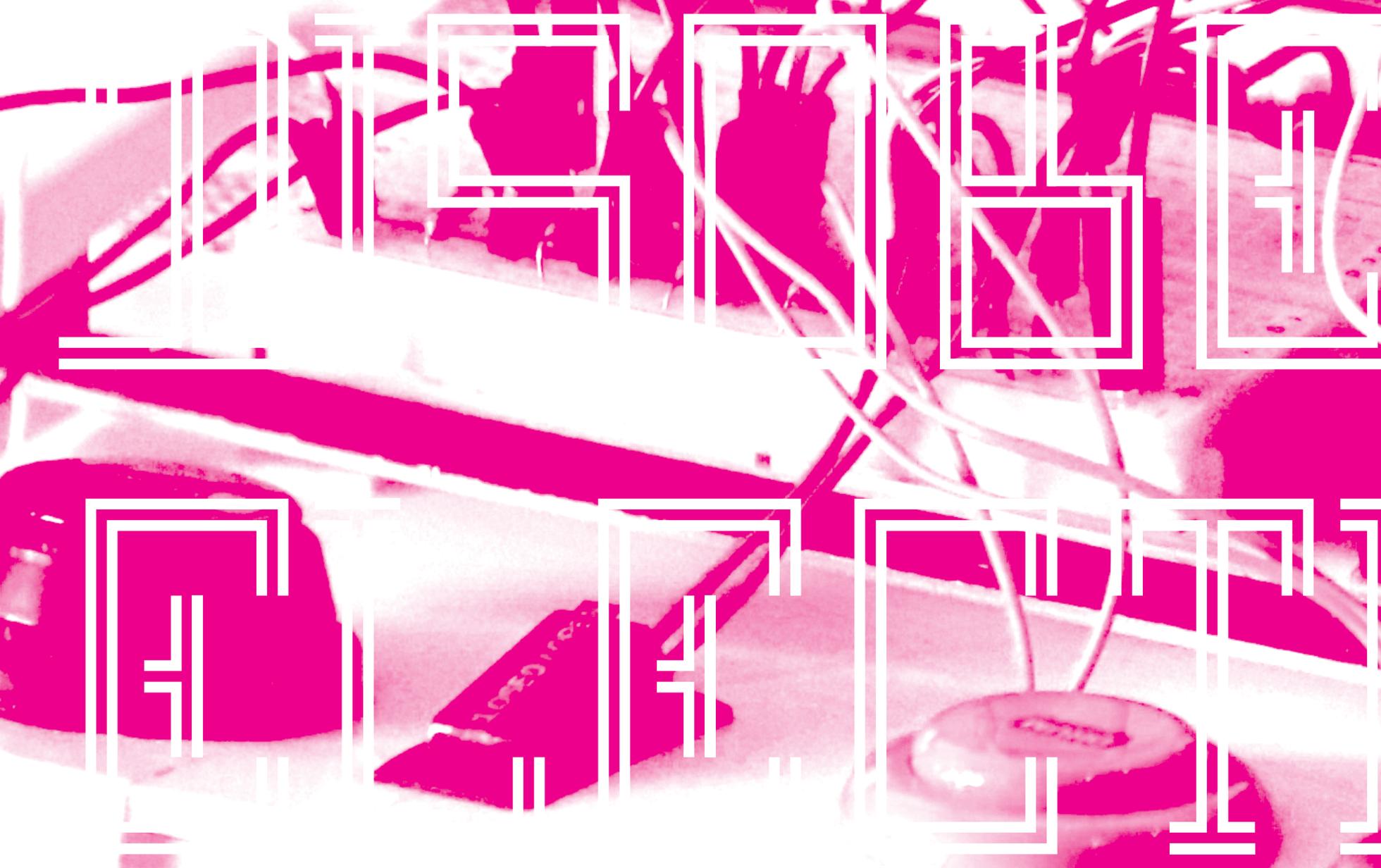


# DISOBEYIENT ELECTRONICS

**PROTEST**



# DISOBEYIENT ELECTRONICS

**PROTEST**

Garnet Hertz, Editor

Protest, First Printing • PDF Edition • January 2018  
Originally Black & Magenta Inkjet, Machine Sewn Binding

**The Studio for Critical Making**

VERSION 201801081332

## TABLE OF CONTENTS

Thanks to Bruce Sterling, Michelle Kasprzak and Mark Anderson for promoting this project, Sabrina Hauser and Katherine Gillieson for print-related help, and to the many, many people that submitted their outstanding projects. This work is made possible by the Canada Research Chair program, the Canadian Foundation for Innovation, and the support of Emily Carr University.

Introduction • G. Hertz	01
Abortion Drone • Women on Waves & Collaborators	03
The 79% Work Clock • J. Carreiro of PARTY New York	07
A Piece of the Pie Chart • A. Rüst	11
PeriodShare • M. Søndergaard & L. Hansen	15
Mixed Messages Bra • J. Hansen	17
Blinkini • N. Wu	18
Home Surgery Instructions • Barbie Liberation Organization	19
The Knitted Radio • E. Kurbak & I. Posch	21
Probots • C. Csikszentmihalyi, V. Aguiar & V. Azevedo	23
Backslash • P. Olivera & X. Chen	25
BIT Rocket • Bureau of Inverse Technology	29
Robotic Graffiti Writer • Institute for Applied Autonomy	31
Dissenting Jabots • J. Liu & C. Baumann-Jaeger	33
CRAF • T. Sawangdee & E. Ishikawa	35
Improvised Empathetic Device • M. Kenyon & D. Easterly	37
Gun Control • S. Kildall	39
Campus Carry Doorbell • SP&CE Media Lab	41
The Transparency Grenade • J. Oliver	43
THERO • R. Torre & Á. Angulo	45
Integrated Entropic Sanitization • M. Klapman	47
Phantom Kitty • N. MacAloney	49
Device for the Emancipation of the Landscape • M. Walker	53
Solar Cooker • S. Kuznetsov, S. Chung & S. Puthenpurakkal	55
What if Artifacts Had a Different Sort of Politics • L. Forlano	57

More information on this project is at  
<http://disobedientelectronics.com>  
and <http://conceptlab.com/>

## INTRODUCTION

This call for submissions was drafted the day after the 2016 U.S. election, partially as a response to the concept of "post-truth": 'relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief'. While facts obviously still matter, the larger issue is that persuasion and creative communication is important. In some ways, progressive dialogue has stagnated in its own Facebook filter bubble and needs to refocus with its roots in direct action.

Industrial design - and the creation of experimental electronic objects - is a useful tool to communicate complex issues, like the wage gap between women and men, homophobia, racism, surveillance and privacy, human rights, economic disparity, climate change or other topics. This directly borrows from a host of approaches, including DiSalvo's concept of Adversarial Design, Oroza's Technological Disobedience, Sengers' Reflective Design, Ratto's Critical Making, Wodiczko's Interrogative Design, Lozano-Hemmer's Perversion of Technological Correctness, Critical Art Ensemble's approach to Tactical Media, or Flood & Grindon's Disobedient Objects. It strives to take more of a confrontational 'Yes Men' attitude than a clinical 'Dunne & Raby' approach. Although affirmative design should be questioned, the larger issues of human rights, racism, sexism, pollution, etc. seem to weigh in as more pressing topics in 2017. In other words, design can be how to punch Nazis in the face, minus the punching.

Thanks to Bruce Sterling for widely circulating this call for projects: over 100 submissions quickly materialized from electrical engineers, artists, hackers, industrial designers - most of which were new to me.

For this issue, I have chosen to highlight work that is protest-oriented or overtly political - although 'political' is a porous category. Many projects whose primary task is to explore perception, utility, or speculative futures have not been included in this edit - please let me know if you are interested in more issues produced around these topics. Also, contact me if you are teaching in the field of electronics and are interested in pooling together a teaching resource for students: a handbook-style guide to 'Disobedient Electronics' would be a useful resource.

Garnet Hertz  
Canada Research Chair in Design and Media Arts  
Emily Carr University of Art and Design  
520 East 1st Avenue, Vancouver, BC, Canada  
V5T 0H2 ghertz@ecuad.ca

This project aims to point out that:

1. Building electronic objects can be an effective form of social argument or political protest.
2. DIY, maker culture and local artisanal productions can have strong nationalist and protectionist components to them - in some senses, populism can be seen as the rise of the DIY non-expert.
3. Critical and Speculative Design (Dunne & Raby) are worthwhile approaches within industrial design, but perhaps not adversarial enough to reply to contemporary populist right-wing movements (Brexit, Trump & Le Pen). Questions like "Is it moral to punch Nazis in the face?" should be answered with smart alternatives to violence that are provocative pieces of direct action.
4. If we are living in a post-truth time, we should focus on trying to make progressive arguments and facts more legible and engaging to a wide and diverse audience.
5. The fad of 'Maker Culture' is over. Arduinos and 3D printers are fascinating things, but the larger issues of what it means to be a human or a society needs to be directly confronted.

# ABORTION DRONE



The Abortion Drone flies abortion pills from one country to women in another country. Using the different legislations and regulations it makes the reality of women in countries where abortion is restricted visible by creating access to the abortion pills.

The first flight of the Abortion Drone was in Poland in 2015. The drone departed from Germany and landed at the opposite side of the river in Slubice, Poland.

While the drones were crossing the German/Polish border, the German Police tried to intervene but the drone pilots were able to safely land the drones at the Polish side.

Two Polish women swallowed the abortion pills. The German police confiscated the drone controllers and personal iPads. They claim there was a violation of the Arzneimittelgesetz. After an extensive investigation charges were dropped in May 2016.

The current restrictive Polish abortion law creates social injustice and affects especially the women without financial means or information.

The medicines used for a medical abortion, mifepristone and misoprostol, have been on the list of essential medicines of the WHO since 2005 and are available in Germany and almost all other European countries. However this medicine is still not registered in Poland.



Scientific research by the World Health Organisation has shown that medical abortion can easily be done by women themselves at home without supervision by health professionals. A medical abortion has the same health impact as a spontaneous miscarriage. Usually women themselves without additional medical supervision handle a miscarriage.[1]

In Poland, a pregnant woman cannot be subjected to punishment for illegal abortion or for any other action leading to a miscarriage.[2]

For pregnancies of up to 9 weeks (63 days) a medical abortion is done as follows:

1. A woman swallows 1 tablet of 200 mg Mifepristone
2. 24 hours later the woman puts 4 tablets (800 µg) of misoprostol under the tongue.

The Abortion drone campaign is a collaboration between Women on Waves, Ciocia Basia, Feminoteka Foundation, the 8th of March women's rights informal collective "Porozumienie kobiet 8 marca", Berlin-Irish Pro Choice Solidarity, Codziennik Feministyczny, and the Political group Twoj Ruch.

Polish women who need help with an unwanted pregnancy can call hotline number +48 (22) 211 8866 (from Monday-Thursday 10AM till 8PM and Friday-Sunday 9AM till 2PM). They can also always email [info@womenonweb.org](mailto:info@womenonweb.org).

#### SOURCES:

[1] [http://apps.who.int/iris/bitstream/10665/70914/1/9789241548434\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/70914/1/9789241548434_eng.pdf?ua=1)

[2] [http://www.federa.org.pl/dokumenty\\_pdf/raporty/report\\_federa\\_20\\_years\\_polands\\_abortion\\_law.pdf](http://www.federa.org.pl/dokumenty_pdf/raporty/report_federa_20_years_polands_abortion_law.pdf)

#### ALSO SEE: **OpenSource Abortion by Channel Two**

OpenSource Abortion is an experiment contrasting open source culture rhetoric with the current socio-political landscape [and a history of sharing knowledge] in the United States. Channel Two (CH2) shares (distributes) "A Womb of One's Own: Taking Charge of Your Reproduction Without Doctors by Jane Doe" a document describing open source knowledge, on github, the "World's largest open source community."

<http://onchanneltwo.com/CH2-open-source-abortion>  
[https://github.com/OnChannelTwo/DIY\\_abortion](https://github.com/OnChannelTwo/DIY_abortion)

# 79% WORK CLOCK

**The 79% Work Clock calls attention to the gender wage gap in America. Studies show that women who work full-time are paid only 79% of what men make annually, so the 79% Work Clock lets you know when 79% of the work day has passed. When a woman hears its chime, she might as well go home.**

**GARNET HERTZ:** How was the 79 Percent Work Clock developed and built?

**JAMIE CARREIRO OF PARTY:** MTV has an ongoing campaign called 'Look Different' to try to confront social issues – anything from marriage equality and other LGBT issues to gender or race bias – specifically topics of equality or inequality. They asked us to try to come up with something surrounding women's issues – they had a brief for us that had a wide variety of things that we could have chosen to talk about, from 'slut shaming' to sexual harassment issues – and what we eventually settled on is something that we thought that we could explore most effectively. We thought that the topic of gender pay gap was something that had a message that could be delivered by us in an understandable way.

In developing the idea what we were trying to come up with is something that would live longer than just that little blip that you get from a press release something that could have a presence beyond just one day or one moment. We wanted something that would have presence in the actual work places where people

were experiencing this inequality rather than just something that would live in a media space.

In thinking about the pay gap we were thinking of how to express it in a relatable and somewhat visceral way, because we can't just have everybody going around saying how much they make all day long: that'd be socially awkward if we tried to convince everyone to do that. We came up with the idea that we could express this as the point in time when you're no longer paid – because if you look at it this way, if you're doing a similar amount of work but you don't get as much money, you should probably be doing less work. That led pretty clearly to the project idea. We also like to build physical and experiential things: it's something that we're focused on just because it's very different to encounter something physically versus something where it is only in a media space.

**GH:** In terms of the process of building something tangible, you mentioned how you find that it's more useful than a press release or something that exists in the mediascape. How do you see that it changes something when something is physically manufactured or exists as a real object as opposed to just a prop in a video shoot?

**JC:** I think in this context it's about trying to create a real conversation – and I mean that literally. The conversation between a few people in an everyday situation. Rather than trying to have a top down massive message that gets spread around every media surface and everybody talks about it.

**PARTY**  
NEW YORK



We thought that if we really want to get people to think about a difficult issue and whether it was the gender pay gap or anything else where there's clearly divided opinions and people have a lot of details and statistics that they have to navigate around. We really kept coming back to this idea that it's going to be individual people talking to people that they see everyday: that's the way that you can change someone's mind. I could get any celebrity in the world to get on TV and tell you you should think differently about a specific thing. It's not going to be as effective as their co-worker or their friend or their family saying, "Hey, this is what I think and I disagree with you."

In order to make a conversation like that happen we wanted to have presence in people's everyday routines. Not the type of presence you get from a poster that says, "Here's my ideological point of view". What we were intrigued by is the idea that there would be this clock and people would say "What is that clock?" Or people might actually turn the alarm on and they hear the alarm and it's the middle of the afternoon and they say "What is that alarm for?" Then the conversation starts from there.

It's a little more passive in a way in that it just lives there and then waits for, hopefully people would use the alarm everyday – and that would start a conversation. Even just the presence of the clock itself, it's not forcing people to immediately agree with you. It's encouraging a question and a conversation to occur. This is something that people can use as a starting point to talk about the topic.

That isn't to say that the press release and the awareness and the coverage that we get is not important, it abso-

lutely is and that's the way that this can spread beyond just the 400 that we were able to distribute – or whatever the final number was. We absolutely love when we had people in the White House tweeting about it, sports figures and all that. That's really, really great. I think that, what I would hope is that there's a little bit more of a long tail to this, that it would actually sit on people's desks and start a real conversation.

# 79% WORK CLOCK

The daily reminder that the wage gap is real

**GH:** Right. That makes sense because I see it as when dealing with physical design and I work and teach as an industrial design professor. When you translate something into a physical artifact it has legibility to it... a young kid can hold it, a grandmother can see it, they can

interact with it. I think it has a certain legibility that a graph or an infographic or something doesn't have. It's a different language, definitely.

**JC:** Yeah, I think so. I think there's also something psychologically that goes on when you encounter an object that's purpose built for one behavior. Let's say you have access to all the music in the world through Spotify – but if you build

specific idea into something physical and then put it in front of you. I think it speaks to a seriousness of purpose sometimes when you make something that way.

**GH:** Yes, definitely. Have you heard of the concept of 'post-optimal design'? The idea is that individuals can generally go to a Walmart or Target and buy the things that fulfill their basic survival needs. 'Post optimal' refers to trying to get beyond just survival or having products that are convenient or easy to use and instead probing moral problems or social issues through design. Essentially, post-optimal design probes the question of what it means to be human. I see this project maybe falling into that, the problem of building a reliable clock is already solved a long time ago – and where a customized object can cleverly bring up important issues that a normal clock wouldn't.

**JC:** Yeah – I think that makes a lot of sense. We could also look at it from even a more hierarchy of needs point of view. Like we're long past the point where we need a clock. We have clocks. Everyone knows what time it is. There's ample ways to know what time it is. Now that becomes a more expressive object. Like you're released from the technology, it's now totally commodified. You can order alarm clock mechanisms for very little money from anywhere in the world. Yeah, I think that's an interesting perspective the way that we keep things around and then start expressing ourselves with them when long after they actually need to exist. Every person has an alarm clock in their pocket right now in the form of a cellphone or another thing. •

a box and the only purpose of that box was to play five songs that a loved one had selected, that takes on so much more meaning. Even though those five songs were already available to you at any time at any moment on your phone, just the idea that you've manifested that

## A Piece of the Pie Chart: Feminist Robotics ANNINA RÜST

A piece of the Pie Chart [1] is a robot that protests gender inequity with edible pies. It is a “sweet” form of robotic criticism. It also tweets. Below, I am providing some background information regarding gender inequity in art and tech and why gender inequity is a problem. Then I am going to describe my feminist protest robot and explain why collecting data on the gender gap is important. Finally, a call to action specifically aimed at men.

Looking at the first edition of Critical Making [2], I found that roughly 30% were woman authors. This is pretty common. Why? Because for women in art and tech, things are pretty grim. In tech, the gender question has been subject to much research. One much cited report by the Harvard Business Review states that coveted creator and producer roles in tech (and science, math, and engineering) jobs are primarily occupied by men and that women are kept out by hostile macho cultures [3]. Feminist art historian Lisa Nochlin already stated in 1971 that the same thing keeps happening in art history [4]. Even in 1971, art had a broader pipeline than tech: Women were graduating at the same rate as men from art programs [5] and since then, the number of women in art has only increased. But when you look at who is invited to exhibit by major museums and galleries you will see that creator roles in this field are still primarily occupied by (white) men.

So why is this important? It’s an obvious economic issue. If women and minorities invest in an education and career but cannot get ahead at the same rate as white men because of discrimination, this creates economic inequality among other things. In a just society, women and minorities should logically be rewarded at the same rate as men both financially and in terms of recognition.

### THE ROBOT

So yes, how to protest economic inequality and the invisibility of female labor using a robot? Through pies! My robot puts pie charts onto real, edible pies. It’s a gallery installation that looks like a miniature industrial production line. It consists of a computer, household electronics, as well as adapted robotics

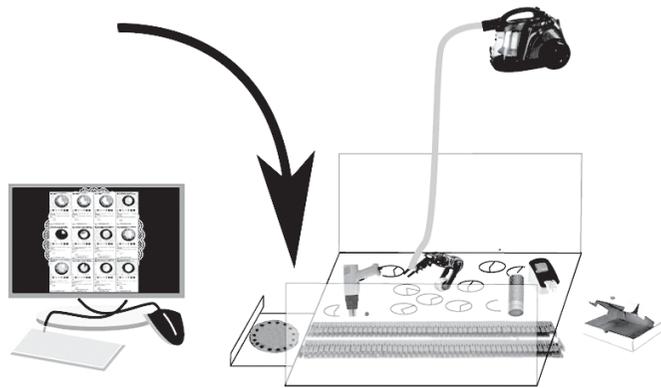
kits. The gallery visitor can browse gender ratios from art and tech using a computer (screen, keyboard, mouse) and select the gender ratio that they would like to put on a pie. The screen then prompts them to put a pre-baked pie onto a designated place and press a button. The machine then pushes this pie onto a conveyor belt. The conveyor belt moves it under a heat gun. The heat gun heats up the chocolate on top of the pie until it is sticky. The conveyor belt moves the pie to a robotic arm. The robotic arm is surrounded by paper pie charts. The arm then selects the pie chart that the visitor previously selected. Attached to the robotic arm is a hose that leads to a vacuum cleaner. Once the robotic arm touches the middle of the pie chart, the vac turns on and the pie chart sticks to the arm. The arm then transports the pie chart to the pie and presses it lightly into the heated chocolate where it sticks as the chocolate cools. Then, the thus decorated pie is transported by the conveyor under a web cam that takes a picture and distributes it via Twitter [6]. When this is done, the finished pie is presented to the visitor along with a label to ship the pie to the place (art museum, gallery, tech company, etc.) where the data originates. If visitors do not want to send the pies, they are encouraged to take them to their workplace and discuss gender and other inequities with work colleagues.

The mix of household electronics and robotics kits is intentional. The installation consists of repurposed robotics kits and household electronics. My project is a mix of “high-tech” robotics kits such as a kit to make a tank robot and a robot arm, as well as “low-tech” domestic appliances such as a vacuum cleaner. By removing unnecessary boundaries between seemingly disparate forms of technologies, I am paying tribute to the invisible labor of female inventors of household appliances and the products of household labor (the pies).

### COUNTING GENDER RATIOS

I collect data on the gender gap primarily myself, counting presented gender via “A Piece of Inequality”, a website I created to archive the ratios I count [7]. People have asked me why I am not going





beyond the male/female dichotomy in "A Piece of the Pie Chart". Let me explain. In theory, going beyond the female/male dichotomy is easy. In practice, it is more difficult. I collect data from artist bios. Bios don't across the board provide a nuanced picture of gender identity, sexuality, and race. And I would find it awkward and creepy to ask friends and strangers about the specifics of their gender identity, sexuality, and race. So I don't have any way of providing a more nuanced picture. In artist bios, people will typically present as male or female via gender pronouns. If I am not sure based on artist self-presentation, I list this person as "unknown". I do the same for artist collectives where gender is not identified on a per-person basis. This adds a margin of error but the margin of error is usually not large enough to be significant. What is significant however is that the data makes it obvious that the gender gap exists in art and tech and that it will likely not go away anytime soon.

I am not alone in collecting data on the gender gap in art, tech, architecture, and other fields: The Guerilla Girls have been counting since 1985 [8]. The Gallery Tally Project [9] directed by Micol Hebrón is a crowd-sourced effort. Gallery Tally participants collect gender ratios from commercial galleries and visualize them on posters which are collectively exhibited. The Countesses [10], GenderAvenger [11], and the feminist wall of shame also count [12]. Heather Dewey-Hagborg created the #KissMyArse

hashtag [13] to protest the fact that Ars Electronica, the oldest Art and Technology festival has in its 29-year history given 9 out of 10 of its top awards to men. Why counting? Because we're dealing with a power differential and data as evidence is less easy for those in power to dismiss or explain away (compared to anecdotal evidence). It also helps confront those who pretend to be blind to the gender gap. In 1971 for example, the Los Angeles Council of Women Artists (LACWA) confronted the then head curator of the Los Angeles County Museum of Art (LACMA), Maurice Tuchman. He had curated the Art & Technology (A&T) program at LACMA which brought together exclusively male and overwhelmingly white artists like Andy Warhol and James Turrell with industrial tech companies like Hewlett Packard and Garrett Corporation. In the catalog accompanying the exhibition, Tuchman said that he had attempted to include "as wide a range of artists as possible" [14]. The LACWA report shows succinctly (in just seven pages) that this was a gross misstatement [5]. Data helps reveal institutional bias and institutional weakness that is glossed over in official documents (such as the A&T catalog). Counting is about holding institutions responsible because numbers can easily show the difference between rhetoric and reality. Institutions who receive taxpayer funding must represent demographic diversity of taxpayers at all ranks of their organization. This is something that LACWA already demanded in their 1971 report.



#### CALL TO ACTION

I want to end this project description with a call to action. If you are a famous male artist, curator, festival director, editor, and/or hold some other position of power – I am talking to you in particular. Read Lisa Nochlin's paper from 1971 [4]. You are an integral part of pushing the feminist cause forward. Some male artists (two cited at the link) have complained that protests done by women artists against Ars Electronica via the #KissMyArse hashtag are not revolutionary enough [15]. Dear male artists, do not tell women that they are doing feminist protest all wrong because people tell us stuff like that all the time. Do not make feminist protest all about you (and women's labor therefore invisible). Instead do the opposite: Support women and minorities. Promote our work and feminism. Again, we are all an integral part of pushing the feminist cause forward.

- [1] Annina Rüst. A Piece of the Pie Chart, 2013-ongoing. <http://anninaruest.com/pie>
- [2] Garnet Hertz et al. Critical Making <http://conceptlab.com/criticalmaking/>
- [3] Sylvia Ann Hewlett, Carolyn Buck Luce, Lisa J. Servon, and Laura Sherbin. The Athena Factor: Reversing the Brain Drain in Science, Engineering, and Technology. HBR Research Report, Harvard Business School, 2006

- [4] Lisa Nochlin. "Why Have There Been No Great Women Artists?", ArtNews, 1971, <http://www.artnews.com/2015/05/30/why-have-there-been-no-great-women-artists/>
- [5] Los Angeles Council of Women Artists, Los Angeles Council of Women Artists Report, June 15, 1971, Getty Research Institute, 2003.M.46. See more at <http://blogs.getty.edu/pacificstandardtime/explore-the-era/archives/i143/>
- [6] Annina Rüst. Piece of the Pie Chart Twitter account, <https://twitter.com/piechartrobot>
- [7] Annina Rüst. A Piece of Inequality, 2014-ongoing, <http://www.anninaruest.com/pieceofinequality/>
- [8] The Guerilla Girls. Our Story, <http://www.guerrillagirls.com/our-story/>
- [9] Micol Hebrón et al. Gallery Tally Project, 2013-ongoing.
- [10] CoJNTess – Women count in the artworld. <http://countesses.blogspot.com/>
- [11] GenderAvenger. <http://www.genderavenger.com/>
- [12] Feminist Wall of Shame. <http://feministwall.tumblr.com/>
- [13] Heather Dewey-Hagborg. #KissMyArse, <http://dewey-hagborg.com/projects/kissmyars>
- [14] Maurice Tuchman. A Report on the Art and Technology Program of the Los Angeles County Museum of Art, 1967–1971. P. 17, [https://archive.org/stream/reportonarttechn00losa\\_/reportonarttechn00losa#page](https://archive.org/stream/reportonarttechn00losa_/reportonarttechn00losa#page)
- [15] Heather Dewey-Hagborg. Addie Wagenknecht, Camilla Mørk Rastvik, Kathy High. "Why women are asking a major art and technology festival to #KissMyArse", <https://www.theguardian.com/science/the-h-word/2016/sep/12/ars-electronica-festival-gender>

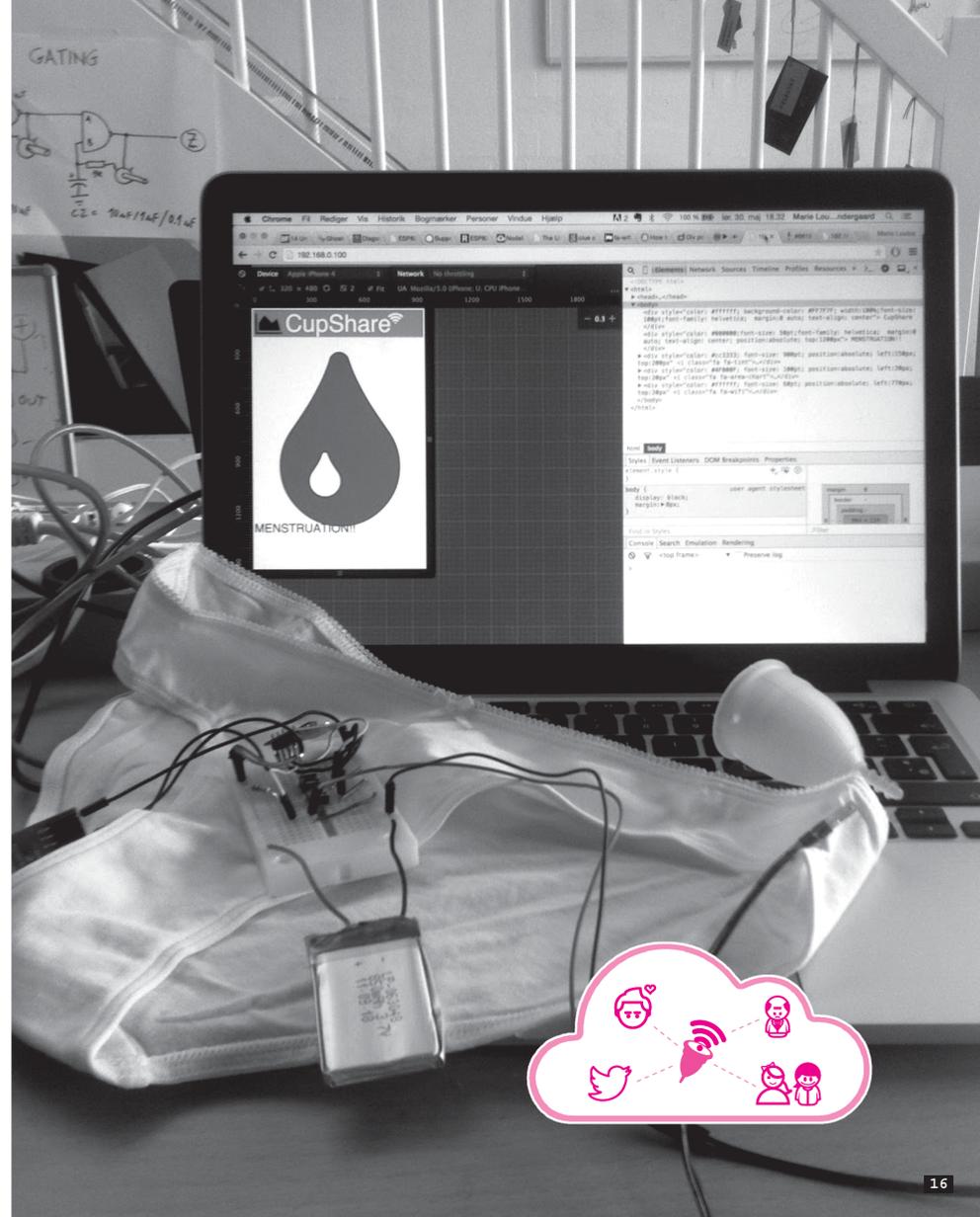
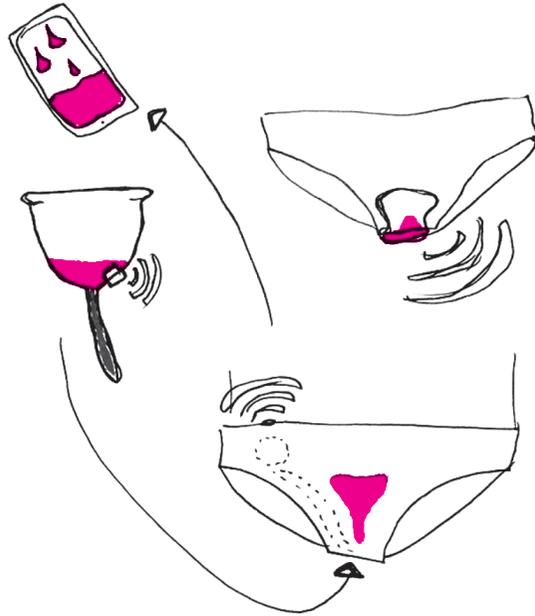
# PeriodShare

Marie Louise Juul Søndergaard & Lone Koefoed Hansen

PeriodShare is a response to how contemporary technology makes bodies possible and how it writes the narratives of what is a normal human body. The project disobeys the gendered culture of Silicon Valley that sees itself in a position to design, build, and decide how technology makes lives matter to humans. Using the rhetorics of a neoliberal startup, it is a physical prototype, a Kickstarter campaign, and a performative intervention at a tech fair. Through using electronics as a feminist tool it questions the business model of menstruation trackers that rely on users wanting to track but not publicly share their body's data. Unlike performance trackers, data from menstruation trackers do not have social media integration and this underlines the dominant cultural idea that the functions of the female body, and in particular menstruation, is a taboo. PeriodShare deexclusifies the data of the fertile female body by encouraging users to share their menstrual data with friends and family and on social networks. It does so through humour and by using electronics as a performative intervention.

PeriodShare follows the neoliberal trend of quantifying and tracking everyday activity and making everything smart. It proposes a wireless menstrual cup for automatic tracking and sharing of a menstrual cycle: In a sensor-augmented menstrual cup, data is tracked directly from the menstrual blood and transferred to an accompanying smartphone application where the user can manually or automatically share the menstrual data with friends, family, colleagues or on social media platforms.

In addition to the physical prototype, PeriodShare consists of a Kickstarter campaign and a performative intervention at a tech fair. The Kickstarter campaign describes the project and features a campaign video, the product's philosophy, and a design manifesto for menstruation. Challenging and affirming the logic and culture of Kickstarter at the same time, PeriodShare uses the platform's language to set a common ground for discussion whilst also disobeying its logics by presenting something slightly humorous, uncanny and absurd. The physical prototype and the Kickstarter campaign also took part in a performative intervention at a tech fair, where the designer performed as a startup entrepreneur trying to get funding for PeriodShare.





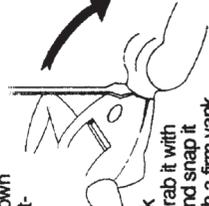
# Barbie Liberation Organization **Barbie/G.I. JOE** HOME SURGERY INSTRUCTIONS

**You Will Need**

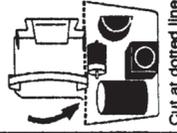
- 2 sharp screwdrivers
- 1 coping or hack saw
- 12" electrical wire
- hot glue (or similar)
- 12" electrical wire
- soldering iron
- electric solder
- Epoxy (not fast drying)

1. To open Barbie, insert a screwdriver firmly into the joint at the base of the spine. With a quick jerk, snap the screwdriver down toward the but-tacks. Pry the backplate off, working up from the waist.

Once the back is loosened, grab it with your fingers and snap it straight off with a firm yank. Do not twist. Remove head, arms, and legs. Gently loosen circuit board. Break off tab holding speaker in place. Remove speaker/circuit board.



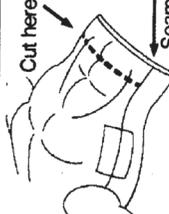
2. Using saw, sever battery contacts from rest of circuit board as shown. Battery contacts go back into doll.



4. Start prying front/back plates apart at neck and work down towards shoulders. Careful - neck is fragile. Once shoulders are split, insert screwdrivers into joints where arms meet torso. Pry torso apart from both arms simultaneously.



3. To open G.I. Joe, remove batteries and pop off head. Using saw, make incision across abdomen from seam to seam. **Be careful not to cut wires underneath.**



5. Cut bracket holding Joe's circuit board and loosen board, speaker, and switch.

6. Locate power wires (red & black) running from Joe to contacts on circuit board. Heat contacts with soldering iron. Remove wires from board but leave them attached to Joe. Solder two similar replacement wires onto circuit board.

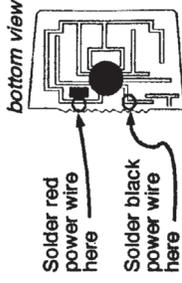
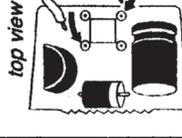


7. Locate the switch on Barbie's circuit board. Heat the four solder points and remove. A solder-removing bulb may help.



8. When removing Joe's switch, wires meet the circuit board. Heat contacts and remove switch.

9. Wire Joe's power and switch to Barbie's circuit board as shown. Install board, speaker, and switch back into Joe. Hot glue works well to anchor everything in place. Speaker should be firmly glued to breadplate for maximum volume.



**10. IMPORTANT:** When running the Barbie circuit board in Joe, use only three batteries. You may want to re-wire the battery contacts, or substitute something to take up the extra space. A filed-down conductive nail wrapped in tape works well as a pseudo-battery.

11. There are two options for re-installing Barbie's switch. The first (and more difficult) is to use a small, stiff, non-conductive scrap of circuit board, plastic or similar material. Mount the switch on the board, and sandwich it between the board and the button on Barbie's back. Glue the board to the posts on Barbie's back. If done carefully, Barbie need never know she's been under the knife.

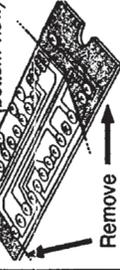
12. The second option is to use a small momentary contact switch. (Radio Shack Cat. No. 275-1571B) Mount it in place of the button in Barbie's back. It's easier and more permanent, although Barbie no longer looks like everyone else.



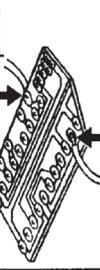
13. Unfortunately, Joe's circuit board will not fit properly into Barbie without modification. First, desolder and remove this capacitor.



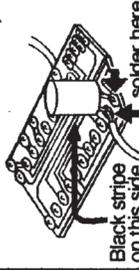
14. Next, cut down board by removing shaded areas shown below. (bottom view)



15. Cut two 2" pieces of wire. Solder them from the contacts on Barbie's switch to these points.



16. Re-solder capacitor as shown. (Note: capacitor shares a contact with switch)



17. Cut any additional unused space off the board. Solder the two wires from step 6 to Barbie's battery contacts.

18. Fitting the board into Barbie is tricky. You may need to bend the capacitors or shave the posts in her chestplate. Before re-sealing Barbie or Joe, first make sure body parts fit together properly. Apply epoxy around rim of front and back plate. Quick-drying epoxy is not recommended, as it leaves little room for error. First insert both neck sections into the head, insert the arms and legs, then clamp the doll together. To touch up any scars or mistakes, use plumber's epoxy putty and model paint.



The Barbie Liberation Organization or BLO, sponsored by RTMark, are a group of artists and activists involved in culture jamming. They gained notoriety in 1993 by switching the voice boxes on talking G.I. Joes and Barbie dolls. The BLO performed "surgery" on a reported 300-500 dolls and then returned them to the shelves of stores, an action they refer to as shopping. This action resulted in girls opening their new Teen Talk Barbie to hear it say phrases such as "vengeance is mine" and boys hearing their G.I. Joe say "The beach is the place for summer."



**Knitted Resistor**  
Silk and Stainless Steel  
Yarn (black), Wool (white)



**Knitted Capacitor**  
Copper Wire (orange)  
Wool (black and white)



**Knitted Coil**  
Copper Wire (orange)  
Wool (black)

*Stitches and materials to knit the textile electronic components of the radio transmitter.*

## The Knitted Radio

*Ebru Kurbak and Irene Posch, 2014*

The Knitted Radio is a knitted sweater that is also a radio transmitter. The pullover is made of wool and conductive materials arranged into specific patterns to hold the electronic functions of resistors, capacitors and the coil to build a simple radio transmitter. The accompanying knitting instructions, to be published in a knitting magazine, comprise the stitches, materials and patterns for the reproduction of the electronic object by an alternative maker group, knitters.

The work is part of a larger investigation into using traditional textile crafting techniques to create electronic components and devices from scratch. The critical question is whether 'what' one makes is really more important than 'how' one makes things. Industrial technology research is mostly driven by the desire to invent the next killer application, whereas artistic research holds the chance to question implications. By exploring alternative production procedures, we might be able to reveal skills, techniques and materials that have been uncharted, undervalued, or decisively left out of popular demand. The Knitted Radio is specifically inspired by the protests on Taksim Square in Istanbul, speculating about possibilities to use local available craft skills to counter traditional media channels subject to governmental surveillance.

The Knitted Radio uses common knitting stitches and off-the shelf materials: black and white wool, a silk and stainless steel yarn from the brand Habu Textiles, and thin enameled copper wire. The silk and stainless steel yarn is usually used to add shapes to knit textiles; twisting the steel thread makes the knit stay in form until it is straighten out. As the thin steel thread has a consistent resistance per length, developing a pattern free of short circuits produces predictable resistor values. The enameled copper wire is used to knit the capacitors. Two of them closely knit together result in two conductive areas electrically separated by the coating of the wire to form a capacitor; the pattern is decisive in the construction of the electrical function. The coil is equally knit with enameled copper wire.

# PROBOTS

Chris Csikszentmihalyi  
• Vitor Hugo Abreu  
Aguiar • Victor  
Azevedo

There is a vast space for new configurations of politically dissident technology.

The political scientist Charles Tilly analyzed what he called “repertoires of contentious politics,” from “rough music” to cat torture and of course public marches and riots, but indeed the repertoire is both frighteningly small and mostly familiar. [1] Our bag of tricks looks quite empty.

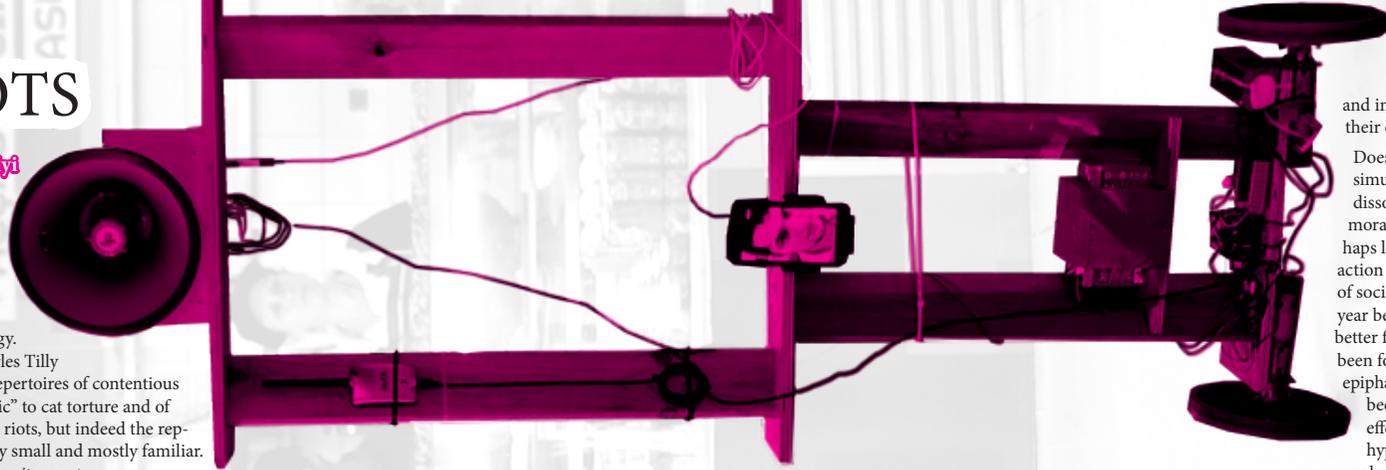
My own work and that from my research groups has taken advantage of, among other things, new network effects and the vastly decreased cost of peer (as opposed to broadcast) communications and coordination. Government Information Awareness [2] [3] [4] is an example of a system (like the later Wikileaks and littleSis) that took bottom-sourced information about the powerful, information that would be otherwise not available, and published and redistributed it. PublicLab.org [5], ExtrACT [6], and Sourcemap.org [7] (like Open Street Map), created platforms for the piecemeal contribution of small pieces of information that could be legibly aggregated into a complex or inaccessible whole, able to be leveraged into direct litigative or legislative change. These approaches, collaborative software platforms, have imbricated from tens of thousands to millions of users.

There is also a space for more absurdist strategies, or more symbolic transactions. Some of the most successful memes of disobedience since the industrial revolution have been technical fictions. Anyone who has attempted to launch new configurations has found the first reaction to their works by journalists or observers will almost always be shoehorned to fit it into existing conceptual vessels minted by Shelly, Orwell, or Capek. Would that any of us should provide such a lasting vision of what we resist as those authors.

There is also, finally, a third space that lies between and blends with the first two. Technologies of dissent that work at both the practical level but also the symbolic. Even their designer isn't exactly sure where they will fall along the continuum. I'm never quite sure if it's not a windmill until the moment of impact. For example:

For those of us born after May 1968, there is both a disappointment of having missed the party, but also a lived experience of profound regression. It's hard to believe in people power when you've seen politics slipping backwards (Thanks, 2016) and witnessed the incredible ability of power to successfully neuter resistance. The politician wishing to prevent people power has bought the policeman no end of gifts, from steadycam drones to GSM hacking Stingrays, warrantless searches to undercover operations. Yes, there are parts of the world where people power seems to have an effect, but it is easy to be cynical about how profound or lasting these physical manifestations can be.

One undeniable effect of protests is the strong emotional transformations felt by protestors in these battles (like Seattle, Wall Street, Plaza del Sol, or the Ring Road). For those who marched on Washington or Genoa, the sudden and often unexpected solidarity, the heady sense of power in the crowd, the physical hardships and simultaneous euphoria, the adrenaline of risk and triumph of bravery, all mixed, together leave a mark that can clearly last a lifetime. The individual feels part of a much greater whole, subsumed in a Jungian collective myth-moment



and imbued with a profound sense of their own protagonism and heroism.

Does this sense of personal heroism, simultaneously mixed with the dissolution of the individual into a moral and powerful collective, perhaps lead protestors to conflate the action with the effect? The record of social progress in the last thirty year begs us to wonder why more an better forms of dissidence have not been forged. Perhaps the personal epiphany of protest has systematically been mistaken for its utility for effecting political change. This hypothesis yields a methodological challenge: how could one test the

efficacy of protest without feeling its intoxicating effects? We could of course hire social and political scientists to tell us, but doing so would undermine the embodied knowledge of the protestors themselves.

Probots is an experimental platform, a “dissident witness” to the act of protest. Following early development by La Fábrica de Cosas Bonitas, my research group is producing a tele-operated self-balancing robot to reduce personal involvement in protests to a clinical and measurable effect. Much like military drone technology, it protects the “operator” from angry police or drunk Trump supporters, while at the same time preserving the impact of an embodied, human sized protestor that can carry a sign and produce loud chants and cheers. Built from shipping pallets, hoodies, and bullhorns, running on an RTOS Debian/Machine Kit single board computer, using surplus motors and a cheap android phone, the self-balancing robots can be sent on protest missions for a full day, controlled via low-latency websockets and WebRTC for two-way audio and video participation. We are building five of the Probots [8] [9] to start, and will deploy them at a variety of demonstrations in Southern Europe and beyond, controlled by well-known and protestors from a variety of movements including labor, anti-globalization, and anti-fascist. The experience of these seasoned protestors will be analyzed with both qualitative and quantitative methods, in an attempt to better understand and effect dissent.

[1] C. Tilly. From mobilization to revolution. Reading, Mass.: Addison-Wesley PubCo, 1978.

[2] “Government Information Awareness,” Wikipedia. 17-Dec-2016.

[3] J. Pope, “MIT Aims to Provide Gov't. Search Engine,” Plainview Daily Herald. [Online]. Available: <http://www.myplainview.com/news/article/MIT-Aims-to-Provide-Gov-t-Search-Engine-8920159.php>. [Accessed: 31-Dec-2016].

[4] “MIT web site gathers and displays information on government,” MIT News. [Online]. Available: <http://news.mit.edu/2003/gia>. [Accessed: 31-Dec-2016].

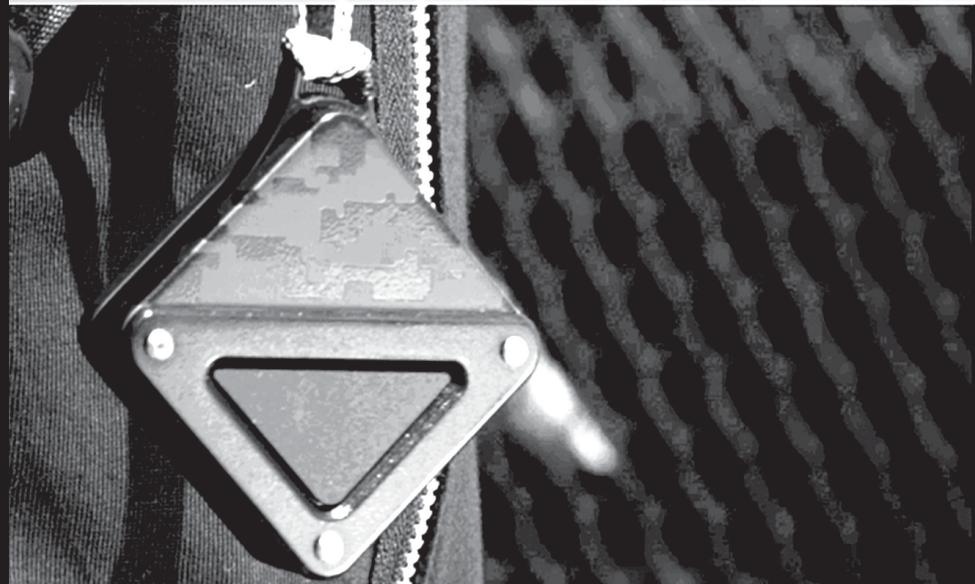
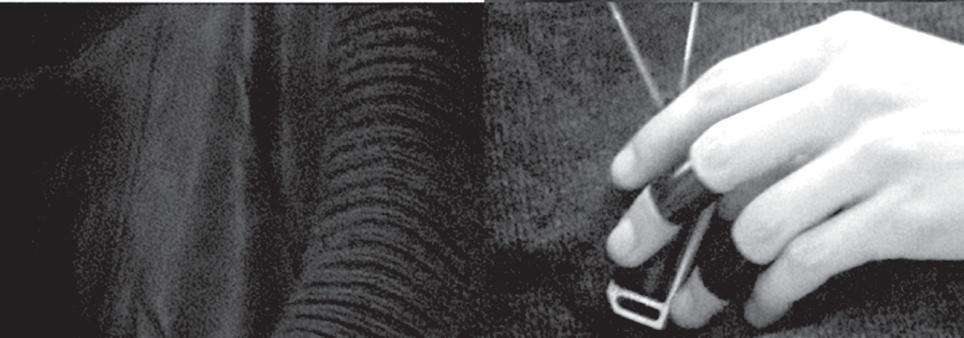
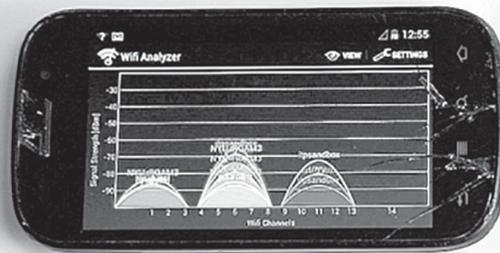
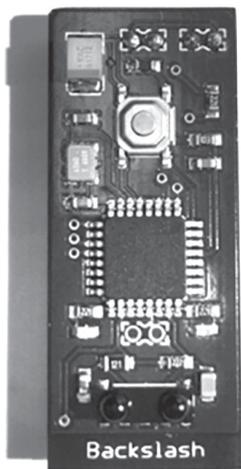
[5] “Public Lab: a DIY environmental science community,” [Online]. Available: <https://publiclab.org/>. [Accessed: 31-Dec-2016].

[6] D. Webb, “Activist works with MIT on tools to educate residents on drilling | G|Sentinel.com,” [Online]. Available: [http://www.gjsentinel.com/special\\_sections/articles/activist\\_works\\_with\\_mit\\_on\\_too](http://www.gjsentinel.com/special_sections/articles/activist_works_with_mit_on_too). [Accessed: 31-Dec-2016].

[7] “Who Made My Bed? - Science and Tech - The Atlantic,” [Online]. Available: <http://www.theatlantic.com/science/archive/2010/05/who-made-my-bed/57039/>. [Accessed: 24-May-2010].

[8] “VitorHugoAguiar/ProBot,” GitHub. [Online]. Available: <https://github.com/VitorHugoAguiar/ProBot>. [Accessed: 31-Dec-2016].

[9] N. Ferreira, “Robôs dissidentes? Rádio livre no Uganda? Esta tecnologia social veio da Madeira,” PÚBLICO. [Online]. Available: <https://www.publico.pt/ciencia/noticia/robos-dissidentes-radio-livre-no-uganda-esta-tecnologia-social-veio-da-madeira-1738462>. [Accessed: 22-Jul-2016].



## WEARABLE Panic Button

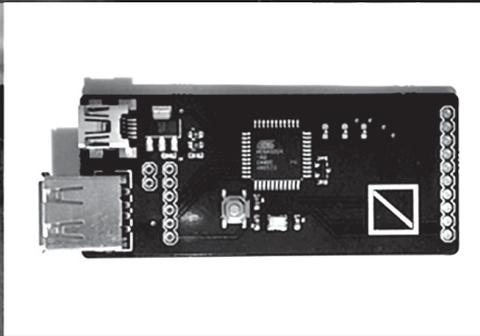
This network-independent wearable device can notify others blocks before entering a certain area if it's under conflict. When a person presses their panic button, other devices that comes within 10 to 15 block radius will vibrate and blink to let people know they are entering an unsafe area or to find a safer route. This wearable works independently, with no need for a paired cellphone, making it ideal for third world countries where number of smartphones are still low.

PEDRO G. C. OLIVERA & XUEDI CHEN · [backslash.cc](http://backslash.cc)

## JAMMER Reclaim Privacy

This short-range personal jammer was created to block all outside communications to the phone while still allowing the user to access their camera and features without worrying about their personal information being collected and used against them.

PEDRO G. C. OLIVERA & XUEDI CHEN · [backslash.cc](http://backslash.cc)



## ROUTER

### Offline Network

The Backslash router is one that is tailor made for fast deployment in emergency situations. With the quick pull of a strap, someone can launch a node for an offline network, which can allow localized communication even during internet and cellular blackouts. Additionally, when used in combination with the Backslash network of wearables, protesters have the ability to plot areas of conflict accurately on a map.

PEDRO G. C. OLIVERA & XUEDI CHEN • [backslash.cc](http://backslash.cc)



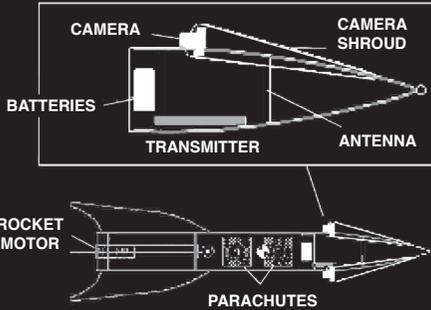
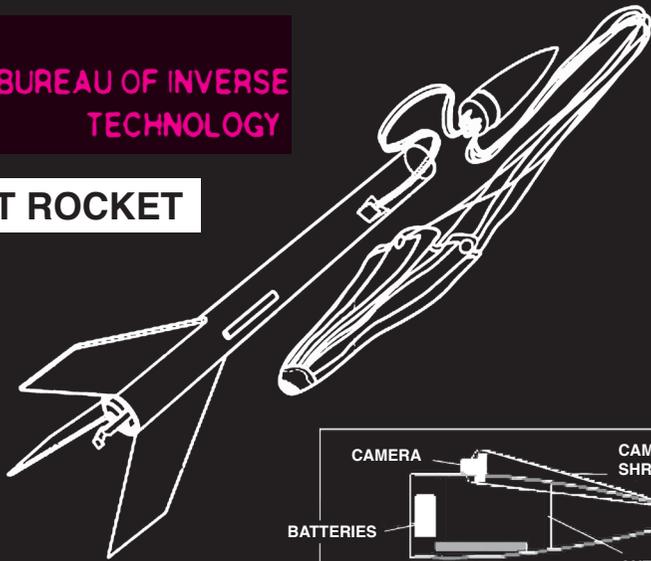
## DRIVE

### Personal Blackbox

This WiFi enabled storage device allows you and others around to upload photos and videos anonymously, without metadata, to a personal cloud. Your personal blackbox for protests keeps a backup of the vital data so that abuses can be documented even if something happens to your phone or camera.

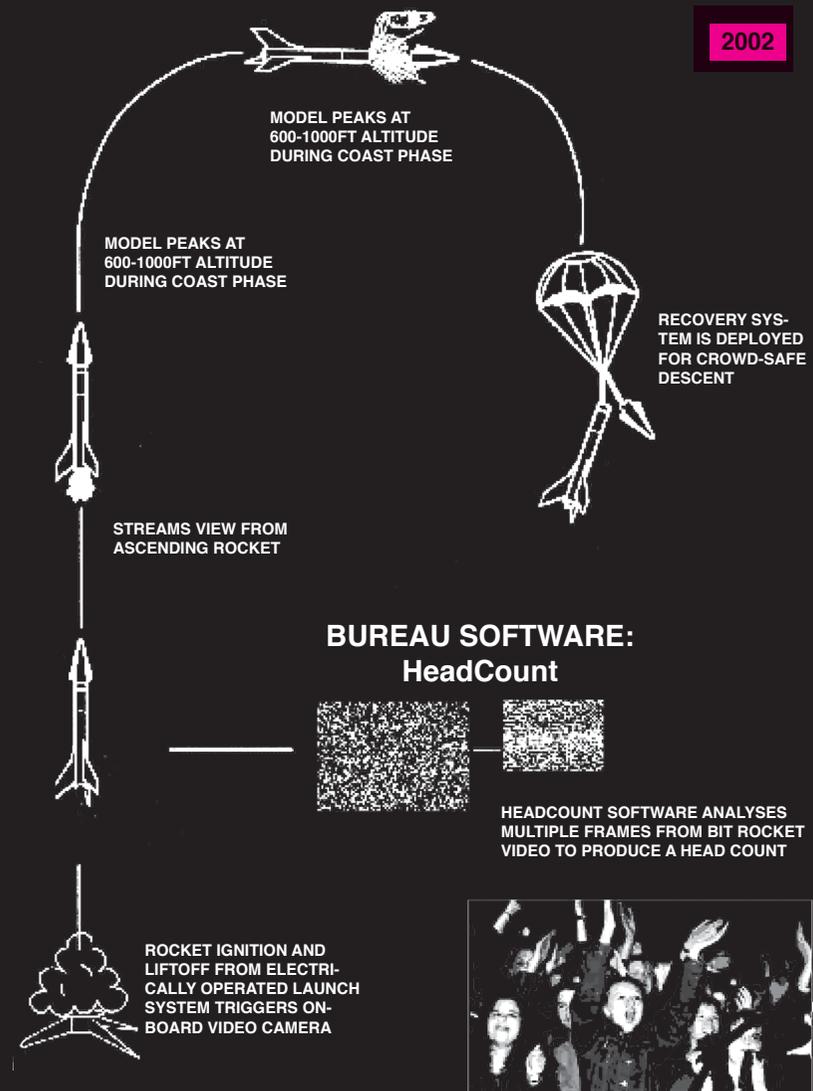
PEDRO G. C. OLIVERA & XUEDI CHEN • [backslash.cc](http://backslash.cc)

**BIT ROCKET**



This system adapts commercially available hobby rocket unit with wireless micro-video, to document crowd formations and occupations at critical public gatherings.

Launching live from street location, BIT Rocket is able to reach a height of over 600ft before parachuting safely back to crowd. Rocket transmits a clear video stream to a local ground receiver; can be webcast live to web sites. Documenting actual crowd attendance, BIT Rocket provides demonstrators with accurate participation figures; active strategic data [location and containment strategies of opposing forces]; and a family aero-portrait. Crowd estimates typically vary by a factor of 10; BIT Rocket evidence supplies a decisive resolution.



High Frequency Radio  
Communications System

Paint Storage

Arm / Disarm

Power Storage

Multi-Terrain  
Wheels

Graffiti Actuators

Graffiti Processing Unit

Optical Velocity Encoder



1998

**RoboticGraffitiWriter** <Institute for Applied Autonomy>

## Dissenting Jabots

Jen Liu (jenliu@cmu.edu) and Camille Baumann-Jaeger (c.baumann@andrew.cmu.edu)

“FASHION IS A RECOGNITION THAT NATURE HAS ENDOWED US WITH ONE SKIN TOO FEW, AND THAT A FULLY SENTIENT BEING SHOULD WEAR ITS NERVOUS SYSTEM EXTERNALLY.”

• J.G. Ballard, novelist

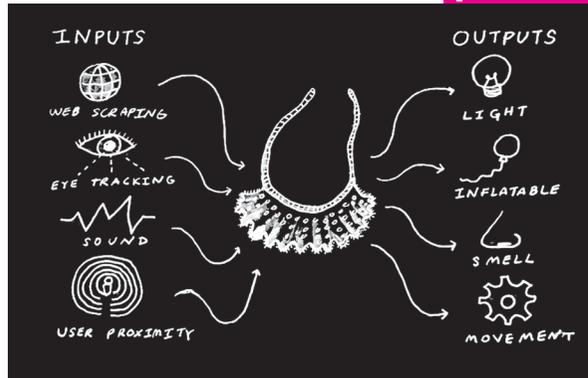
Our proposed project, Dissenting Jabots, is a series of interactive neckwear that takes inspiration from Ruth Bader Ginsburg’s judicial wardrobe. This Supreme Court Justice has a collection of collars that visually expresses her personality and opinions over the standard black robe of the court. Some of the collars have personal meaning for RBG and others are reserved for occasions such as when she is in the majority opinion in a ruling.

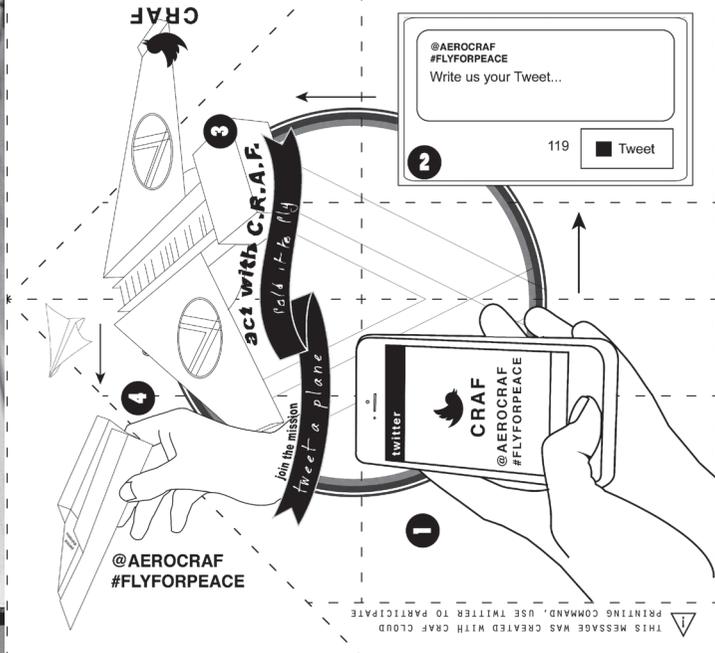
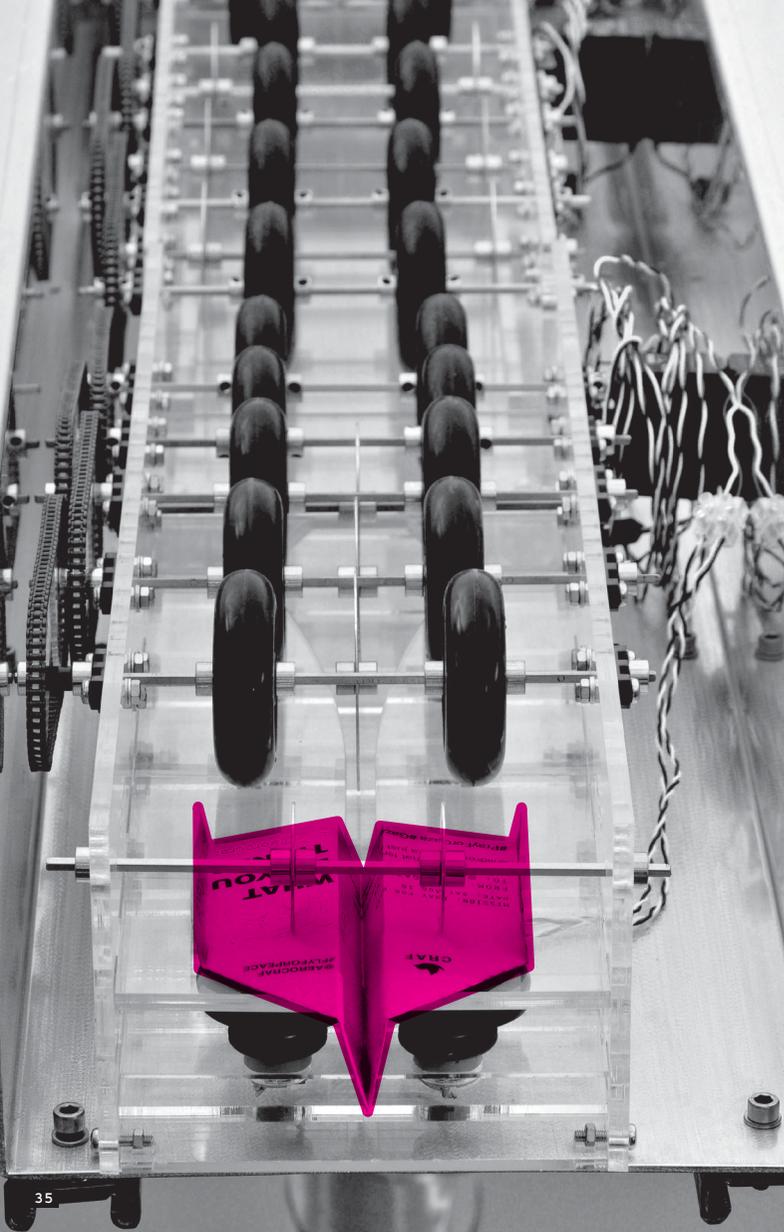
The collar that we are particularly drawn to for this project is her “dissent jabot”, usually worn when dissenting the majority opinion of the court. However, RBG chose to don this particular collar the day after the November 2016 election even though there was no ruling being made that day. This form of protest through garment inspired us to think how we can build our own neckwear using smart textiles that can actively react and express our sentiments in subtle or not so subtle ways.

For our project, we propose a dissent jabot that reacts to external stimuli pre-programmed to be perceived

as negative based on the preferences of the user. For example, the jabot could react to physical sensors that track eye movements across the user’s body, the user’s muscle tension when faced with certain situations, or proximity of foreign bodies in relation to the user. As a result, the jabot will react- perhaps by inflating or illuminating in order to convey the user’s feelings towards a certain behavior, thus demonstrating a certain level of dissent. In the process of building these jabots, we aim to build a framework and tutorial to guide people to design and fabricate their own neckwears that can fit into their own narrative and wardrobe.

The point of the project is to allow for users to express themselves despite social confines that might restrict them. In the case of an exterior individual approaching the user, it might now be socially acceptable to vocalize one’s distaste for the particular social interaction. The dissent jabot allows room for the user to express oneself, but also, in posing a visible reaction, emphasizes that certain, specific interactions are considered distasteful. The dissent jabot is at once liberating for the user, an artistic expression, and social commentary on the boundaries we place on ourselves and our social interactions.





This project looks at how machines can be deployed to organize spectacles and engage people into performances. It proposes the use of social communication systems and ubiquitous computing as tools to collectively utilize online information and facilitate individual's freedom of speech. Online information from social media is physicalized and represented as messaged printed onto paper planes. In order to understand machine and public performances, we examine the process of production, dissemination and display. The performance process are portrayed as mechanisms of paper folding and physical projectiles whereas the display is explored in the methodologies of mobilization and street performances.

**CRAF**  
 Tamon Sawangdee & Eizo Ishikawa  
 Interactive Architecture Lab  
 Bartlett School of Architecture

# I.E.D.

(Improvised Empathetic Device)

*Matt Kenyon &  
Doug Easterly*

The United States-led war in Iraq has resulted in an enormous number of human casualties. While the number of Iraqi deaths is unreported and therefore vague, an exact account of U.S. military deaths is broadcast through widely available sources. Many are these deaths are the result of improvised explosive devices, commonly abbreviated as I.E.D.s. Coverage of these atrocities, meanwhile, is often overshadowed in the popular news media by more personal and spectacular stories. These stories, which grace runaway brides and jailed heiresses with primetime coverage, have little bearing or reflection of the experiences of the war itself.

I.E.D. is a wearable device that prompts awareness of the death and violence in the Middle East by creating physical pain in correspondence to reports of killed American soldiers. In I.E.D., a software application continuously monitors the website, [www.icasualties.org](http://www.icasualties.org). This site updates the personal details and numbers of slain U.S. soldiers as they are released by the US government.

When news of American deaths are reported on the website, the data is sent wirelessly to custom hardware installed on the I.E.D. armband. The LCD readout displays the soldier's name, rank, cause of death and location, and then triggers an electric solenoid to drive a needle into the wearer's arm. The needle draws blood, calling immediate attention to a soldier has just died in the Iraq war.

In I.E.D., the medical concept of bio-telemetry—the remote monitoring of a patient's vital signs—is inverted. Rather than receiving a read-out of various vital metrics, the physical pain that is transmitted and ultimately experienced by the wearer is a proxy for a much more severe form of injury. Yet, as initial demonstrations of the armband revealed, I.E.D. also served as an indicator of the political strength of the presiding administration and the favorability of the war effort. As the American death toll mounted, casualty figures were released once a week on Friday afternoons—a practice aimed at burying politically troublesome information within the unread pages of Saturday's news. To this end, I.E.D. confronts a disconcerting arrangement between media and governance in which the deaths of American soldiers are not considered newsworthy.

2005-present

# GUN CONTROL

In 2004, I created Gun Control — a set of four electromechanical sculptures, which used stepper motors, servos and cheap cameras that were controlled by AVR code. The distinguishing feature of each unit is a police-issue semi-automatic replica handgun. You can purchase these authentic-looking firearms for less than \$100.

The make-believe weapons arrived in the mail a week after I ordered them.

That night, I closed the blinds, drank too much whisky and danced around my apartment in my underwear waving my new guns around. The next morning, I packed them in a duffel bag and took the “L” in Chicago to my studio. During the 45-minute commute I felt like a criminal.

Each gun is connected a stepper motor via a direct-drive shaft and flexible couplings. I used a lathe and a milling machine to make custom fittings. I hid unsightly electronics in a custom-sewn leather pouch, resembling some sort of body bag.

As people enter the Gun Control installation space, the cameras track their movement, and the guns follow their motion. Well, at least this is what I had hoped it would do. However, I had committed to using the first gen CMUCam and its blob-tracking software was spotty at best. I was under a deadline. It was too late to spec out new cameras. Plus, these were the right size for the artwork, which was using decentralized embedded hardware. I shifted my focus to building a chaotic system.

I re-coded the installation so the guns would point at different targets. They would occasionally twirl about playfully and re-home themselves. I programmed the stepper motors to make the armatures shake and



# SCOTT KILDALL

rattle when they got confusing target information. The software design embraced unpredictability, which made the whole artwork feel uncertain, embodying the primal emotion of fear.

Gun Control was my heavy-handed response to the post-911 landscape and the onset of the Iraq War. I exhibited it twice, then packed it up. It lacked subtlety and tension. At the time, there was not enough room for the viewer.

Just last month, I pulled the artwork out of deep storage. I brought the pieces to my studio and plugged in one of the units. It functioned perfectly. Upon revisiting this piece after 12 years, my combination of guns and surveillance seems eerily prescient.

Mass shootings have drastically increased in the last several years. Surveillance is everywhere, both with physical cameras and the invisible data-tracking from internet servers. Documentation of police shootings of unarmed African Americans is sadly, commonplace. I no longer recoil from the explicit violence of this old artwork.

I coded this using AVR microcontrollers, just before the Arduino was launched. It was tedious work just to get the various components working. I can no longer understand the lines of C code that I wrote many years ago. The younger me was technically smarter than the current me. My older self can put this historical piece into perspective. I plan to re-exhibit it in the coming years.



[www.kildall.com](http://www.kildall.com) @kildall

GitHub repo: <https://github.com/scottkildall/GunControl>

# Campus Carry Doorbell Wreaths

SP&CE Media Lab, The University of Texas at Dallas

The Feminist MakerSpace (FMS, <http://feministmaker.space/>) at The University of Texas at Dallas is a project of SP&CE Media Lab. The FMS creates an inclusive creative space that situates maker culture in relation to a long and diverse history of craft and communal work. The site-specific project we present for Disobedient Electronics was developed in reaction to S.B. 11, a Texas State law known colloquially as “Campus Carry.” The law stipulates that license holders may carry a concealed handgun throughout public university campuses starting on August 1, 2016. UTD’s implementation of the law prohibits carrying concealed weapons in some buildings, such as residence halls and select labs. The policy on other spaces is more nuanced. Faculty in single occupancy offices may ban handguns from their offices, but in order to do so they must verbally issue an official statement to each student upon entering:

“Pursuant to Section 30.06, Penal Code (trespass by license holder with a concealed handgun), a person licensed under Subchapter H, Chapter 411, Government Code (handgun licensing law), may not enter this property with a concealed handgun.”

Performing this for every student, in every situation in which a student might drop by our assigned offices, creates additional, ongoing work for faculty (i.e., remembering to read the statement; the mental and emotional labor of thinking about gun violence on university campuses). It is an absurd task if one is committed to enacting it each time a student enters the office. In addition, it creates an uneasy tone for an office visit. In response, the Feminist MakerSpace held a workshop, led by xtine burrough, approximately four months after the policy was

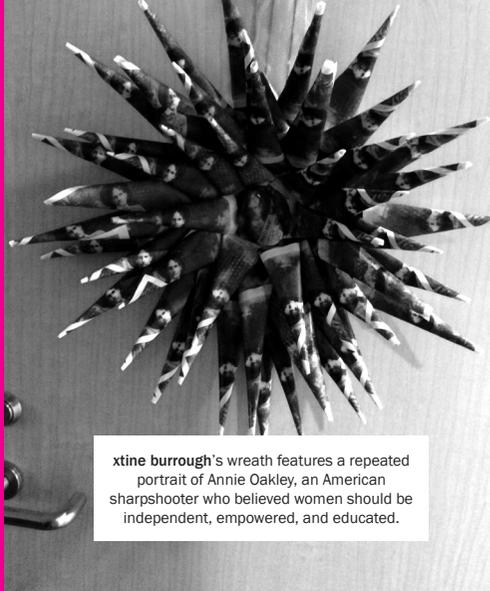
instituted. In it, participants created decorative wreaths featuring a “doorbell” that sounds a recording of the official statement.

Our toolbox included paper, prints of select text or images, hot glue, cardboard backings, ribbon and other craft materials, and a readily available simple voice recorder and player that typically provides audio for toy stuffed animals.

While as objects the wreaths may appear merely decorative, the actions they incur—pressing the embedded button—delivers our protest to the official Campus Carry statement. By automating this task, and juxtaposing the official statement with the visuals we chose for the wreaths, traditionally signs of welcome, we talk back to S.B. 11 on the doors of our assigned public offices.

Our Campus Carry Doorbell Wreaths are “disobedient” because the electronic recorder/player automates and further dehumanizes the statement put forth by S.B. 11. It transforms the reading of the statement into an interaction between the student and our hand-made, domestic decorations. It disrupts office entry. Instead of reading the statement, we find ourselves talking about the wreath, and our dissent in regard to S.B. 11, with people who enter our offices. We subvert the signaling function of the wreath from “You are welcome here” to “Concealed weapons are unwelcome here.”

Workshop Participants: Olivia Banner, Andrew Culp, Kristin Drogos, Michele Hanlon, Kim Knight, Josef Nguyen, Jillian Round, and Sabrina Stamaman. Photos by xtine burroughs & Andrew Culp.



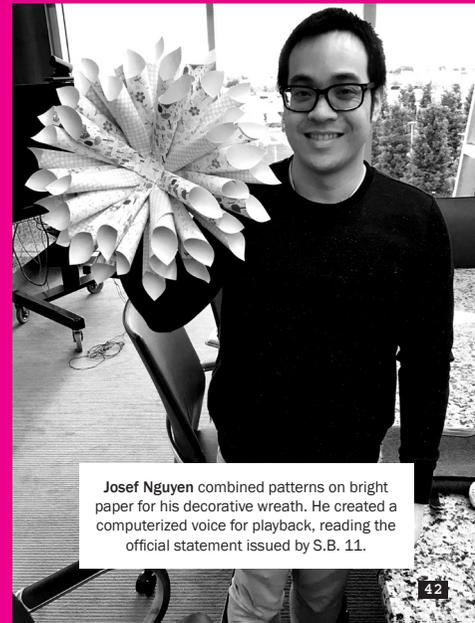
xtine burrough’s wreath features a repeated portrait of Annie Oakley, an American sharpshooter who believed women should be independent, empowered, and educated.



Michele Hanlon’s wreath, with room for the audio to vibrate against her door and pipe cleaners juxtaposed next to the text of S.B. 11, the Texas “Campus Carry” Law.



Sabrina Stamaman started her wreath by assembling abstract flower shapes. She plans to incorporate text from S.B. 11 and the doorbell on one of the pods.



Josef Nguyen combined patterns on bright paper for his decorative wreath. He created a computerized voice for playback, reading the official statement issued by S.B. 11.

## The Transparency Grenade - Julian Oliver



The lack of Corporate and Governmental transparency has been a topic of much controversy in recent years, yet our only tool for encouraging greater openness is the slow, tedious process of policy reform.

Presented in the form of a Soviet F1 Hand Grenade, the Transparency Grenade is an iconic cure for these frustrations, making the process of leaking information from closed meetings as easy as pulling a pin.

Equipped with a tiny computer, microphone and powerful wireless antenna, the Transparency Grenade captures network traffic and audio at the site and securely and anonymously streams it to a dedicated server where it is mined for information. User names, hostnames, IP addresses, unencrypted email fragments, web pages, images and voice extracted from this data and then presented on an online, public map, shown at the location of the detonation.

Whether trusted employee, civil servant or concerned citizen, greater openness was never so close at hand.

The components include a 'Gumstix' ARM Cortex-A8 computer with expansion board, Arduino Nano (for SPI display control), LED Bargraph (for wireless signal level, controlled by GPIO pin outs from Overo COM), powerful 802.11 board antenna, 3.7v battery, 64x32 pixel LCD RGB display (harvested from NKK 'SmartSwitch), 5mm cardioid microphone and an 8Gb MicroSD card. The computer runs a modified Angstrom OS, a GNU/Linux embedded operating system popular on ARM devices.

The Transparency Grenade leverages GNU/Linux with the following software relevant to the capture part:

```
airmon-ng  
tcpdump  
ssh
```

Capture is trivial, sent over an encrypted tunnel (ssh) like so:

```
# Capture on monitor device with full snaplen over SSH  
# tunnel to date formatted filename  
tcpdump -s 0 -i mon0 -w - | ssh xxxx@transparencygrenade.  
com 'cat > caps/$(date +%d%m%Y').pcap'
```

The grenade itself has no other software related to the capture part running on-board.



# THERO



Román Torre + Ángeles Angulo

THERO is presented as a heavy sculpture that encloses a device that blocks and / or encrypts our digital communications by direct manipulation of the subject with the object. Through a turn in its structure, THERO is able to manage our digital contact with the outside.

Basically, this piece is an access point in which we can connect all our devices, either directly through a cable connection or as an extension of the network wirelessly. Any flow that passes through it can be handled manually by the user by simply rotating the lid of the object.

We have four degrees of privacy, to being able to limit unwanted pages, to warn of unwanted devices that connect to the local network, to surf anonymously through the TOR network, etc. At the end of the development process, the idea is to implement a kind of API in which with simple Python scripts, you can configure the states according to your needs.

For now, we have thought by default in these four states:

0. Access Point with some security options (Check and alert new devices connected, etc)
1. Access Point with as Tor Relay (Encrypted traffic)
2. Access Point without social distractions (Block social websites)
3. Blackout. Only local navigation allowed, internal web server for project information and device settings.

For electronics we chose a Raspberry Pi 3, which by its characteristics (integrated wifi) allows us to program and manage all connections in an advanced and totally open way. For more on the process, visit <http://www.romantorre.net/tag/next-things/>

# Integrated Entropic Sanitization

by Matthew Klapman

A pair of virtual reality video sunglasses are donned by a covert operative detailing her next mission. The end of the video playback instructs her to discard the sunglasses, "This device will self-destruct in 3, 2, 1..." The sunglasses then explode, permanently destroying the embedded mission video.

In the real world, how many mobile devices have been filled with personal, private information, then broken without the ability to properly erase the data, and were subsequently discarded? Documents are shredded to prevent garbage snooping. What is preventing information retrieval from these discarded mobile phones?

Today's best practices for privacy protection preach "sanitization," which are a set of procedures to electronically erase data or physically destroy the medium storing said data. The guidelines to sanitize these devices were written for smart devices a decade ago or assume you are discarding a perfectly working device for an upgrade. Computers used to be modular and their storage components were easily identified, easily removed, and could be physically destroyed whether the computer was functional or not.

Today's mass produced smart devices (phones, tablets, laptops, etc.) are monolithic and have non-removable integrated storage that is difficult to identify, get access to, and destroy. This is a growing problem as these smart devices are now extending to include automobiles, set top boxes, and other "intelligent" appliances. While more devices are storing information in the cloud (which is a separate privacy concern), today's smart devices contain an embedded computer that store personal information. The ability to destroy private data in each of these devices when they break down is becoming increasingly difficult.

The current practice of using encryption to protect data is typically implemented poorly or it is not applied to all the necessary data. Even when it is done correctly, today's encryption is tomorrow's easy hack. The bottom line is that physically destroying the digital storage medium is the best guarantee that the private data within it is destroyed. Incinerating the entire device is another option, but at the expense of releasing toxic pollutants into the air and hindering the ability to recycle.

There should be an easier way to guarantee data is destroyed from smart devices regardless if the device is functional or broken. There is a viable solution. It is proposed here to add an independent mechanism to each storage medium, whether an IC or hard drive, that can be activated to physically destroy the data stored inside them without harming the surrounding system or user. This is similar to the exploding sunglasses example depicted earlier sans the grandiose fireworks. When your smart device, say a smart phone, ceases to work, you can bring it to an authorized dealer who will wave an electronic transponder over it to physically destroy each storage IC within the phone, destroying your private and personal data.

What is the destructive mechanism? There are several ways to destroy an IC, which usually consists of a

flat silicon chip embedded in a protective resin with protruding metal electrical connections to provide power and communications. The chip is the data storage medium and can be destroyed by activating a destructive mechanism that is integrated or adjacent with the chip. There are several methods to destroy the chip: chemical: chemical reaction with the chip; electrical: force program all storage bits to a common state or electrically damage the chip's electrical circuits with higher electrical power or heat, and kinetic: use mechanical methods to destroy the chip whether through microelectromechanical systems (MEMS) or explosive reaction.

Regardless of the destructive mechanism utilized, an additional embedded computer circuit called a "governor" is contained within the same IC resin package or integrated on the chip. This governor has independent power and communications from the phone's system so it cannot be hacked through the phone's operating system. It provides several functions: it communicates to an outside device, determines proper authorization utilizing a known algorithm to commence the data destruction, triggers the destructive mechanism, and provides verification that the destruction has been completed.

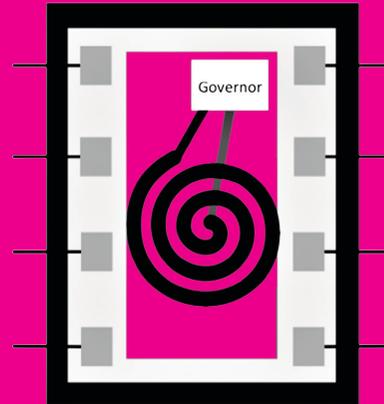
The governor gets power and communicates to an external transponder outside the phone either through dedicated wires or via radio frequency (RF) transmissions. Dedicated wires can be physically damaged outside the IC, so RF is the more robust solution. The RF solution uses passive RFID technology, the same utilized in credit cards and ID badges. This technology uses a single antenna to both communicate with a transponder and to harvest electricity from the RF energy it receives. This results in a single integrated IC that can be utilized by phone manufacturers today without changing their

designs (as long as the RFID signal is not blocked). An RFID governor is a robust solution since each IC can be "erased" even if the phone is damaged.

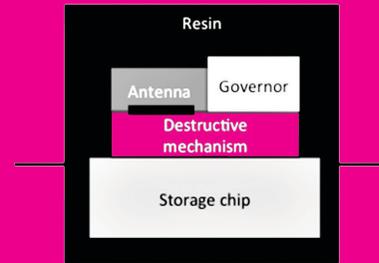
Independently destructible ICs can be applied to other areas besides storage. One area is to disable communications. A router's software can stop the flow of information over a network, however, this software solution can be hacked to re-establish communication. A permanent destructive operation cannot be hacked to re-establish communication if implemented properly. Deploying routers that can be remotely "turned off" using independent connections through a secure enclave, or active network cables that automatically sever their wires in the event of a security breach or lockdown to disconnect from the internet would be of great interest for national security when applied to power plants, water filtration, and other basic need utilities.

Today's electronic devices contain enormous amount of private information. There is no practical method to sanitize broken mobile devices (maybe the future is shredding printed electronics as easily as paper). As society increasingly looks to software solutions for IT security, creating physical entropy may be the more reliable solution for many use cases.

Internal IC Top View



Internal IC Side View





# PHANTOM KITTY

Neil MacAloney

This device, the Phantom Kitty, is a new tool to rein in Big Bro. It is a device that injects a vast amount of misinformation into any internet activity tracking system from government or corporate internet surveillance. It can potentially render many of these collection systems useless without the need for users to set up complex VPNs or Proxy servers.

## INTERNET SURVEILLANCE

Between corporations attempting to gain a competitive advantage to sell products, and a fearful government, it is expected that nearly all online actions are logged and stored in a database somewhere. Online activities are used to profile users to sell products, or kept coded in secure servers in the off chance it may be needed to be exploited in future crimes. The extent and depth of this tracking by the government or corporations is not disclosed to the public. In light of this, most most savvy internet users assume everything that they do is tracked and act accordingly.

An example of the online tracking that became public in November 2016, was when the UK ratified the Investigatory Powers Act of 2016. One of the many provisions of the act was that all internet service providers are required to retain the records of every internet user and a list of websites each user has visited for the past year. Even though this may be not surprising, it confirms that the means to store this data is available. It also shows that a bureaucracy expects this information to be available when they request it. This is in stark contrast to the what a more "typical" (loosely used) due process is. That is, a warrant with probable cause is issued by a judge, then electronic surveillance is initiated to collect someone's activity. In either case, citizens should have a choice whether or not everything they do online is collected, and there are some things they can do to be hard targets in these data bases.

A few of the more common methods that internet users can mask their actions from surveillance is using proxy servers (such as the TOR project), using a Virtual Private Network (VPN) that encrypts your outgoing packets, or using public internet connections that can only be tracked back to the public location. However, the Phantom Kitty is a new device that is different from these.

## HOW PHANTOM KITTY WORKS

The Phantom Kitty pads user's activities with a huge amount of misinformation, rendering many of these surveillance and corporate collection processes useless. It is a device that types and interfaces with an internet browser like a human, but performing its own intelligent and scripted search queries.

The device consists of an adjustable rack of solenoids that are placed over the keys on a keyboard and over the buttons on a mouse. The solenoids are controlled by a dedicated computer that actuates each solenoid to type a specific letter. The computer comes pre-loaded with the search parameters, and has a potential to use learning algorithms to mimic typing styles. This device is placed in position and turned on when the computer is not being used to make it appear the outputs are still from the user. The device performs searches that consist of both random and targeted queries, and can open and access websites. Learning algorithms can also be incorporated that make the patterns appear to be from a specific person. With this process, the device will inject an enormous amount of misinformation into any surveillance processes that may be in effect.

Ultimately, any attempt to use the activity logs to target/prosecute users based on search queries will not be possible as the source of the query cannot be tied to the person anymore. Additionally, there will be so much bad data in these databases that they will not be able to be used to fish for patterns.

## SECURITY

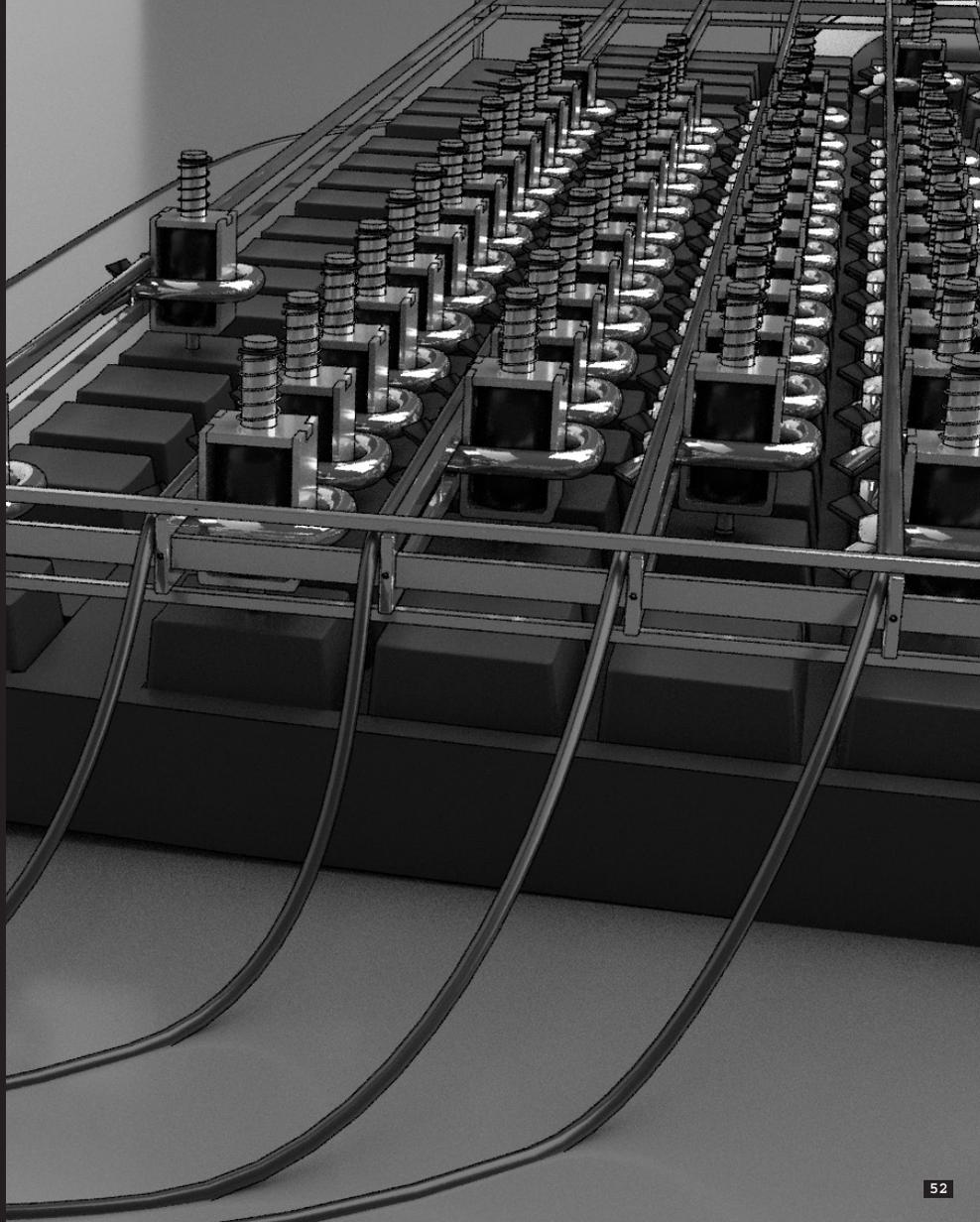
The design of the Phantom Kitty standing off from the keyboard may look archaic, but is made that way for a purpose. The device is completely air-gapped from the user's computer, that is, there is no physical connection to the user's computer, and no software needs to be downloaded to run. This reduces the possibility that a spyware can be created that could associate a user's computer to the ownership and use of one of these devices. This would be one of the first counter measures that would be created, so it might as well be ruled out before it starts. To update the algorithms of the device, only the programs, not the expensive solenoid assembly, would need to be updated.

## FUTURE UPDATES

Although I'm not actively building the Phantom Kitty now. However, if there is significant interest in the project, I will. Feel free to email me if you're interested in receiving updates or contributing to its development.

Thanks,

Neil  
neil.macaloney@gmail.com



## Device for the Emancipation of the Landscape · MATT WAKLER

A reaction to the aggressive nature of contemporary sound ecology, Device for the Emancipation of the Landscape uses a portable 4000 lb sound cannon to fire audio field recordings made in natural areas into sites of colonial, social, or ecological interest. These recordings are layered into compositions that brings together ecological aural memory with resonant action in an expressive gesture aimed at bringing a prioritization of voice from the land and with that a new relationship with it.

Being an emblematic tool of resistance – including its obvious inversion of the sound weapons used by police in militarized actions against democratic dissent – the cannon is powerful enough to be heard over 6 km away. The sounds disrupt the existing aural space, arresting attention, and offering an alternative ecological condition. The project has performed interventions at civic spaces, resource extraction and infrastructure sites, armoury buildings, among others.

The main component of the cannon is a 4" thick x 3' deep x 6' diameter parabolic concrete form. This elliptical dish makes up the rear of the cannon and provides the reflective mass and primary geometry to focus the sound produced by two 500-watt speakers. A 12V battery-powered amplifier powers the cannon, making it transportable.

The recordings, done with a Zoom hand-held recorder and a variety of stereo and shotgun microphones, capture both the ambient sonic environment of the naturalized spaces and the individual voices within them. The act of recording is fundamental to representing spaces, textures, and voices of the ecology that would naturally occupy the sites of intervention.

Musician and ecologist Bernie Krause has made considerable contributions to our understanding of the role sound plays in the natural environment and what it can tell us about health and human impact. Sound brings awareness of things that are unseen and each animal takes up a specific frequency in the acoustic spectrum. These acoustic spectrums can be analyzed to see diversity in the ecology and how human disturbance effects animal behaviour. The difficulty in making recordings that do not contain human generated noises illustrate the pervasiveness of our presence in the landscape and working in the field can bring out some of the local geopolitical conditions related to the places engaged.

For example, recording in and around Kitimat, British Columbia (2014) was challenging. Access restrictions to forestry roads and the northern shore of the Douglas Chanel were in place due to security control of LNG terminal preparations. The Kitimat Valley is also under the constant hum and droning of the Rio Tinto Alcan plant that smelts aluminum with electricity generated from the Nechako Reservoir. The sounding here was initially a response to the proposed Northern Gateway project, however, the understanding of this project as a continuation of the historic incursions by nationalist and corporate industry became folded into the content of the intervention.

[www.emancipatethelandscape.info](http://www.emancipatethelandscape.info)



Crafting, 3D printing, and programming a solar cooker:  
A provocation for engaging with extreme heat and climate change



Augmenting a 3D printed form with wheel throwing.



Pouring slip into a cast made from the 3D print.



2-walled insulated ceramic bowl and 3D printed lid



LCD display showing temperature inside the cooker

In Phoenix and other parts of the world that are increasingly affected by climate change, extreme heat poses major challenges for human health and economy. However, projects that support adaptation to and mitigation of climate change are increasingly encountering political challenges.

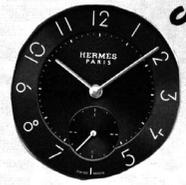
Indeed, recent government agendas shy away from supporting climate science research or denying the reality of climate change altogether. This project aims to design a solar cooker as both a practical tool to harness natural heat in habitual, low-energy cooking, as well as a provocation for publicly examining the marginalizing effects of extreme heat.

Our design combines elements of traditional ceramic craft, 3D printing, and digital fabrication: our solar oven relies on a 3D printed mold, which was cast into a 2-walled hollow ceramic container, fired in a traditional gas kiln, and outfitted with low-cost sensors to monitor cooking temperature.

Indeed, heat does not effect everyone equally, and lower socio-economic groups are hardest hit by lack of access to coping infrastructures and high energy bills from running the AC and cooking indoors over the summer. Utilizing a source of energy that is so abundant in Phoenix can support economic resilience, and also prepare communities for survival in more extreme scenarios of energy rationing or blackout. More broadly, the fact that complex recipes such as meat stews, breads, or desserts can be prepared using natural heat alone serves to draw attention to the very real impacts of climate change on local populations.

Stacey Kuznetsov<sup>1</sup>, Samuel Chung<sup>2</sup>, Sunny Puthenpurakkal<sup>3</sup>  
{kstace, sam.chung, sputhenp}@asu.edu  
<sup>1</sup>School of Art, Media and Engineering, <sup>2</sup>School of Art, <sup>3</sup>The Design School  
Arizona State University, Tempe, Arizona, USA

"WOKE" ALARM CLOCK...



WAKING UP TO SOCIAL & ECONOMIC JUSTICE EVERYDAY



WHAT IF?

DECOLONIZING 10T

LAURA FORLANO CRITICAL FUTURES LAB

ARTIFACTS HAD A DIFFERENT SORT OF POLITICS...



WE WILL NOT BE SILENT IN THE FACE OF OPPRESSION

WE ARE ALL EQUAL!



I WOULD PREFER NOT TO

LIGHTING THAT EXPOSES THE IMPERIALIST WHITE SUPREMACIST CAPITALIST PATRIARCHY.



THE INTERNET 4

ANTI-RACIST  
ANTI-SEXIST  
ANTI-ABLEIST  
ANTI-HOMOPHOBIC THINGS

ANTI-CLASSIST  
ANTI-SPECIES  
-IST

@laura4lano  
@critfutures



GENDER-NEUTRAL CLOTHES ONLY!!

12.31.16



I TURN ON FOR DELORENDO!

ACKNOWLEDGEMENTS: MARIE HICKS & SOPHIE EHRLMANNTRANT CONTRIBUTED TO THIS PIECE.



# COINTEGRATION

# QUESTIONS

HERTZ 2017