

17. [Introduction]

From *Software*— *Information Technology* *Its New Meaning for Art*

Exhibition at the Jewish Museum, 1970

Documentation of projects by Ted Nelson,
the Architecture Machine Group, and Les Levine

At the 1970 exhibition *Software*, organized by Jack Burnham, visitors were invited to do something extremely strange: operate computers. The exhibit introduced artists to an important dimension of computing, too, since it suffered from the technical problems of the same sort that still plague ordinary computer users today. Edward Shanken, a Duke University art historian, notes that in many respects it was “a disaster”: the computer controlling many of the works (a PDP-8) didn’t work for a month after the start of the exhibition, the gerbils that were part of *Seek* attacked each other, a showing at the Smithsonian Institution was canceled, and the show caused a financial crisis for the museum and thus the dismissal of director Karl Katz. These difficulties didn’t prevent *Software* from having an influence on artists, technologists, theorists, and the public. This influence was felt both through the pieces it highlighted—which ranged from working technological artifacts to conceptual pieces—and through the underlying vision of art that caused these selections for *Software* to diverge so sharply from those encountered in the major technology and art exhibitions that preceded it.

The exhibition had a catalog by Ted Nelson called *Labyrinth*, which Nelson named as the first publicly-accessible hypertext. Another participant of new media fame was Nicholas Negroponte (¶23). The Architecture Machine Group he headed contributed *Seek* (featured on the cover of the *Software* catalog), which housed the abovementioned violence-prone gerbils in an environment of metal blocks. These blocks were light enough to be rearranged by the gerbils’ movements. *Seek* reacted to the modifications the gerbils made by stacking the blocks into more grid-like versions of the gerbils’ “designs,” using a moveable electromagnet. For one group of observers the gerbils and robotic arm seemed to form a prototypical cybernetic circuit: it was an inspiring image of a machine that paid attention to the preferences expressed by the gerbils and then completed and formalized them into new, pleasing structures. Others took *Seek* as an image of the less sunny side of human-computer interaction and its future possibilities. As Ted Nelson wrote in *Dream Machines*, “I remember watching one gerbil who stood motionless on his little kangaroo matchstick legs, watching the Great Grappler rearranging his world. Gerbils are somewhat inscrutable, but I had a sense that he was *worshipping* it. He did not move until the block started coming down on top of him” (14).

Other overtly technological projects involved constantly broadcasting poetry inside on an AM frequency, turning the glass windows of the museum into low-power speakers, and offering access to various data streams and interactive computer programs via Teletype and CRT. There were also conceptual artists aplenty at *Software*. John Baldessari exhibited *Cremation Piece*, interring the ashes of his paintings in the wall of the museum behind a plaque. Vito Acconci’s *Room Situation: (Proximity)* involved his “standing near a person and intruding on his personal space.” (Acconci assigned a substitute to do this when he was unable to attend.) The catalog included the text of the reply Nam June Paik sent when invited to participate and Alan Kaprow’s description of a September 1969 Happening (¶06); Hans Haacke and Joseph Kosuth also took part.

The technical problems encountered by *Software* may have sprung from a rather different source than many of those encountered today. In his 1980 essay, “Art and Technology,” Burnham implied sabotage might have been as likely a reason as any: “Yet even after our major computer, the PDP-8, had been reprogrammed a second time, it took several D.E.C. engineers six weeks to make both ‘Labyrinth’ (the interactive catalog) and related exhibits operational. The computer’s failure to function was a mystery to everyone and a source of embarrassment to D.E.C. . . . And the night before ‘Software’ opened, a janitor sweeping the floors of the Museum short-circuited the entire program of the PDP-8 by breaking some wires in a terminal stand with a push broom—or at least that was the official story released by the Jewish Museum. . . . Talmudic scholars and rabbis situated on the top floor of the Jewish Museum were heard to mutter darkly as to the inappropriateness of exhibiting ‘Software’ in a museum mainly devoted to Judaica and Jewish studies.” (239)

A different excerpt from Nelson’s *Computer Lib / Dream Machines* is included (¶21). Richard Bolt (¶29) was a member of MIT’s Architecture Machine Group.

The exhibition wasn't about getting artists and technologists together, or about using new technologies for artistic purposes. Burnham wrote in the catalog that, rather, "the goal of *Software* is to focus our sensibilities on the fastest growing area in this culture: information processing systems and their devices." He added, "it may not be, and probably is not, the province of computers and other telecommunications devices to produce art as we know it; but they will, in fact, be instrumental in redefining the entire area of esthetic awareness."

For Shanken, Les Levine's contributions to *Software* provide a bridge for understanding the place of conceptual artists in the exhibition. Shanken points out that Levine's *Systems Burn-Off*, in embodying Levine's somewhat idiosyncratic definition of the hardware/software split, was very close to the concerns of conceptual art. It was, as Shanken writes in "Art in the Information Age," "an artwork that produced information (software) about the information produced and disseminated by the media (software) about art (hardware). It offered a critique of the systematic process through which *art objects* (hardware) become transformed by the media into *information about art objects* (software). Whereas Levine stated that most art 'ends up as information about art,' *Systems Burn-Off* was *art as information about information about art*, adding a level of complexity and reflexivity onto that cycle of transformations in media culture" (9). Levine suggested the name for *Software*; his other two projects in the exhibition prefigure significant types of recent new media art, such as voyeuristic Web video works.

Burnham's introduction to the catalog described the selection criteria for the exhibition. Before *Software*, computer art such as that shown at *Cybernetic Serendipity* had often worked to duplicate the effects of previous artforms, even to the point of imitating the styles of past masters. The focus was generally on a finished product, produced with computer tools. The Museum of Modern Art's important *The Machine as Seen at the End of the Mechanical Age* was similarly focused on finished products, many of which (as the name implies) were mechanical sculptures, images of machines, or inert objects that referred to machines. Burnham laid out a vision of new media art much more in line with how it is viewed today—neither a celebration of technology nor a condemnation, but an investigation, through implementation, of new shapes for the processes brought into the culture via computation. Burnham located the beginnings of understanding these processes in Norbert Wiener's cybernetics, but then made the case that current work had moved beyond this formulation, into the software model. Burnham wrote in the catalog that "many of the exhibits in *Software* deal with conceptual and process relationships which on the surface seem to be totally devoid of the usual art trappings . . . Most importantly [*Software*] provides the means by which the public can personally respond to programmatic situations structured by artists." He noted that "Many of the finest works in the *Software* exhibition are in no way connected with machines. In a sense they represent the 'programs' of artists who have chosen not to make paintings or sculptures, but to express ideas or art propositions." *Software* considered interaction in a way that built upon ideas in Happenings, and in the world emerging through information processing and in then-current media theory—as evinced by Burnham's many references to Marshall McLuhan (◊13). It marked the beginning of the fulfillment of the cybernetic visions of artists such as Roy Ascott (◊10) and Nam June Paik (◊15) (even as it sought a formulation beyond cybernetics within which to do so) and a look forward to the work of later artists such as Lynn Hershman (◊44).

—NWF & NM

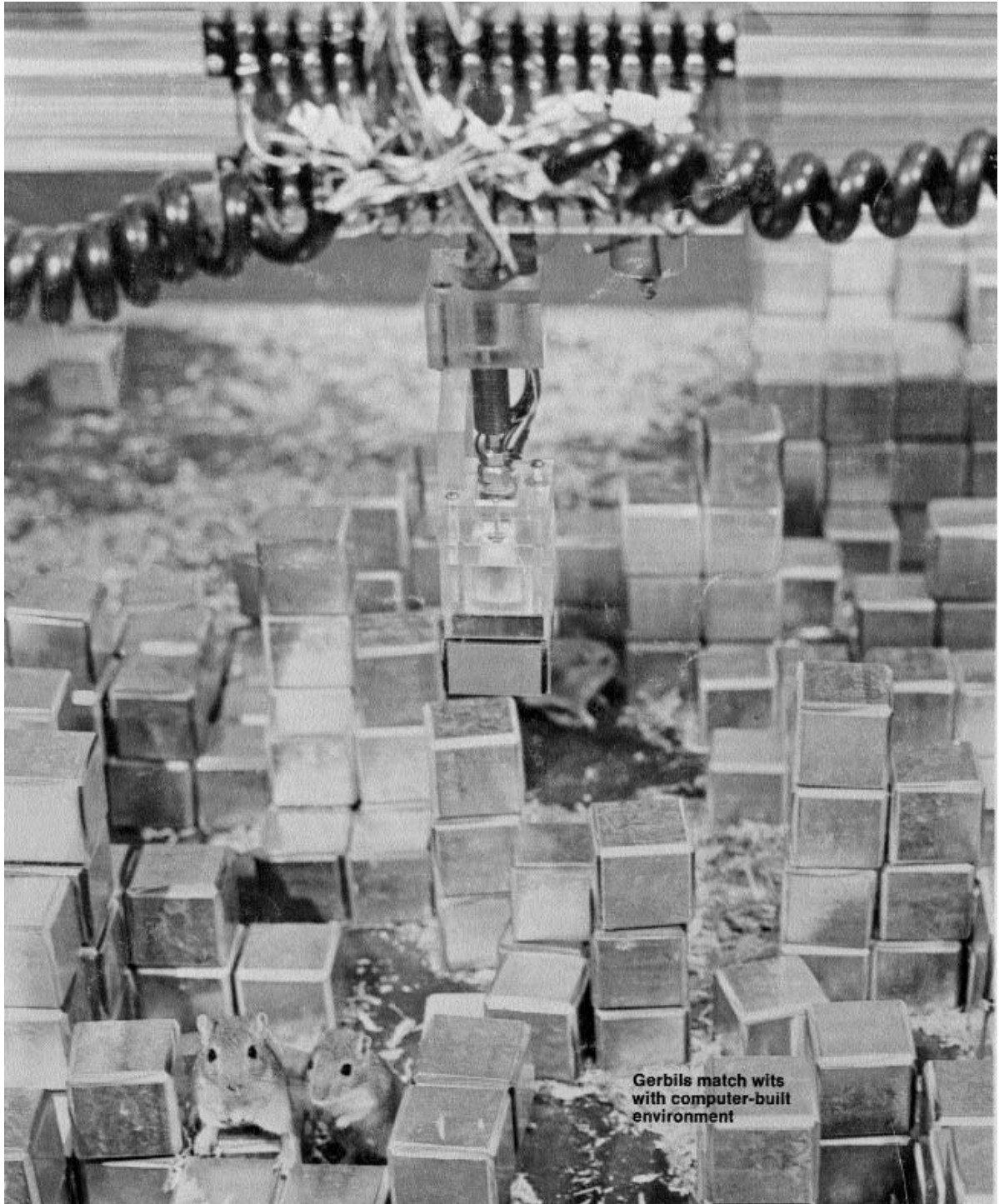
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See the CD for excerpts from the work of Nina Sobell and Emily Hartzell, who are credited with, while at the NYU Center for Advanced Technology, creating the first live performances over the Web, using an audience-steerable camera developed at the NYU Robotics Lab.

4h

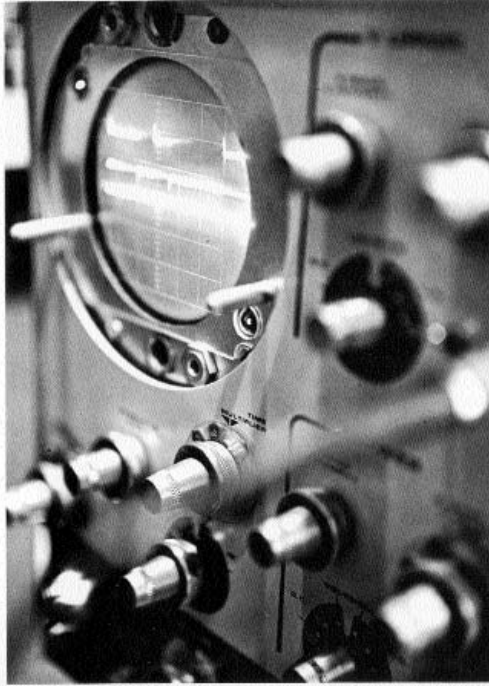
Further Reading

- Burnham, Jack. *Beyond Modern Sculpture: The Effects of Science and Technology on the Sculpture of This Century*. New York: George Braziller, 1968.
- Burnham, Jack. "Art and Technology: The Panacea That Failed." *The Myths of Information: Technology and Postindustrial Culture*. Ed. Kathleen Woodward. Madison, Wisc.: Coda Press, 1980. Reprinted in John Hanhardt, ed., *Video Culture: A Critical Investigation* (Rochester, N.Y.: Visual Studies Workshop Press, 1986).
- Shanken, Edward. "Art in the Information Age: Technology and Conceptual Art," *SIGGRAPH 2001 Electronic Art and Animation Catalog*, 8–15. New York: ACM Press, 2001. <<http://www.duke.edu/~giftwrap/InfoAge.html>>
- Shanken, Edward. "The House That Jack Built: Jack Burnham's Concept of 'Software' as a Metaphor for Art." *Leonardo Electronic Almanac* 6(10) November 1998. <<http://www.duke.edu/~giftwrap/House.html>>

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**Gerbils match wits
with computer-built
environment**



Ned Woodman/Theodor H. Nelson
Labyrinth: An Interactive Catalogue 1970
 with assistance from Scott Bradner (Art & Technology, Inc., Boston)
 Digital Equipment Corporation (time share PDP-8 computer)

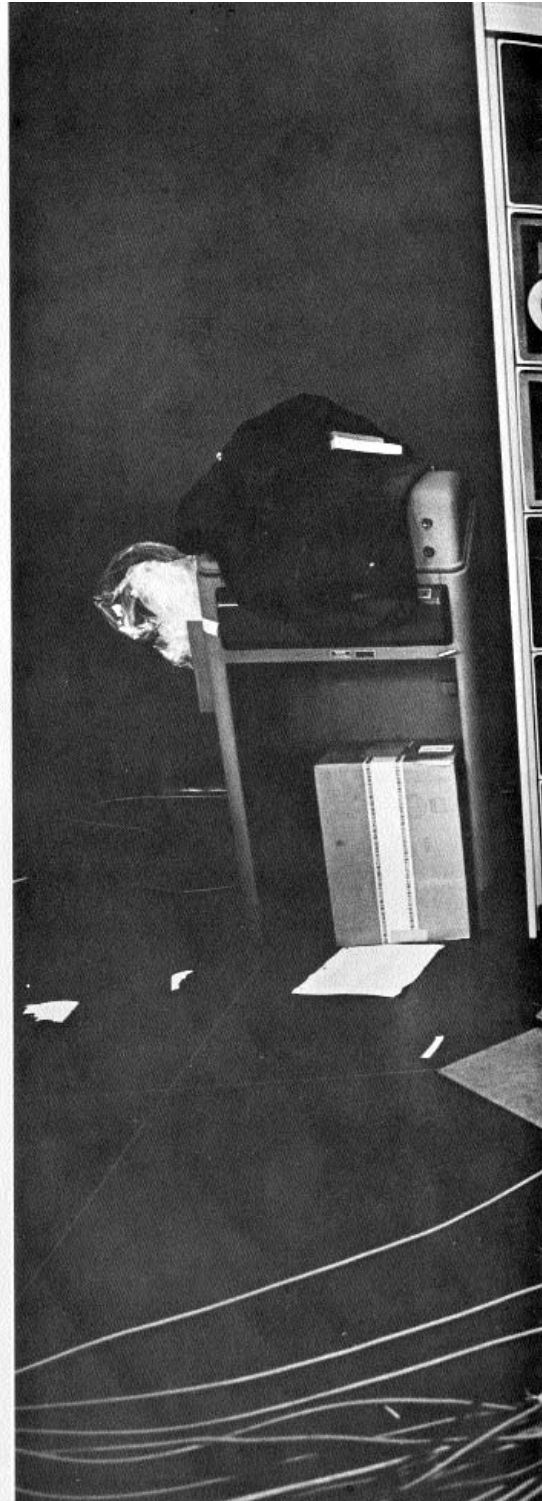
Labyrinth is a hypertext, or interactive text retrieval system. To read in this interactive catalogue, the user sits down at one of many *Labyrinth* keyscope terminals and begins to read. To read more of any section which is larger than the screen, the user types F (forward). To go back to the beginning of the catalogue, the user types R (return). To obtain a related section as indicated by an asterisk appearing in the text, the user types the code appearing with the asterisk.

Before leaving the show, the museum goer may obtain a printout of what he himself has selected to read in the interactive catalogue by giving his name to an attendant at the line printer by the main exit.

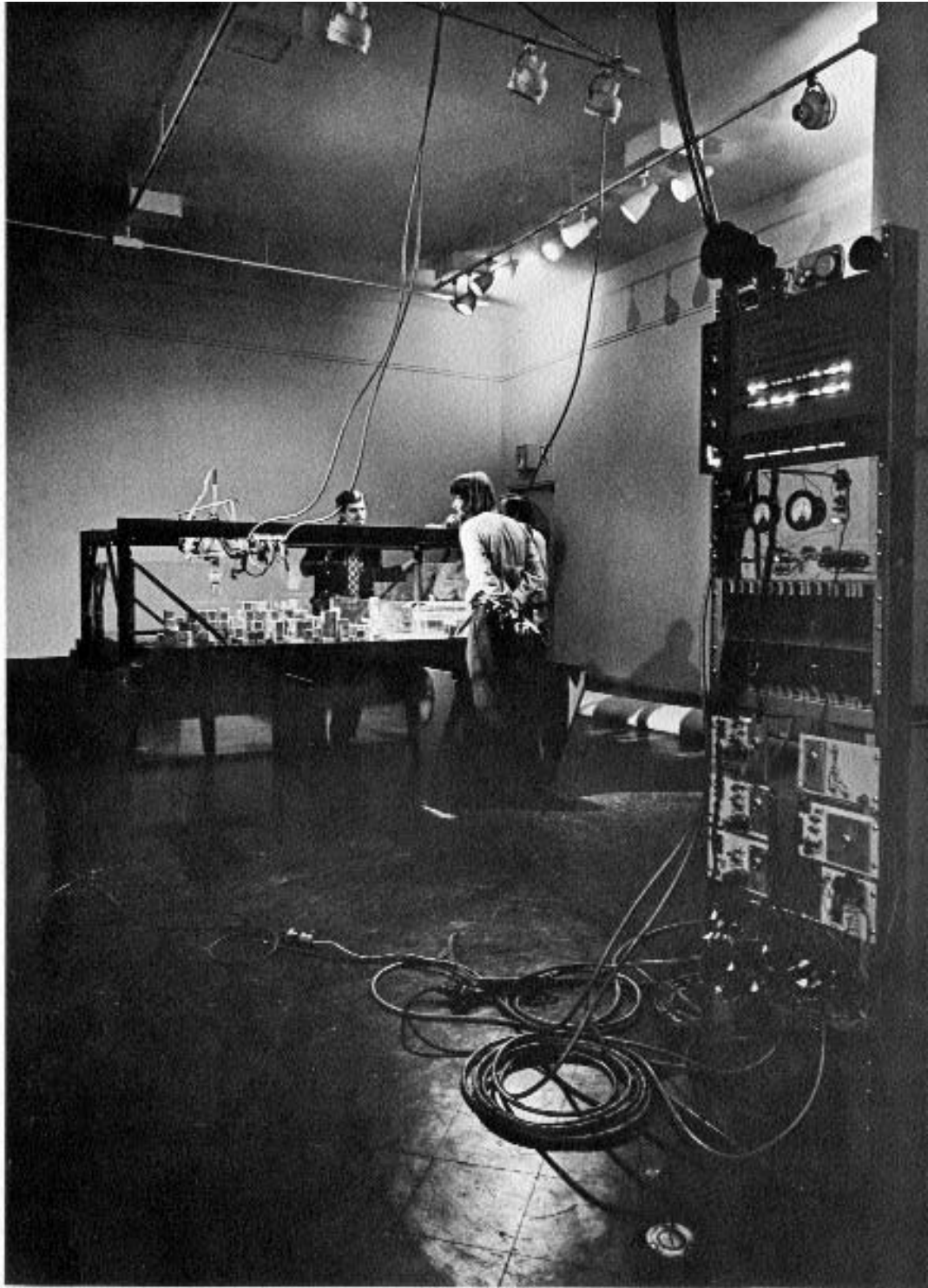
This catalogue system was programmed for the PDP-8 by Ned Woodman of Art & Technology, Inc. Interesting features of the program include the ability to output to any display scope, a temporary terminal history to allow the forward and return commands, a permanent user history permitting a final printout. The interactive catalogue for software consisting of information from the printed catalogue and additional materials has been edited by Theodor H. Nelson, who has been advocating hypertexts as a form of writing for some ten years. This is the first public demonstration of a hypertext system.

Scott Bradner (left) and Ned Woodman of ATI program their PDP-8.

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The gerbils live in a glass-walled house with a rotating electromagnet overhead, picking up and depositing ten-inch cubes

The Architecture Machine Group, M.I.T.
Seek 1968-70

Seek is a sensing/ effecting device controlled by a small general purpose computer. In contrast to an input/output peripheral, Seek is a mechanism that senses the physical environment, affects that environment, and in turn attempts to handle local unexpected events within the environment. Seek deals with toy blocks which it can stack, align and sort. At the same time, these blocks form the built environment for a small colony of gerbils which live within Seek's three-dimensional world.

Unbeknownst to Seek, the little animals are bumping into blocks, disrupting constructions, and toppling towers. The result is a substantial mismatch between the three-dimensional reality and the computed remembrances which reside in the memory of Seek's computer. Seek's role is to deal with these inconsistencies. In the process, Seek exhibits inklings of a responsive behavior inasmuch as the actions of the gerbils are not predictable and the reactions of Seek purposefully correct or amplify gerbil-provoked dislocations.

Seek consists of a 5x8 foot superstructure supporting a carriage which has three dimensions of freedom. Its extremity is composed of an electromagnet, several micro-switches, and pressure-sensing devices. This elementary prosthesis is guided by the blind and handless computer to pick up or deposit its payload of a single two-inch cube. The nucleus of the system is an Interdata Model 3 Computer with 65536 single (yes/no) bits of memory which are shared by instructions and data.

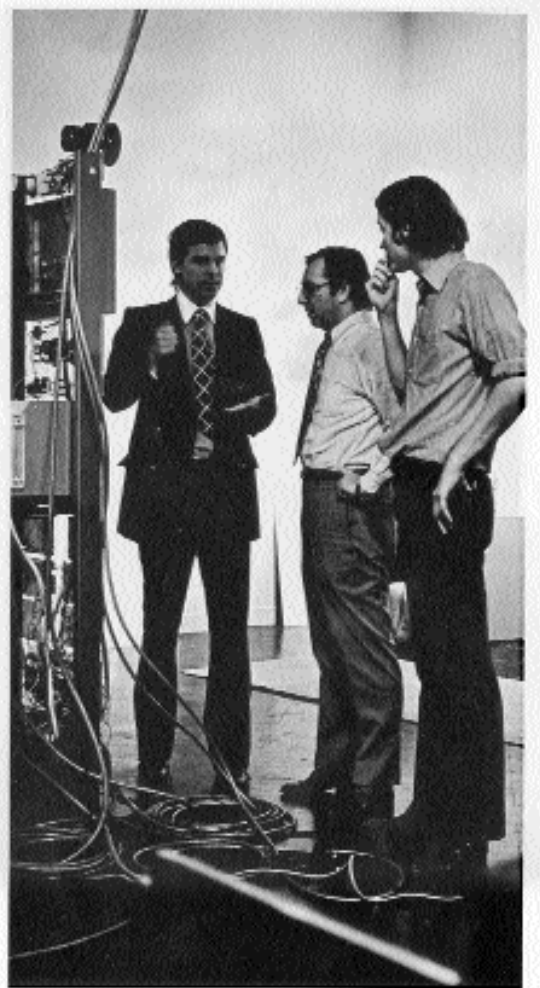
Even in its triviality and simplicity, Seek metaphorically goes beyond the real-world situation, where machines cannot respond to the unpredictable nature of people (gerbils). Today machines are poor at handling sudden changes in context in environment. This lack of adaptability is the problem Seek confronts in diminutive.

If computers are to be our friends they must understand our metaphors. If they are to be responsive to changing, unpredictable, context-dependent human needs, they will need an artificial intelligence that can cope with complex contingencies in a sophisticated manner (drawing upon these metaphors) much as Seek deals with elementary uncertainties in a simple-minded fashion.

Seek has been developed and constructed by M.I.T. students who form part of the Architecture Machine Group, a Ford Foundation sponsored research effort within the M.I.T. Urban Systems Laboratory. The participants have ranged from freshmen working in an Undergraduate Research Opportunities Program, to post-graduates designing elements as part of their research assistantships.

The co-directors of the group are Professors Nicholas Negroponte and Leon B. Grolsner, of the faculty of Architecture and Planning. Randy Rittberg and Mike Titelbaum, students in Electrical Engineering, have been in charge of the electronics—in particular, the interface and controller. Steven Gregory, a graduate student in the School of Architecture and Planning, has been in charge of the programming. Steven Paters and Ernest Vincent have been responsible for the actual construction of the device.

Following the Software exhibition, Seek will return to M.I.T. to be used with many different detachable heads as a general purpose sensor/effector. Seek will become a frame for experiments conducted by students in computer-aided design and in artificial intelligence.



Nicholas Negroponte (left) with Karl Kutz and Steven Gregory





Les Levine
Systems Burn-off X Residual Software 1969

The 33 photographs on exhibition were originally taken by the artist in March of 1969 during an excursion by New York critics and press to view the opening of the Cornell University "Earth Works" exhibition in Ithaca, New York.

In April, 1969, Les Levine exhibited 31,000 photographs consisting of 31 separate images, 1,000 copies each, at the

Phyllis Kind Gallery, Chicago. Most were randomly distributed on the floor and covered with jello; some were stuck to the wall with chewing gum; the rest were for sale.

"Software is the programming material which any system uses, i.e. in a computer it would be the flow charts or sub-routines for the computer program. In effect software in 'real' terms is the mental intelligence required for any experience. It can also be described as the knowledge required for the performance of any task or transmission of



communication. They say, 'It's going to be raining tomorrow.' is software. All activities which have no connection with object or material mass are the result of software. Images themselves are hardware. Information about these images is software. All software carries its own residuals.

The residual may take the form of news, paint, television tapes or other so-called 'media'. In many cases an object is of much less value than the software concerning the object. The object is the end of a system. The software is an

open continuing system. The experience of seeing something first hand is no longer of value in a software controlled society, as anything seen through the media carries just as much energy as first hand experience. We do not question whether the things that happen on radio or television have actually occurred. The fact that we can confront them mentally through electronics is sufficient for us to know that they exist. . . . In the same way, most of the art that is produced today ends up as information about art." L. L.

Artist exposes himself electronically

Lee Levine
A.I.R. 1968-70

A.I.R. basically consists of a group of television sets in a museum which displays activity taped in my studio, showing museum visitors the artist in his natural environment. The images change position from monitor to monitor on a random basis.

I believe this brings the art process directly to the public environment and thereby makes a closer connection between art and general culture.

**Note: Lee Levine's original proposal consisted of constant direct optical transmission from his studio for the duration of the exhibition. This approach was abandoned when it was found that line-of-sight transmission was impossible.*

