5.2

Conceptual Kinetics and Electronics

Artistic Research

In the last decades, artists have been active exploring robotics and machine-activated motion. Some of the art research shares similar agendas with the scientific/technological research, for example, exploring the limits of "intelligent" machines, the dexterity of machine motion, the relevance of artificial life and emergent behavior concepts, and the implications of telepresence and telerobotics.

Other artists, however, pursue divergent interests. For example, some artists create robotic/kinetic devices that reflect on the military/industrial origins of much contemporary research. Others create devices that demonically comment on issues of control and the relationship of machines to human activity. Still others abandon the utilitarian emphases of scientific research to explore the qualities of the devices' motion or appearance, such as beauty, mystery, intrigue, danger, or foreboding. Still, for others, the robots and machine environments are primarily used as dramatic settings to explore a panoply of personal or formal issues similar to those pursued by artists working in conventional media.

This artistic activity illustrates an important difference in the ways artists and researchers approach research. Even though scientists and technologists may give some heed to the context of their funding or research agendas, artists are much more likely to deeply explore the cultural context underlying the research activity. Similarly, robotics researchers usually emphasize the functional qualities of robot appearance or quality of motion or ignore them; artists can make these the focus of their work. Questioning what is taken for granted in other disciplines is often the heart of the artistic enterprise.

A more radical position would hold that robotic research is intrinsically art. In *Beyond Modern Sculpture* the art theorist Jack Burnham suggested that self-replication was at the core of art and that robotics was an inevitable continuation of that quest. These ideas are intriguing to some artists who work in the field. Building on Burnham's ideas, Bruce Cannon, whose works are described in a following section, wrote an essay called "Art in the Age of the Microcontroller," which considers the inherent aesthetics of electronics and robotics:

> [T]he automata of the last few centuries and the electronic robots emerging in the 1960s both represented for him the logical extension of this striving. He suggested that robots themselves were the ultimate extension of sculpture, and should be judged as such without any other esthetic criteria. That their striving [of artists toward self-replication] made them inherently art, regardless of their physical form.
>
> Despite the fact that he later recanted all this, it was and remains an amazing conceptual leap, one that I respect and admire. As an artist using computers, interested in artificial intelligence

and robotics, I strive toward the purity of this vision, but fail. I long to be able to strip away the superficial trappings in which I feel I must dress technological work in order for it to fit into the dialectic of the art world. I crave the unary pursuit of sentience and autonomy over the rote schematicization of the prevailing cultural fad.[1]

Kinetic Art Precursors

Contemporary artists working with robotics can trace their lineage to kinetic art. Kinetic art is art that moves, motivated by human touch, natural forces such as wind, or by motor. In the early part of the twentieth century, kinetic artists were crucial pioneers seeking to expand the arts to address contemporary culture. In that era, when the norms of the art world were firmly dominated by historical media such as painting and sculpture, making art that moved was radical. Also, in this era artists willing to work with electricity, motors, metal fabrication, and new materials were as much technological researchers as digital artists are today.

As will be explained in my book *Great Moments in Art and Science,* kinetic artists worked from a variety of perspectives. Some, like the Bauhaus artists, Futurists, and Constructivists, and artists such as László Moholy-Nagy, sought to create art that reflected on the new opportunities offered by industrial/technological "progress." Others such as the Dadaists, Surrealists, and artists such as Marcel Duchamp were more dubious about progress. Others such as Alexander Calder saw motion, change, and time as just more formal elements to be explored in composition.

In the 1960s and 1970s, artists continued the exploration of kinetics, refining old themes and expanding its concerns. Examples include Frank Malina, Nicolas Shoeffer, Otto Peine, Takis, Jean Tinguey, EAT (Experiments in Art and Technology), Lygia Clark, Helio Oiticica, Jesus Rafael Soto, Alejandro Otero, Pablo Neruda, Agam, Alexander Calder, and David Medalla. Interested readers should consult the histories of technological art listed in the bibliography.

Eduardo Kac's article "Foundations and Development of Robotic Art" identifies several artists from the 1960s and 1970s as especially significant precursors of contemporary robotic work. Nam June Paik and Shya Abe created *Robot K-456* in 1964. They rolled this "robot," which had a vaguely anthropomorphic/electronic look without very sophisticated behaviors, around the streets in attempts to create public events. In 1966, James Seawright created *Watcher* and *Searcher,* which were interactive kinetic sculptures. In 1970, Edward Ihnatowicz created *Senster,* which was a roboticlooking arm that sensed the presence of humans. In the 1970s, Norman White created the *Helpless Robot,* which asked humans to interact with it in order to make it function.

Contemporary kinetic artists update this work by incorporating more sophisticated technology and using the technology to explore cultural commentary or conceptual investigations. Also, note that the boundary between robotic and kinetic art is not clear because of the wide range of meanings the word *robot* has assumed. When does a sophisticated machine cross over to "robothood"? Conversely, many things called robots are not very sophisticated in their behavior. Humanoid appearance is not a requirement. Most likely, many of the artists who now think of their work as experiments in robotics would have considered it kinetic a few years back.

Kinetics and Light Sculpture

Milton Komisar

Milton Komisar's career spans decades. He was one of the first kinetic light artists to apply computers to control. His light sculptures are famous for their elegant movement of light and their progression in time created via computer program. Komisar describes his approach:

> Developing a system to work with Light in this particular way has led me to the idea of COMPOSITION IN TIME. This is traditionally a musical concept. There is no sound in my work. I do not want to create a multimedia art form. I believe it is possible to "mold" Light through time in such a way that a coherent composition is experienced by the viewer. The physical structure and the electronics are simply necessary tools to this end. I have been working with this goal in mind for the last twenty-three years.[2]

Gregory Barsamian

Gregory Barsamian creates kinetic sculptures that use stroboscopic technology to freeze and manipulate motion. The events combine the reality of constructed objects with the dreamlike quality of mediated vision. Barsamian has shown his work in several locales, including the ICC. He explains animation as a doorway to the unconscious:

> My technique adds the fourth dimension of time and allows the viewer to share the same physical space and time with an animated sequence. Animation is ideally suited to the realization of

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Milton Komisar: ⟨http://www.xInt.com/neonart/mkomisar/mkomisar.html⟩
Gregory Barsamian: ⟨http://www.concentric.net/~Venial/⟩

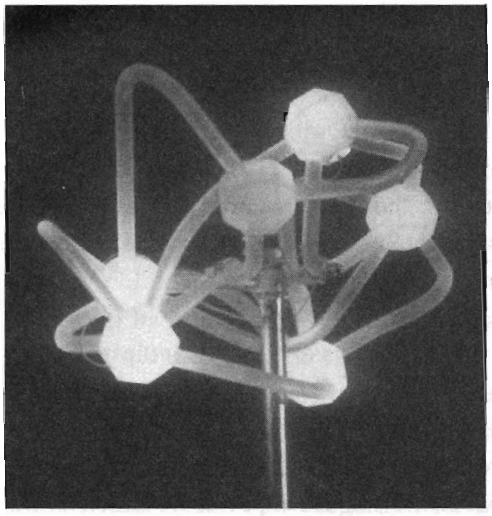

Fig. 5.2.1. Milton Komisar, *Sign of the Fish.* Modular units used in a computer-controlled light sculpture.

subconscious images and alternate realities. My passions lie in bringing these images to life in this most vivid form.[3]

Barsamian questions science's claim that it presents absolute vision. He questions the givens of perception and emphasizes the importance of the unconscious, noting that no one angle of view captures totality and that science is distrustful of the imagery of dreams:

In creating alternate realities, I confront the viewer physically in the language of the subconscious with a skepticism of our perceptions. The power of sharing the same space with these surreal three-dimensional images lies partially in witnessing your own act of interpretation. . . . It is the nature of that order that defines us as human beings. Order, however, is not what I offer you. Instead, I offer a three-dimensional window into an ontological bazaar where self-deception is an oxymoron.

In one installation called *Putti,* tiny cherubim fly around in circles, change direction, and transform back and forth with helicopters. The curator Janet L. Farber describes the event:

Putti is perhaps the clearest illustration of Barsamian's intentions. Hovering overhead, spinning figures of cherubs (putti) turn into helicopters and back again into winged babes. The nature of this transformation is purposefully ambiguous: Do the cupids become helicopters first or do the

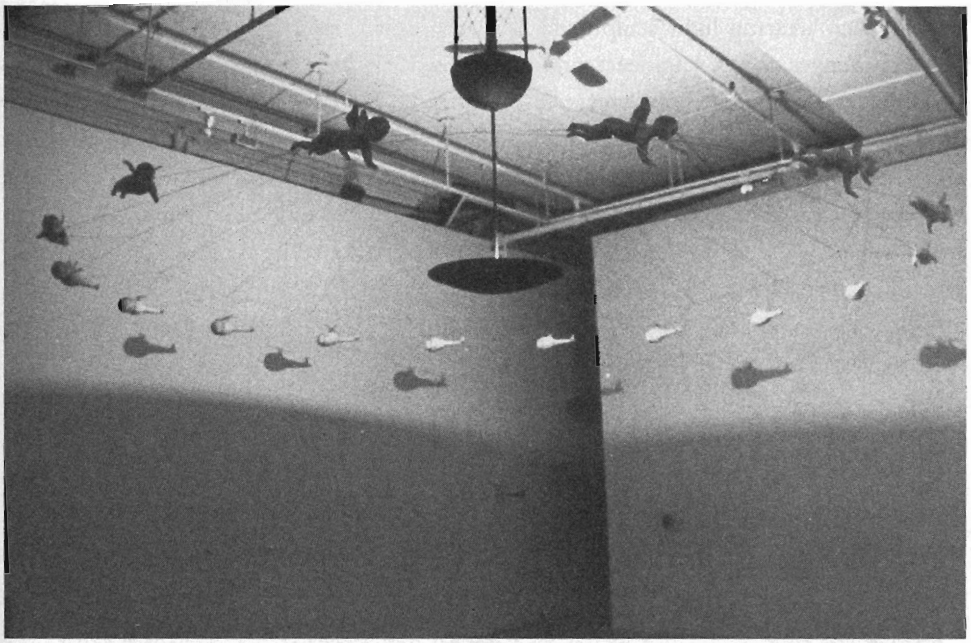

Fig. 5.2.2. Gregory Barsamian, *Putti.* A kinetic sculpture is illuminated by a stroboscopic light.

whirlybirds turn into ministering angels? . . . Yet, what does it say about human nature that the interpretation most frequently given of this transformation is negative? It conjures up the loss of innocence, the encroachment of police states, the buzz of Valkyrian war machines.[4]

Other Artists and Projects

James Seawright, director of visual arts at Princeton, has a long history of developing interactive kinetic sculptures, such as *Watcher,* which modify their behavioral and sound patterns based on changing light patterns produced by other sculptures or viewers. Recent work incorporates more sophisticated technologies, such as *Mirror I,* which focuses the sun's light in a complex way, arranging 225 mirrored blocks to precisely focus rays on an *X* on the sidewalk twelve feet away. ***Eric and Deborah Staller*** create kinetic and light public art, such as *Bubbleheads,* in which multiperson bicycles are driven by

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James Seawright: ⟨http://www.tezcat.com/~divozenk/plaza/mirrori.html⟩

people, each wearing light sculptures. A yearly kinetic sculpture race called Da Vinci Days challenges artists, engineers, and others to design human-powered moving sculptures that must negotiate city streets, mud, the river, and a sand trap. ***Paul Friedlander*** creates stroboscopic kinetic light installations. Coordinating the movement of sound and light, ***Guy Marsden***'s sculptures confound traditional categories. Promoting the humanistic study of light, *Seth Riskin* creates dance and body movement events that incorporate light phenomena—for example, by including projectors or reflectors on his body. ***Jennifer Steinkamp*** sets up room-sized installations in which shadow, projection, and light movement "de-center" and "dematerialize" space and respond to visitor motion and proximity.

Conceptual Kinetics

What conceptual kinetic artists do is quite remarkable. They convert the mundanities of motors, gears and levers into philosophical and artistic discourse.

Bryan Rogers

Bryan Rogers was in the forefront of conceptual kinetics in the 1970s and 1980s. He appropriated state-of-the-art mechanical and electronic technology to create families of devices focused on particular concepts or cultural niches, for example, his "Timepieces," "Umbrella," and "Coffin" series. Illustrating this approach, his "Coffin" series featured multiple variations on the theme, for example, rotating coffins, self-propelled coffins, and coffins whose lids automatically opened to welcome the viewer. His constructions typically played with disjunction—finely crafted advanced engineering applied to the creation of unlikely objects, puns, and conceptual explorations.

Roger's approach is also evident in other works. His spearfishing piece is famous for the uproar it created. An aquarium was fitted with a rapid-action hydraulic harpoon that would periodically jut in and out. The event was picked up by the tabloid *National Enquirer* and caught the attention of the Society for the Prevention of Cruelty to Animals, even though the probability of harm to the fish was remote. In his multipart *Odyssetron* project, he undertook to create a seaworthy robot that could navigate itself

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Kinetic sculpture races: ⟨http://www.rdrop.com/users/batie/davinci97/kinetic.html⟩
Seth Riskin: ⟨http://web.mit.edu/mit-cavs/www/Seth.html⟩
Jennifer Steinkamp: ⟨http://jsteinkamp.com/html/art_statement.htm⟩
Bryan Rogers: ⟨http://www-art.cfa.cmu.edu/www-rogers/⟩

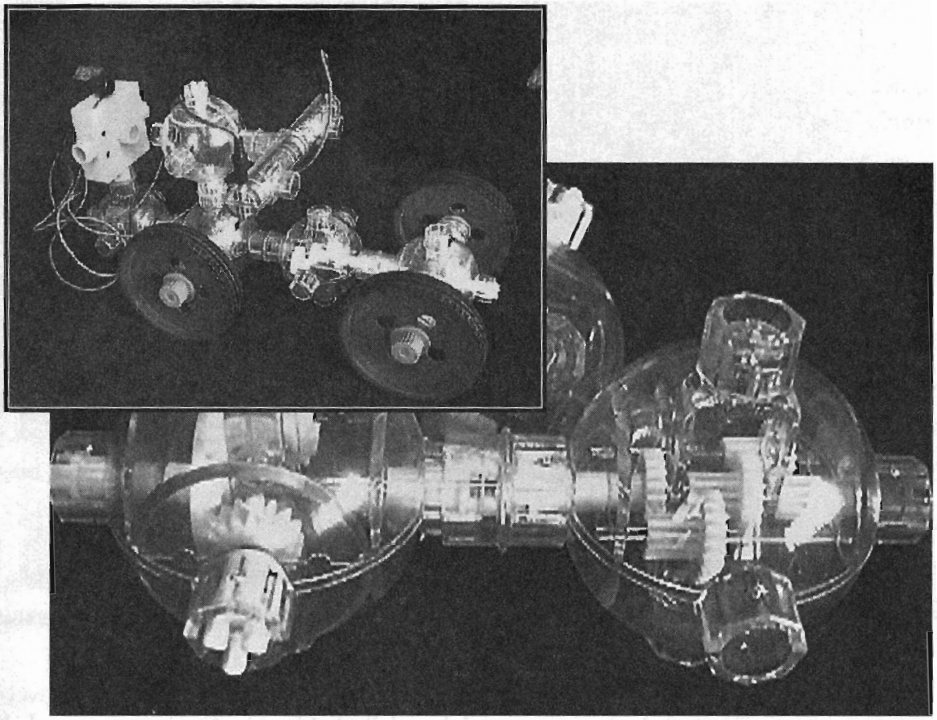

Fig. 5.2.3. Capsella mechanical experimenter kit, composed of modules such as motors, gears, and pulleys, to explore the principles of energy conversion and transfer. Photo: Stephen Wilson.

around the globe. Rogers holds degrees in both art and engineering and founded the Conceptual Design program at San Francisco State University. He developed the Studio for Creative Inquiry at Carnegie Mellon University.

Perry Hoberman

Perry Hoberman creates installations that expose the cultural underpinnings of technology. Typically, his works are simultaneously humorous and troubling. *Faraday's Garden* presented the viewer with a hodgepodge of consumer appliances such as radios and power tools and image-projecting machines. Ironically commenting on issues of control, the appliances automatically sprung into action, tripped by security foot pads, as viewers

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Perry Hoberman: ⟨http://www.hoberman.com/perry/⟩

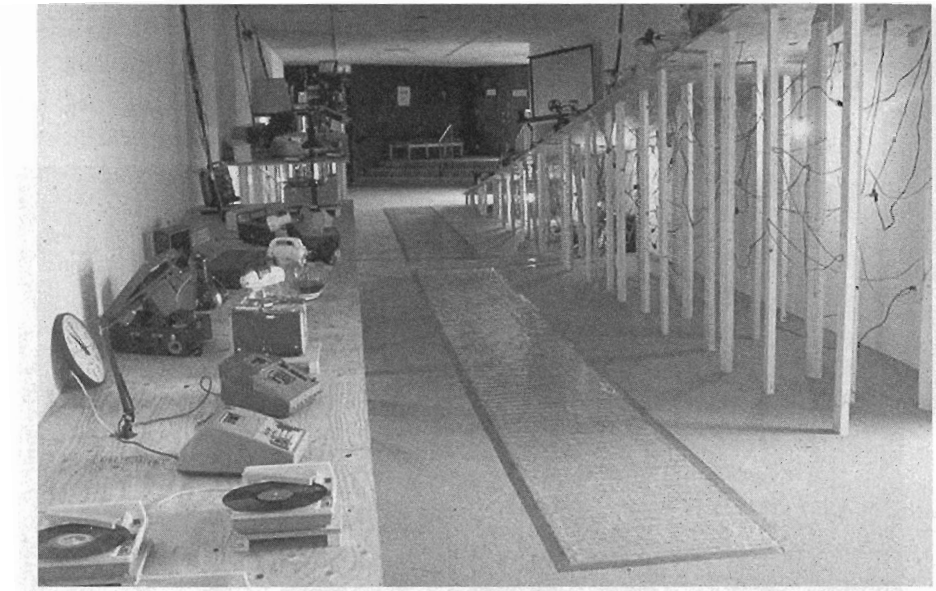

Fig. 5.2.4. Perry Hoberman, *Faraday's Garden.* Household devices and image machines are activated by visitor's motion.

moved about the space (see also chapters 7.3 and 7.4). Here is the description of the installation from Hoberman's Web site:

The machines wait silently, ready to be activated at any moment by the footfalls of the public. When stepped upon, the switch matting triggers the various machines and appliances, creating a kind of force field of noise and activity around each viewer. As the number of participants increases, the general level of cacophony rises, creating a wildly complex symphony of machines, sounds, and projections. The machines and accessories (such as tapes, films, slides, and records) are collected from thrift stores, flea markets, and garage sales. Since they span the entire twentieth century, movement around the room also functions as a kind of time travel. All wires and switches are left exposed, creating an intense environment of electrical current.[5]

Alan Rath

Alan Rath creates sculptures built out of the paraphernalia of the electronic age. His sculptures incorporate electronics, video screens, speakers, microprocessors, voice chips, and robotic elements. He was one of the first artists to create tapeless digital video in which image sequences were drawn directly from chip memory. He has an electrical engineering degree from MIT and has worked as an artist since the 1980s.

His works have been described as playful, humorous, ironic, and beautiful. He typically makes the electronics and other constructive structures of his work visible to the viewer, and indeed works with the electronic infrastructure of connectors and components as aesthetic elements. Rath's view that the selection and construction of components is an important element of the art was expressed in an interview he gave on the "San Francisco Gate" Web site:

Often there's not a single optimal solution, so things like the selection of an electronic part are open to interpretation. I'm picking components based on what they look like. To me, transformers can be attractive or ugly. The pieces are made in a certain meditative state. A lot of emotion goes into the building, and I hope they somehow contain that. You know, the Mars lander is a beautiful piece of sculpture. The people who built it identified with it, so it has a lot of soul. I want power from art at that level of commitment and mastery.[6]

Typically, the electronics are embedded in other artifacts of everyday culture as part of the cultural commentary. Dana Friis-Hansen, senior curator at the Houston Contemporary Arts Museum, wrote this introduction to Rath's "Bio-Mechanics" show:

Alan Rath's "live machines" are eerily engaging—we are immediately drawn in by their uncanny, humanlike actions. On video screens, eyes move, mouths open, faces wince, tongues lick, hands gesture to spell out messages. Simple speaker cones seem to whisper, breathe, or pulse like a heartbeat. We cannot help but project human emotions—fear, curiosity, desire, pain, excitement, or the will to communicate—onto these otherwise confusing configurations of circuitry.[7]

Examples of the video and kinetic work include *Info Glut 3,* in which video screens display sign language as the sculpture speaks; *Message in a Bottle,* in which a small video screen enclosed in a bottle shows the image of a hand signing phrases by sign language; *Arecibo,* which uses hand signals to spell out the digital encoding of DNA being sent out in a radio beam's search for extraterrestrial life; *Ultra Wallflower,* in which several speakers hung on the wall in an arrangement suggesting plant life vibrate in isolated sociality; *Ouch,* in which the video image of the artist's face responds to being held in a vice; *Likker,* which has a tongue extended on a long metal rod; *ScannerII,* in which eyes glance to and fro as under surveillance. Rath has created a wealth of pieces that include enlarged video eyes and mouths that are simultaneously funny and ominous.

Later work includes robotics, such as *Robot Dance,* in which two kinetic structures vaguely representing hands play hand jive games together; *One Track Minds,* in which two small carts on a single track play approach-and-avoidance games with each other, and

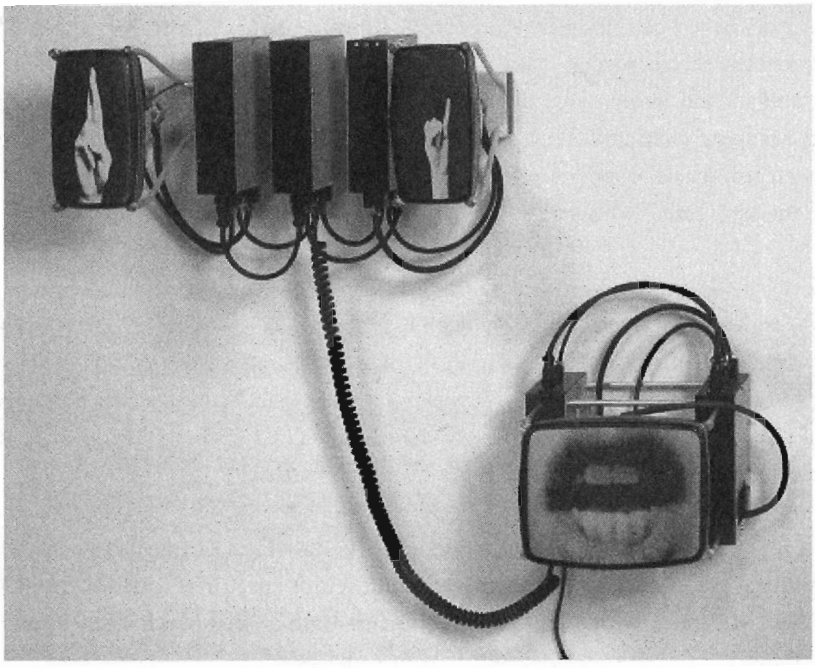

Fig. 5.2.5. Alan Rath, *Info Glut3.* A digital video sculpture speaks with sign language.

Five on the Wall, in which five constructions hanging on the wall engage in synchronized performance. He suggests that machine autonomy is a fascinating concept that he intends to pursue in further work: "Interesting is halfway between nothing and random."[8]

Rath indicates several motivations in his work. He is upset by our culture's ambivalent and shallow attitude toward technology. He notes that many of those whose decry technology fail to see its relationship to the everyday life they take for granted, such as shoes or glasses, and make unwarranted distinctions:

I don't know why people are so alienated from machinery. The next Freud will figure out why we perceive that stuff as external and different. I am amused by the idea that people might draw the line at machinery in a gallery. Somehow the technology and chemistry of paint is OK but other technologies are out of place. It's only that way because of the time we grew up in. Future generations won't see anything strange about it.

Similarly, many people—even those intimately involved with technology in their work—cut themselves off from appreciating the beauty of the technology. Rath believes

that machines are an important part of the human exploratory and play potentials. He would like people to get more connected to that aspect of technology:

Our problem is not getting their experiential or toy possibilities [that is, the potential of the technology]. Play is one of the most significant human activities and machines help us play. Probably because our tax dollars are used to put robots on Mars, people don't like that to be called play. But it's obviously play. And then it becomes beautiful.

Bruce Cannon

Bruce Cannon creates conceptual kinetics and robotics that explore a variety of topics, such as life, death, time, social convention, personality, responsiveness, and relationships. His installations will often integrate surplus, ignored, and neglected cultural items with the latest in electronic and robotic technology. Several of the works incorporate electronic speech and proximity detection. Often the minimalist works are ironic and/or meditative. Here are excerpts from his artist's statement:

[Engineering aesthetics] function for me as grounding devices, reality checks on the often arrogant projects of both art and technology. They also invoke a reductive coding which I find interesting, and in fact have adopted as one of my principal techniques. While some of the pieces manage to exhibit lifelike behaviors despite their technical limitations, my general approach is to construct objects whose behaviors or characteristics are in some ways lifelike yet which embody little of the richness of being.

These machines' failure to transcend their artificiality is their most significant aspect. The pieces are not so much lifelike as referential to being, and what is missing is what resonates for me. I have come to think of this negative space as the place where the work happens, at its best a sort of electro-mechanical Haiku in which randomness and absence generate issues of sentience and presence which I would be unable to evoke directly.[9]

Doublespeak attempts to deconstruct social conventions of polite speech. It uses the subtleties of electronic sensors to accentuate a person's role in choosing what to hear, with a person's shadows triggering one facing sculpture to say what is expected of it while the other says what it's really thinking. *Contact II* comments on human relationships by reacting to a viewer's interposing in its space. It speaks phrases of love and admiration

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Bruce Cannon: ⟨http://www.siliconcrucible.com⟩

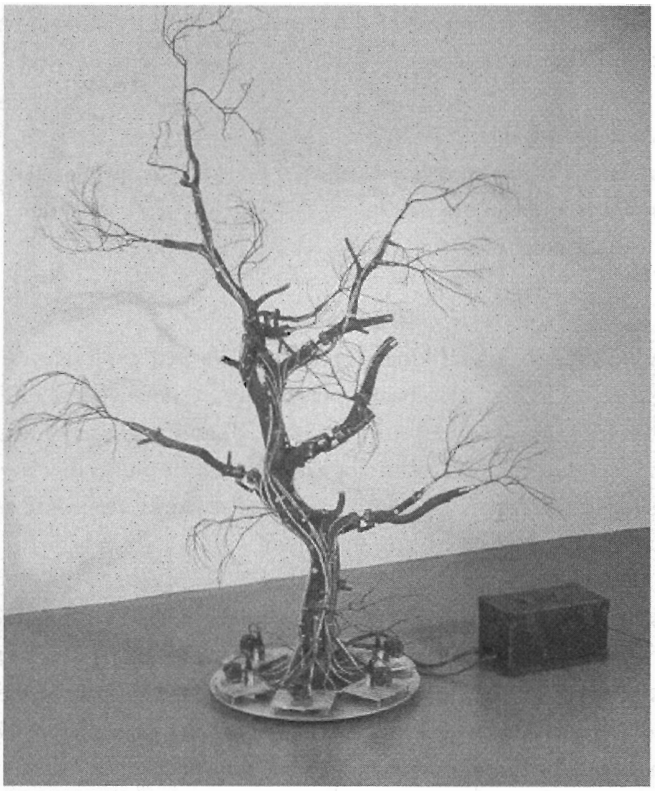

Fig. 5.2.6. Bruce Cannon, *Time Tree*. A robotic tree that moves at slow pace similar to that of plants. Courtesy of the artist and Gallery Paule Anglim.

until one gets too close, when it says, "I wish you were dead." In what appears to be a framed mirror, *Reflection* captures one digital portrait a day and scrolls through the time archive, showing an image of an accumulating life.

Tree Time (in collaboration with Paul Stout) is an installation that reanimates a lightning-struck tree transported from a forest. Robotic elements have been added so that the branches move at an almost imperceptible organiclike speed, its motion perceptible only over many days:

This machine is I think equal parts meditation on slowness and bastardization of nature. The obvious reference to Mary Shelley's Frankenstein in the lightning-struck tree, the garish reassembly, the electrification, the technological "improvement" upon the original organism, is intentional. Paul calls it eco-porn, which I think is nice . . . I associate both words with *Tree Time,*

because of the pleasure and the pain, the beauty and the obscenity of the endeavor. In that sense, *Tree Time* is a morality story about limits.[10]

Cannon's paper "Anti-Speed" reflects on our culture's preoccupation with speed as a fear of mortality. *Tree Time* attempts to reflect that concern with time and its underlying meanings:

We're preoccupied with speed because we fear death. In other words, immortality is our goal, and since we can't have that we settle for the compression of time. The faster we can do things, the more things we can get done in the amount of time we do have. And this speeding up of the pace of life, the squeezing of more and more events into a given period of time, is the culture's desperate attempt to live longer.[11]

Paul DeMarinis

Paul DeMarinis's works straddle the world of art, music, invention, technological archaeology, and social commentary. DeMarinis carefully studies the history of technology and invention to discover its underexplored underbelly. He simultaneously celebrates its innovation and analyzes what has been sacrificed in its unfolding. He then develops elegant, unprecedented installations that communicate his investigations, mixed with personal and social references. DeMarinis's magic is that the accomplishment of these installations often require him to invent and extend technologies. Thus, his creative process is intimately intertwined with the very processes of invention, on which he comments:

My pieces deal, in part, with the way technologies mediate the relationship of people to their memories and to question the situation of technology in our lives, the mythos of technology. The fact that I use technology itself to delineate these themes means that I must develop alternate or sometimes "impossible" technologies. Without overly stressing the apparent impossibility of making a hologram of a record play the music in the record's groove, or making a clay pot recording of a voice, or making a bathtub make music, I must admit that many of the technologies in my pieces did not exist when I set out to make them. I have had to invent them. It is an important requisite of my art that the pieces actually work. I wouldn't be comfortable with a piece that created an illusion by conventional means. For me the real illusions are the ones that still mystify even when the technology is revealed and explained. Nor would I be satisfied if the works stopped there. There are many other cultural and personal themes woven into them.[12]

DeMarinis's brief descriptions of several of his installations illustrate this mixture of invention, humor, and analysis:

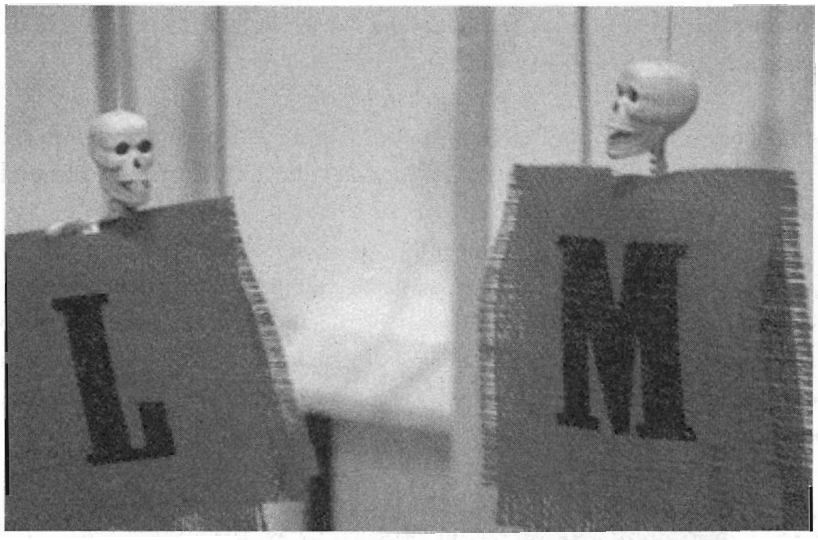

Fig. 5.2.7. Paul DeMarinis, *Messenger* (1998). Skeletons shake their letters to spell out a sent message.

- *RainDance/Musica Acuatica:* Twenty falling streams of water, modulated with audio signals, create music and sound when intercepted by visitors' umbrellas.
- *Living with Electricity:* Three domestic settings, each containing a throw rug, a lamp, a transduced rocking chair, and a sound-making device fitted with actuators. The three areas are interconnected via local area network so that rocking in one chair produces movement and sound in a different one.
- *Gray Matter:* Interactive electrified objects that produce sound and sensation when stroked with the hand.
- *Edison Effect:* Ancient phonograph records, wax cylinders, and holograms are scanned with lasers to produce music at once familiar and distant, like some faintly remembered melody running through the head.
- *Fireflies Alight on the Abacus of Al-Farabi:* A sixty-foot-long music wire with little dancing loops of monofilament is stretched in a dark room and illumined by an emerald laser beam. The loops dance on the harmonic nodes of the wire, producing flickering points of light and aeolian harplike sounds.

Each of his installations has a depth of historical reflection that is easily missed by the casual observer. *The Messenger,* presented in the Galerie Metronom in Barcelona, demonstrates this depth. Here is DeMarinis's short description:

The Messenger: E-mail messages received over the Internet are displayed letter by letter on three alphabetic telegraph receivers: a large array of 26 talking washbasins, each intoning a letter of the alphabet in Spanish; a chorus line of 26 dancing skeletons, and a series of 26 electrolytic jars with metal electrodes in the form of the letters *A* to *Z* that oscillate and bubble when electricity is passed through them.[13]

The installation seems a fascinating event to observe. Its historical referents make it even richer. It is based on a 1753 landmark telecommunications event in which an unnamed researcher with the initials C.M. sent messages via twenty-six charge-carrying lines that caused movement in distant static-electricity-detecting Leyden jars, thus indicating letters of the alphabet. DeMarinis sees this era's interest in electricity intimately tied to cultural developments in democracy. In the catalogue for *The Messenger* installation, DeMarinis shares some of his analysis of Francisco Salvá, a Catalan scientist's, experiments:

Electricity, though observed since ancient times, only became a subject of intense interest in certain enlightened circles during the first half of the 18th century. . . . In electrical demonstrations during the ancien regime, little distinction was made among the message being transmitted, the path of conduction, and the recipient. On one occassion in a demonstration before the king, organized by the Abbé Nolle, 180 guards were said to have been made to jump simultaneously [by shocks]. . . .

[In Salvá's experiments] 26 wires each carried a voltage corresponding to a letter. Salvá specifies a number of people, one for each wire. Upon receiving a sensible shock, each of these people, presumably servants, was to call out the name of the letter of the alphabet to which he corresponded. . . . Toward the final years of the 18th century, after Galvani's discovery of animal electricity, Salvá formulated a revised proposal for the telegraph using freshly severed frogs' legs as the indicators. Each leg, when stimulated by the spark, would dance and, in so doing, jerk a slip of paper on which the corresponding letter of the alphabet had been written. In the first decade of the new century, after Volta's invention of the electrochemical battery, Salvá proposed a scheme that proves politically correct to this day: electrical current flowing through the wires causes electrolytic decomposition of water, the resulting bubbles of hydrogen serving to indicate the letter selected.

Background materials for other installations provide other fascinating discourses on culture, technological history, and personal reflection. His description of his work *The Edison Effect* (reflecting on Thomas Edison's inventions and cultural context) shows a similar mining of technological history for its deeper meanings and its conversion of these ideas into visual poetry:

[I]t invokes a metaphorical allusion to the physical phenomenon known as the "Edison effect," wherein atoms from a glowing filament are deposited on the inner surface of light bulbs, causing them to darken. . . . the metaphorical image of the darkening of the light is an ancient one, recurring in the I-Ching, in Mazdaism, and in Shakespeare's oxymoronic "when night's candles have burnt out." Enantiodromic reversal at the atomic level can be used to symbolize opposing primal forces and may serve to mythicize otherwise commonplace occurrences. . . .

Eminent authorities, including French scientist Sainte Claire de Ville, upon reading announcements of the talking machine, pronounced it a fraud and a hoax perpetrated by a concealed ventriloquist. . . . Perhaps the very notion of compressing the vitality of human utterances, of squeezing the flights-of-fancy of musical invention into the unidimensional coffin of machine reproduction, was abhorrent on some primal level. Or, perhaps, there persisted the stubborn notion that sounds are inherently transitory and must always be synthesized or intoned anew . . .

A dream of early phonographers was to read with their eyes the wiggly line inscribed by the needle as a lasting trace upon the wax . . . Until very recently—the 1980s,—the memorative act of audition still consisted of dragging a diamond stylus, fingernail-like, across a vinyl blackboard. . . . [With the CD] the laser touches but fleetingly upon the groove, the impact of its photons abrading no material whatsoever. The rupture is complete. The emancipation of memory from touch has been fulfilled.[14]

DeMarinis claims that neither extreme of antitechnological Luddism nor unbridled technophilia are sufficient to reflect on the role of technology in culture. Art that attempts to make ideas physical is a fertile locus for considering the myths of technology:

Art is a response to belief and acts as a consolidating force within culture. It gives place, time, image, and sound to myths. But the myths of science are not content to be represented by picture, poems, and symphonies. The scientific revolution threw away the idea that things were connected by appearances and replaced it with the idea that things are connected by how they work. Thus the artist's role is to animate with the imagination the way things work.

I think of technology as having a dual-being. It is simultaneously a dream, or product of our dreams, and the medium in which our dreams are exchanged and elaborated. . . . To disentangle these two functions of technology is difficult. One could, of course, stand aside and take an antitechnological approach. I have chosen what is perhaps a more difficult path—to use technology itself to express and investigate this dilemma. I try to do this by standing technology on its head. Exploring alternative technologies, using physical principles that have not found any place in the dominant technology, re-connecting the dream and the mechanism. . . .

The promise of technology enabling us to be conscious masters of our experience, overlords of the material world, is long past. We have more the impression of being swallowed by our own

doing. . . . There is no way out, but we are hopefully capable of an occasional lucid moment within our dream where we can savor and marvel at the whole process even as we are swept away by it, that being the nature of our experience.[15]

Other Artists and Projects

Comment on Popular Culture ***Sheldon Brown***'s outdoor installation *Video Wind Chimes* presented a video projector that looked like a streetlight but projects video from television stations that changes channels as it blows in the wind. ***Tammy Knipp***'s *Case Study* presented viewers with a simulation of dyslexic perception by asking them to vulnerably lay down under big video monitors that kinetically move toward them. ***Marque Cornblatt*** created kinetic and quasi-robotic devices that expressed the ambivalence of the cyber era. Using cyberpunk techniques of assemblage, he created installations that confuse and bemuse, such as self-propelled TV stands doing whirlies, and Icarus figures with windable wings. One critic described the works as being assembled out of the three *T*s—toys, trash, and technology. ***Joseph DeLappe*** created works such as *The Mouse Series* which customized computer mice as forms of social commentary, and *Masturbatory Interactant,* in which a bar-code scanner on a mechanical arm randomly selects self-erotic videos to be projected onto a plastic inflatable party doll. ***Jim Pallas***'s interactive scultpures usually comment on social processes, such as *The Senate Piece,* commissioned by U.S. Senator Carl Levin, in which kinetic objects respond to Senate processes—an inflatable senator comes to life during quorum calls and a dollar bill drops during Senate activities. ***Neil Grimmer*** created electronically controlled kinetic sculptures out of commercial items such as vibrators. The ***Art and Robotics Group*** of Canada created *SenseBus,* which allows everyday home objects to sense and communicate with each other without any central brain or traditional digital interfaces, and *SpaceProbe,* which was a collection of electro-art that incorporated unusual sensors and telemetry. ***Steve Gompf***'s *Televisors and Early Motion Picture Technologies* kinetically activates old wooden boxes and other found objects in an attempt to comment on the early days of television. ***Arthur Ganson***'s whimsical contraptions activate diverse materials and found objects to manifest "qualities least associated with machines."

Sheldon Brown: ⟨http://www.cra.ucsd.edu/~sheldon/⟩
Tammy Knipp: ⟨http://siggraph.org/artdesign/gallery/S97/art_knipp.html⟩
Marque Cornblatt: ⟨http//www.falsegods.com.transhuman.html⟩
Joseph DeLappe: ⟨http://digitalart.artsci.unr.edu/delappe.html⟩
Jim Pallas: ⟨http://www.ylem.org/artists/jpallas/JPALLAS1.HTM⟩
Art and Robotics Group: ⟨http://www.interaccess.org/arg/index.html⟩
Arthur Ganson: ⟨http://web.mit.edu/museum/exhibits/ganson.html⟩

Comment on Interaction ***Peter Dittmer*** created kinetic devices that explored language and communication. His systems typically engaged the viewer in a dialogue via onscreen text and spoken words. Things sometimes go wrong. The *Wet Nurse* kinetically acted on a glass of milk as part of its interactions. ***Mark Madel***'s interactive electronic sculptures, such as *Timesharing,* demand user interaction with the piece and each other, calling forth "blurred distinctions between interaction and relationship and between coercion and invitation." ***Laura Kikauka*** created kinetic works that question technophilia. A *Leonardo* article describes her *Hairbrain2000* harness, which creates a wearable viewing chamber in which sparks and relay clicks are activated by viewer motion. The artist group ***Sine::apsis*** experiments creates kinetic and robotic art events that attempt to introduce concepts from biology and artificial life into their installations in order to investigate complex behaviors and interactive structures. The ***Soda*** artist group's kinetic installations challenge the inertia of architectural spaces and the nature of autonomy—for example, with autonomously flexing panels and electrochromic mirrors with dissolving messages and *The Priest and the Dying Man* sculptural robots, which speak together about free will.

Extensions of Puppets ***Heri Dero*** creates shadow puppetlike kinetic assemblages by which he tries to capture the "machine as mystery, play, magic, and metaphor." In *Childhood/Hot and Cold Wars,* ***Ken Feingold*** built an installation reflecting on personal memories of the cultural history of the 1950s and 1960s by offering a grandfather clock full of rear-projected video images shaped by a globe of the earth that viewers could turn. In *Interior,* viewers touch a medical torso to control puppets speaking, seen outside of a window.

Linkage of Motion and Virtual Space In *Room for Walking,* ***Daniel Jolliffe*** offered a wagon with a video projection in its bed that reveals aspects of a virtual object as the viewers pulled it around. ***Doug Back***'s *Small Artist Pushing Technology* consisted of a monitor on wheels with an image of a small person pushing coordinates the same way that the viewer moves the monitor. ***Sigi Möslinger***'s *Sweetcart* revealed a digital landscape as a monitor is rolled about.

Peter Dittmer: ⟨http://www.foro-artistico.de/english/program/literat.htm⟩
Mark Madel: ⟨http://www.mggrd.com/mm⟩
Laura Kikauka: ⟨http://mitpress.mit.edu/e-journals/Leonardo/gallery/gallery291/kikauka.html⟩
Sine::apsis experiments: ⟨http://www.sine.org⟩
Soda: ⟨http://www.soda.co.uk/index.htm⟩
Heri Dero: ⟨http://www.ntticc.or.jp/permanent/heridono/introduction_e.html⟩
Ken Feingold: ⟨http://www.kenfeingold.com/⟩
Daniel Jolliffe: ⟨http://www.interaccess.org/touch/jolliffe.htm⟩
Doug Back: ⟨http://www.interlog.com/~steev/exhibition/networks/gallery/back.html⟩

Summary: More Than Robotics

Although not high technology, machines are a critical infrastructure for contemporary society. They are the brawn that ultimately translates intelligence to the world of stuff. Research attention is mostly focused on robots as the ultimate machines that incorporate intelligence and flexibility. But the lowly machine without robot aspirations is an important cultural icon. Indeed, some feel that the electricity that makes the technology go deserves more cultural analysis.

Since the beginning of this century, isolated artists have experimented with machine motion and electrical light. Usually they approached these technologies within the aesthetic traditions of seeking beauty of motion and illumination. Within the last decades, however, artists have explored the cultural implications of machines and light. The artists described in this chapter have been free to create mechanical installations that use the latest technologies but pursue cultural agendas unaddressed by mainstream industrial applications. In some ways they are the logical extension of the ancient art form of sculpture.

Notes

1. B. Cannon, "Art in the Age of the Microcontroller," ⟨http://www.jps.net/bcannon/⟩.
2. M. Komisar, "Statement," ⟨http://www.xlnt.com/neonart/mkomisar/mkomisar.html⟩.
3. G. Barsamian, "Description of Work," ⟨http://www.concentric.net/~Venial/⟩.
4. J. Farber, "Commentary on *Putti,*" ⟨http://www.concentric.net/~Venial/⟩.
5. P. Hoberman, "*Faraday's Garden* Description," ⟨http://www.portola.com/PEOPLE/PERRY/perry.html⟩.
6. "San Francisco Gate" Web site, "Interview with Alan Rath," ⟨http://sfgate.com/eguide/profile/⟩.
7. D. Friis-Hansen, "Curatorial Statement 'Bio-Mechanics' Show," ⟨http://www.camh.org/cam_exhandprograms/cam_onlineexh/cam_rath/rath-index.html⟩ [expired link].
8. "San Francisco Gate" Web site, "Interview with Alan Rath," ⟨http://sfgate.com/eguide/profile/⟩.
9. B. Cannon, "Artist Statement," ⟨http://www.jps.net/bcannon/⟩.
10. B. Cannon, "*Tree Time* Description," ⟨http://www.jps.net/bcannon/⟩.
11. B. Cannon, "Anti-Speed," ⟨http://www.jps.net/bcannon/⟩.
12. *ICC Journal,* "Interview with Paul DeMarinis," ⟨http://www.well.com/user/demarini/shiba.html⟩.
13. P. DeMarinis, "Description of *The Messenger,*" ⟨http://www.well.com/user/demarini/messenger.html⟩.
14. P. DeMarinis, "Description of *Edison Effect,*" ⟨http://www.well.com/user/demarini/edison.html⟩.
15. *ICC Journal,* "Interview with Paul DeMarinis," ⟨http://www.well.com/user/demarini/shiba.html⟩.