2000.

Semiconductor (UK) is the artist duo Ruth Jarman and Joe Gerhardt. In their moving image and other art works they explore the material nature of our world and how we experience it through the lens of science and technology, questioning how they mediate our experiences. Their unique approach has won them many awards and prestigious fellowships, including the Samsung Art + Prize 2012 for new media, a NASA Space Sciences Fellowship and the Collide@CERN Ars Electronica Award.

Solveig Settemsdal (UK/NO) is a multi-disciplinary artist working across sculpture, video, photography and drawing. Her practice studies fluidity and potential: sculptural, geological or cognitive. She is currently studying for an MFA in sculpture at the Slade School of Fine Art in London and was recently awarded first place in the Jerwood Drawing Prize for her work *Singularity* (2016).

Günter Seyfried (AT) is an artist who lives and works in Vienna. He has a background in medicine and psychology, which he studied at the University of Vienna, and has strong links to the fine arts, digital art and media art, having graduated from the University of Applied Arts Vienna (Department of Digital Art). He teaches at the New Design University in St. Pölten, Department of Manual and Material Culture. He combines science and art education and develops projects as an independent artist, participating in national and international exhibitions and publications. He is a founding member of pavillon_35—Gesellschaft für wissenschaftsbasierte Kunst.

Christian Skjødt (DK) is a Danish artist who explores the material and aesthetic interrelations between sound, bodies and memory. His work investigates the imperceptible. Working with sound as primary materiality and often site-specific, Skjødt sets up autonomous systems out of which immersive and often performative environments emerge. He lives and works in Copenhagen, and holds a MA from the Royal Academy of Music, Denmark.

Christa Sommerer (AT) and Laurent Mignonneau (FR) are internationally renowned media artists, researchers and pioneers in the field of interactive art. For 25 years now they have been exhibiting their works worldwide, and they have won numerous awards, such as the 2012 Wu Guanzhong Art and Science Innovation Prize of the Ministry of Culture of the PRC and the Golden Nica of the 1994 Prix Ars Electronica. They are professors and heads of the Interface Cultures Department at the University of Art and Design Linz, and guest professors at Aalborg University in Denmark, the Université Paris 8 and the Empowerment Informatics Laboratory at Tsukuba University in Japan.

Morten Søndergaard (DK), is associate professor and media art curator, member of Relate. He is international coordinator of the Erasmus Media Arts Cultures Master Program at Aalborg University. He is on the faculty of the Media Art Histories program in Krems. He has been working professionally as a curator and conceptual designer in the mixed field of art and technology since 1994.

Michele Spanghero (IT) focuses his artistic activity on sonic arts and photography. He has exhibited and performed in various international venues and festivals in Europe, the Middle East and North America. Spanghero was awarded the Premio Icona at ArtVerona (2012), the online Blumm Prize in Brussels (2013) and received a mention by *Artribune* magazine as Best Young Italian Artist 2016. www.michelespanghero.com

Spectro Duo (PL/IR) was founded by Martyna Kosecka (Polish composer, conductor and performer) along with Idin Samimi Mofakham (composer and performer from Iran) as an electronic improvised music duo. Since 2013 they have focused on electronic and electroacoustic experimental live shows, which are sometimes structured in complex forms and other times based on only free improvisation. They also create fixed media projects (tape music) based on field recording materials and a rare instrumental sound samples. Spectro Duo's music is always centered on psychoacoustic phenomena and the aural perception experience. They always invite the audience into the unknown world of sounds they create for each project.

Stadtwerkstatt / STWST (AT) has stood for art, club and autonomous structure since 1979. Currently, the Stadtwerkstatt is active in the areas of New Art Contexts, operates the STWST Club and the Cafe Strom, media channels such as the magazine *Versorgerin* and other art and discourse formats. <http://www.stwst.at>

STAIR Lab (JP) is Software Technology and Artificial Intelligence Research Laboratory (STAIR Lab) founded in 2015 at the Chiba Institute of Technology, Japan. In recent years, machine learning has made remarkable progress, with a significant contribution from deep learning. Our mission, through research into these areas of science and technology, is to contribute to society and to train excellent young researchers.

Gerfried Stocker (AT) is a media artist and an electronic engineer. Since 1995 he has been a managing and an artistic director of Ars Electronica. 1995/1996 he developed the groundbreaking exhibition strategies of Ars Electronica Center with a small team of artists and technicians and was responsible for the set-up and establishment of Ars Electronica's own R&D facility, Ars Electronica Futurelab. Since 2004 he has been in charge of developing Ars Electronica's program of international exhibition tours. From 2005 he planned the expansion of Ars Electronica Center and implemented the total substantive makeover of its exhibits. Stocker is a guest speaker at many international conferences and a Visiting Professor at Osaka University of Arts as well as guest lecturer at Deusto University Bilbao. He is also a consultant for many international companies on creativity and innovation management.

Lucie Strecker (DE) works in the field of performance and hybrid art as a senior postdoc at the Art & Science department of the University of Applied Arts Vienna, conducting the FWF Elise Richter PEEK project The Performative Biofact. Performances and installations in cooperation with Klaus Spiess have been shown internationally and their works have been awarded the ZIM Performing Science Prize and a Prix Ars Electronica Honorary Mention.

Felix-Benedikt Sturm (AT), born 1988 in Linz, received his master of fine arts in sculpture and transmedia space at the University of Arts Linz, class of Eva Grubinger, in 2015. He has participated in group shows around Europe. Currently he is working on his first solo show, opening in Salzburg in fall 2017.

Hiroshi Sugihara (JP) is a PhD student in emerging design and informatics at the University of Tokyo, Japan.

Supasorn Suwajanakorn (TH) received his PhD in computer science from the University of Washington in 2017 and BEng in computer science from Cornell in 2011. His thesis focuses on modeling human personae using unconstrained data such as personal photo and video collections. He has won a Madrona Prize Award and the Innovation of the Year 2016 for work in his thesis. He is now a resident at Google Brain.

Reiji Suzuki (JP) is an associate professor at the Department of Complex Systems Science, Nagoya University. His research is focused on artificial life, evolutionary computation and agent-based models.

Atsushi Tadokoro (JP), born in 1972 in Tokyo, is a creative coder. Currently he teaches at Tama Art University, Tokyo University of the Arts and Keio University in Japan. Tadokoro performs live coding improvisation with sounds and moving images. His lectures on creative coding are online (<http://yopppa.org/>) as practical aids for students and creators.

Kotaro Tanimichi (JP) is a master's student in design engineering and mechanical metamaterials at the University of Tokyo, Japan.

Charles Taylor (US) is a professor emeritus at the UCLA Department of Ecology and Evolutionary Biology. He worked in diverse research areas such as machine intelligence and population genetics and ecology of malaria-carrying mosquitoes. Most recently his research has been focused on avian bioacoustics, adaptive sensor arrays and artificial life.

Team Zo (US) based in the AI & Research Division at Microsoft, the multidisciplinary team develops new technologies to facilitate greater human connection through conversation with images, voice and other senses.

Vibert Thio (TW) is an electronic music composer using Processing (Java) and C++. He is also working on research on VR and bio-art studies. Duanger Du (TW) performs as a DJ and electronic music producer and focuses on interactive program design of audio and visual art. Hsin-Jen Wang (Aluan) (TW) is a digital artist who specializes in multimedia design and creates audiovisual performances. Aluan is actively involved in the promotion of free software with OpenLab Taipei, and also designs interactive images for theater and dance performances.

Stefan Tiefengraber (AT) lives and works in Linz/Austria. His art works range from audio/video noise performances to interactive installations to time based media such as experimental video. In 2015 he took part in the MMCA Changdong residency program in Seoul/Korea for six months. His works have been exhibited at the Ars Electronica Festival 2016 (Linz/Austria), O'NewWall Gallery (Seoul/Korea), Today'sArt 2014 (Den Haag/Netherlands), and the New Media Gallery (Vancouver/Canada).

Time's Up (AT), founded in 1996 and anchored at Linz Harbor in Upper Austria, endeavors to expand the conventionally construed boundaries delineating art, technology, science and entertainment, and to dovetail those disciplines. As a lab for the creation of experimental situations, Time's Up models realities borrowed from everyday life and merges them with possible future scenarios to yield narratives that can be experienced haptically, narratives that, in the form of trans-media installations, invite those perusing them to engage in active exploration. For additional information about past and present Time's Up activities, research processes and outcomes, go to <http://www.timesup.org>.

Nao Tokui (JP) received his PhD from the University of Tokyo researching artificial intelligence and human-computer interaction. He has been actively working in the field of interactive art and music based on his research expertise and insights. After pursuing his research and creative interest in several laboratories in Japan and Europe, he founded Qosmo in 2009 with his fellow researchers and artists to deploy their ideas in the real world and market.

Yusuke Tomoto (JP), born in 1982, studied at the Department of Physics, Applied Physics, at the School of Advanced Science and Engineering, and Waseda University. He began his career at *Rhizomatiks* after working as an engineer in the R&D department of a leading medical instrument company.

Miha Turšič (SI) is an artist, designer and researcher, dedicated to the development of arts and humanities in outer space for more than ten years. He has designed works in reference to a human condition in outer space, developing post-gravitational art and artistic satellites, founded the Cultural Centre of European Space Technologies and is actively developing cooperation between institutions and domains. Currently, he is working as a project developer at the Waag Society.

Mike Tyka (DE) is an engineer and artist who currently lives and works in Seattle. His work combines science, technology and traditional art techniques. His sculptural pieces have focused on macromolecules such as proteins and DNA, which he represents in hand-sculpted copper or cast in glass or bronze using lost 3D-print casting. He also works with artificial neural networks as an art medium, using techniques such as DeepDream and Generative Adversarial Networks to create unique and contemporary media artworks and paintings. <http://www.miketyka.com>

Unknown Fields (UK/AU) is a nomadic design studio that travels on expeditions into the shadows cast by the contemporary city, to uncover the industrial ecologies and precarious wilderness its technology and culture set in motion. They chronicle their journeys in the book series *Tales from the Dark Side of the City* and their work features in publications such as the *Guardian*, the BBC, *Wired* and the *New Scientist*, and has been collected by institutions such as the New York Metropolitan and the Victoria and Albert Museum.

V2_, Institute for the Unstable Media (NL) is an interdisciplinary center for art and media technology in Rotterdam (NL). V2_ presents, produces, archives and publishes research at the interface of art, technology and society. Founded in 1981, V2_ offers a platform for artists, designers, scientists, researchers, theorists and developers of software and hardware from various disciplines to discuss their work and share their findings. In V2_'s view, art and design play an essential role in the social embedding of tech-

nological developments. V2_ creates a context in which issues regarding the social impact of technology are explored through critical dialog, artistic reflection and practice-oriented research. <http://www.v2.nl>

Phil van Allen (US) and Ben Hooker (UK) are an interaction designer and artist who are core faculty in the Media Design Practices MFA Program at ArtCenter College of Design. They devised the Internet of Enlightened Things project as a space to explore their shared interest in new manifestations of machine learning and artificial intelligence in the neighborhood where people interact with the urban at a human scale.

Ruben van de Ven (NL) combines his backgrounds in filmmaking and programming, challenging alleged objective practices. He is intrigued by the intersection of highly cognitive practices and ambiguous experiences. In his most recent works he investigates computational quantification of emotions.

Roland van Dierendonck (NL) is a creative researcher with a background in biology and media technology. The media of his work include interfaces, electronics and video. Through a series of collaborations, he pursued his fascinations, such as drawing robots, perceived authenticity, interactive laboratory technologies and utilizing biological unpredictability. Recently he went back to the lab, working together with Špela Petrič, Günter Seyfried and others.

Aoife van Linden Tol (IE) is a London-based multi-disciplinary artist working with explosives, fusing her interests in nature, cosmology, chemistry and physics. Her practice spans sculpture, installation, drawing, photography, film and performance. She creates abstract works and experiences which often examine concepts of time, density and matter as well as deep human emotions and motivations.

Katia Vega (PE) is the creator of Beauty Technology and a professor at UC Davis. She was a postdoc at MIT Media Lab, RA at Fine Arts-HKBU and PhD at PUC-Rio. Her work has been covered by the *New Scientist*, *Wired*, *Discovery* and CNN, and exhibited at the Barbican, Tekniska and Bellagio. It has won awards from Ars Electronica, TEI and Ubimedia. In 2016, Springer published her book about Beauty Technology. <http://www.katiavega.com>

Philip Vermeulen (NL) is an artist who makes performative installations. He discovers primary phenomena in all kinds of different media, sound, light, physics and nature. He starts playing and fighting with them, to isolate the things he sees, and tries to tame and compose with these characteristics. He builds setups and immersive installations of provoking experiences, which questions the senses of the viewer by transporting them into another world.

Victoria Vesna (US), PhD, is an artist and a professor at the UCLA Department of Design | Media Arts and Director of the Art|Sci center at the School of the Arts and California Nanosystems Institute (CNSI). With her installations she investigates how communication technologies affect collective behavior and perceptions of identity shift in relation to scientific innovation (PhD, University of Wales, 2000). Her work involves long-term collaborations with composers, nanoscientists, neuroscientists and evolutionary biologists and she brings this experience to students. She is the North American editor of *AI & Society* and in 2007 published an edited volume *Database Aesthetics: Art*

in the Age of Information Overflow and another in 2011 *Context Providers: Conditions of Meaning in Media Arts*. <http://victoriavesna.com/>

Florian Voggeneder (AT) was born in 1986 in Linz. Following a one-year stint performing civilian service in Auschwitz, he enrolled in Linz Art University's Time-Based and Interactive Media bachelor's program. After graduating in 2011, he entered the school's Time-Based Media master's program, and has been studying photography there since 2013. Signals, people and interferences are recurring motifs in his photographic work and installations.

VOID (TR) is a young creative group that mainly focuses on animation, digital arts and art installations and provides support to its customers on various different media platforms. It has been involved in several national and international art/science/technology activities and has given distinguished demonstrations in different cities in the US, Europe, the UK, Russia and Turkey.

The Waag Society (NL) is an institute for art, science and technology—a pioneer in the field of digital media. Over the past 22 years, the foundation has developed into an institution of international stature, a platform for artistic research and experimentation, and has become both a catalyst for events and a breeding ground for cultural and social innovation. The Waag Society explores emerging technologies and provides art and culture with a central role in the designing of new applications for novel advances in science and technology.

Ei Wada (JP), born in 1987, is an artist/musician. Around the time he began to understand things, he believed that a music festival is a place with a gigantic tower shaped like the leg of a crab with a television tube embedded in it. But at a certain moment his friend pointed out that there was no such place on Earth. So he decided to make a virtue of necessity and to produce it himself. He started a group called the Open Reel Ensemble and a project called the *Braun Tube Jazz Band*. He also created many art-installation projects and in recent years he started his latest project called *Electronicos Fantásticos!* where he recycles second-hand home electronics and turns them into musical instruments.

Thomas Wagensommerer (AT) lives and works as a media artist in Vienna, Austria. He studied digital media technology at the University of Applied Sciences St. Pölten, philosophy at the University Vienna (without graduation) and transdisciplinary art (TransArts) at the University of Applied Arts Vienna. He is a lecturer in experimental media at the University of Applied Sciences St. Pölten and a member of the research / artistic staff at the University of Applied Arts Vienna.

Lien-Cheng Wang (TW) is a new-media artist, open-source education collaborator and audiovisual performer. His art and research involves interactive devices and real-time sound performance. He uses open source to create installations and audiovisual real-time performances. The works are committed to seamless combination of images and sounds created by computer algorithms as well as human perception of the universe and nature. He often utilizes a volume of installed approaches to achieve a unique physical perception. His works have been exhibited and performed at Ars Electronica (Austria), New Technological Art Award (Belgium), Les Journées Grame (France), Madatac (Spain), and the Digital Art Festival Taipei (Taiwan).

Florian Weigl (NL) works as a curator at V2_, Lab for the Unstable Media, an interdisciplinary center for art and media technology in Rotterdam (NL) focusing on various public programs making what is happening in the lab visible. Alongside his work at V2_, Florian works as a freelance curator, writer and advisor.

Alexander Wilhelm (AT) had already caught the bug of perennial enthusiasm for science in his childhood. A qualified designer by training, Wilhelm is active in the fields of the visualization of scientific content and of interaction design. He is a lecturer on 3D animation, on film and games design at the University of Art and Industrial Design Linz and at the Fachhochschule Hagenberg.

Xin Xin (US/TW) is an artist and journalist who questions the relationship between agency and technology through video, web, and community projects. She co-founded voidLab, an intersectional feminist collective that programs exhibitions and forums at the crossroads of art, technology, and society. Her work had been exhibited at the Hammer Museum, IndieCade Festival, Gene Siskel Film Center and Machine Projects. Xin holds an MFA from UCLA Design Media Arts. She has given numerous talks at universities and currently teaches web and video courses at UCLA and Loyola Marymount University. <http://xin-xin.info>

Maria Yablonina (RU) is a research associate and doctoral candidate at the Institute for Computational Design and Construction at the University of Stuttgart. With a strong interest in robotics and digital fabrication techniques, she is currently focusing on exploring potential techniques enabled through the introduction of architecture-specific custom robotic tools for construction and fabrication. Her work includes the development of hardware and software tools as well as complementing material systems.

Aki Yamada (JP) attended Doshisha University in Kyoto, Japan, graduating with a BA in policy studies. She continued studying at Doshisha University and received her MA in American Studies, studying at Stanford University for one year as a Freeman Spogli Institute Visiting Researcher. In 2015 she completed her PhD in education at the University of California, Los Angeles, writing her dissertation on new Japanese migrants and immigrants living in the United States. Her research interests include globalization, contemporary Asian immigration, transnational identity, and internationalization of higher education. Aki is now working as an assistant professor in the Empowerment Informatics program at University of Tsukuba.

Takahiro Yamaguchi (JP) produces art based around digital media and inspired by graffiti, street art and other modes of expression in public spaces. Employing devices and software and presenting works in an unconstrained, freeform manner, he casts doubt on entrenched conceptions and questions existing value systems. **So Kanno** (JP) also works with technology, exploring phenomena unique to the field, such as signal vs. noise, errors and glitches. In 2011 they won the New Face Award at the fifteenth Japan Media Art Festival for Senseless Drawing Bot, a drawing machine that creates abstract lines with spray utilizing the movement of a double pendulum. Kanno and yang02 have since exhibited drawing machines at the SeMA Biennale Mediacity Seoul 2012, the Sapporo International Art Festival 2014 and elsewhere.

Shunji Yamanaka (JP) is product designer and professor at the University of Tokyo, Japan. He has received many awards, including the 2004 Mainichi Design Award, the iF Product Design Award (Germany) and the Good Design Award Gold Prize.

Junichi Yamaoka (JP) is an artist and postdoctoral researcher. He received a PhD in media and governance at Keio University, and he is currently a postdoctoral fellow and part-time lecturer at Keio University. He is studying human-computer interaction, and interactive technologies for human creativity. Based on concepts he has considered, he has invented technologies and applications such as fabrication tools, user interfaces and media-art pieces.

Pinar Yoldas (TR), PhD is an interdisciplinary scholar and artist whose work operates under the framework of science and technology. Her curiosity-driven work has been exhibited internationally in group shows, including the Istanbul Biennial, Nordic Biennial, ZKM, National Museum of Art Beijing, Transmediale, Sonic Acts and solo shows in S25 Amsterdam, Polyteknikum Moscow, the Schering Stiftung Berlin and Roda Sten Konstall Sweden. She is a 2015 John Simon Guggenheim fellow and a Future Emerging Art and Technology award recipient. She had her first solo exhibition when she was five, and holds a bronze medal in Chemistry Olympics.

Cynthia Zaven (LB) is a composer, pianist and artist based in Beirut. Her projects combine a variety of media to explore the relationship between sound, memory and identity through interwoven narratives. Her music is published by the Berlin-based label, Staalplaat. She is currently a piano professor at the Higher National Conservatory of Music in Beirut.

Emma Yann Zhang (SG) is a PhD student in computer science at the Imagineering Institute, Malaysia, and University of London. She received a BEng in electronic engineering (first class honors) from the Hong Kong University of Science and Technology in 2013. Her research interests are multisensory communication, haptic technologies, pervasive and wearable computing.

Christian Ziegler (AT) graduated in Business Education at Johannes Kepler Universität Linz. Together with partners he runs a web agency in Vienna, focusing on open-source software. As Drupal Austria Association chairman he is very active in the local open-source community. **Nico Griener** (AT) is a graphic designer. He is a Drupal Austria Association board member, CodeWeekEU Ambassador, Drupal evangelist and founder of Acolono GmbH, Laserbox and Ausgetrock.net. **Florian Fida** (AT) is leading developer of the open-source IoT project OpenTrigger.

Elisabeth Zimmermann (AT) is a cultural manager living in Vienna. She has been involved in organizing, coordinating and curating radio art projects, symposia, CDs, publications and international telematic art projects. Since 1998, she has been the producer of the weekly radio art program Kunstradio–Radio-kunst (<http://kunstradio.at>) on the cultural channel Österreich 1 of ORF (the Austrian state broadcaster). In 1999, she founded Werks—an art association dedicated to the realization of artistic projects in telecommunications media. Since 2010 she is one of the coordinators of the EBU's Euroradio Ars Acustica group.

AI—The Other I

What we are experiencing at present can quite justifiably be termed the Cambrian Explosion of Digitization. Just as futurists have repeatedly foretold, the digital has proliferated in all conceivable directions—though it's happening a lot faster now, and it's more intensive and wider-ranging than anticipated. Artificial intelligence (AI) is no exception. Quite the contrary. Confronted by this trailblazing progress, more and more observers are concluding that AI could even be the next evolutionary step, the one with which technology asserts its mastery over us once and for all. Regardless of whether this dystopian scenario ever becomes reality—and if so, when—the vision of AI brings together both the longing to create our perfect likeness and our fear of being overthrown by that very creature. AI is thus the perfect projection surface for a process of reflection upon our conceptions of human beings and the worldviews that are widespread in this digital age of ours. Together with artists, scholars in the natural and social sciences, and experts in business, politics, and religion, Ars Electronica is investigating which of our fears are justified and which are merely expressions of our ambivalent attitude toward technology. After all, if everything really is on the line here, then why are we even getting involved in this adventure with AI? This is a question that's well worth dedicating an Ars Electronica Festival to.

400 pages, 609 illustrations

<http://www.aec.at/ai>

