Stony Brook University

Indicator

A thesis presented by
Joseph A. Esser
to
The Graduate School
in Partial Fulfillment of the
Requirements
for the Degree of
Master of Fine Arts
in
Studio Art

Stony Brook University

May 2010

Stony Brook University

The Graduate School

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Abstract of the Thesis
Indicator

by

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Stony Brook University
2010

Making art is a journey. Like links of a chain, each work leads to the next and so on and so on. This progression can be subtly altered as the artist grows; new techniques, new experiences and changes in personal beliefs all affect the work. Occasionally the next step can be an evolutionary leap. This, I believe, is where one series ends and another begins. Although the new work may be drastically different, it is forever linked to what came before.

Through the examination of my own work, I found it more and more necessary to start the story before the beginning. In order to better explain my current body of work, I had to first examine my previous body of work. This thesis outlines the progression of my artwork from the end of undergraduate school to my current body of work. I examine each link in the chain, exploring the changes in process, concept and influence.

My most recent body of work examines the wondrous and beautiful occurrences in nature. The experience of these wonders may be dismissed by the casual passerby. I translate these experiences into interactive, multimedia gallery installations that involve the audience as active participants. My creations are nothing more than facsimiles of the real phenomena. Many of Earth's natural wonders are in danger of disappearing. My work brings to light these endangered wonders and describes the difficulty inherent in recreating them as well as the possibility of their extinction.

The focus of this thesis is to highlight the transitions from project to project, explaining the changes that take place and to illustrate the profundity of an evolutionary leap in concept, materials, technology and process.

Contents

Acknowledgements

I would like to sincerely acknowledge everyone what has helped me along my journey and made my accomplishments possible. Without the support of my family, peers and instructors I would have never discovered the ability within myself to make it this far. Specifically: My mother and father, my brothers, Ms. Anna Miller, Christa Erickson, Nobuho Nagasawa, Takafumi Ide, Levy Lorenzo, Alexander Reben, John Maffucci, Dan Richholt, Stephanie Dinkins, Melvin Pekarsky, Toby Buonagario, Andrew Uroskie, Grady Gebracht, Martin Levine, Howardena Pindell, Dwaine Crigger, Jerry Hatch, Victoria Weaver, Douglass Freed, Paul Allen, Donald Luper, and Josephine Dey.

Introduction

"To invent, you need a good imagination and a pile of junk." - Thomas A. Edison (1847 - 1931)

For as long as I can remember, I've been taking things apart and rebuilding them. It probably began with Lego blocks in my childhood. From there, it evolved to radio-controlled cars to bicycles to the lawnmower to the family computer and to nearly every part of my 1963 Ford Galaxie. My innate curiosity has always driven me to imagine how things work. My explicit desire to see how those things work often compels me to disassemble them for a clearer understanding; frequently leaving me with the dauntless task of having to put them back together.

I was born and raised in the rather rural setting of Central Missouri. I spent a great deal of my youth in the outdoors, surrounded by nature and given the opportunity to experience its wonders. I was a Boy Scout for many years. Camping, hiking, canoeing and exploring the wilderness at an early age gave me a strong appreciation and understanding of the natural environment.

In high school I studied art. I became fascinated with Impressionism and Post-Impressionism, specifically, the landscapes of these movements. My knowledge of art history at the time was quite limited. However, in the works of Monet, Cézanne and Van Gogh I discovered a kindred appreciation and uninhibited perception of nature. Their landscapes were not merely representations of mere visual perception, they were much more. Their works were a description of their individual experience of the place, a personal narrative, presenting each artist's understanding of their existence within the landscape. These artists' awareness of nature reinforced my own and has been a source of inspiration throughout my life.

I entered college with the intent of following in my father's footsteps as an architect. In architecture school I began learning the principles of design. I studied the history of architecture and developed an approach to design in which form and function were not mutually exclusive. I was inspired by Bauhaus architecture and the International Style and was attracted to the work of Le Corbusier, Walter Gropius and Mies van der Rohe. Their approach, in which ornamentation was done away with completely, sought harmony between the function of a building and its design. Aesthetics as an architectural concern had

given way to the greater interests of efficiency and programming of a building.[1] Their no-nonsense style is something that I have tried to reproduce again and again throughout my work, foregoing decoration and maintaining honesty with my materials.

After three years of architecture school I decided that it wasn't what I wanted to do with my life. I had been spending my summer and winter vacations earning practical experience by working in my father's office. It was nothing like school. Instead of conceptualizing grand architectural schemes, building models and using my hands, I was serving time in a cubicle in front of a computer screen editing drawings of nursing homes, apartment buildings and jails. These human filing cabinets offered no creative outlet and I couldn't stand the thought of a career in which I would never get to use my hands. My architectural studies were highly entrenched in a hands-on approach: hand drafting, model building and practical construction techniques. The reality of working in an architectural office was something altogether discouraging. This idea of using my hands became the driving force behind my decision to leave architecture school and begin studying art.

I returned to my home town and began attending the local community college. Unsure of my future plans, I focused my studies on studio art and environmental science. Through my research of the environment I was able to gain a greater understanding of the Earth and its function as well as humanity's responsibility to it. In art, I didn't focus on any single medium. I studied drawing, painting, ceramics, fibers, sculpture and history. I absorbed any knowledge of art that I was taught and in my second year I got a job working in the Daum Museum of Contemporary Art. Over the next two years I worked in the museum installing exhibitions and had the opportunity to meet a great number of artists and interact with them. Another interaction which I observed heavily was between the museum goers and the artwork. Rural Missouri was a very unlikely setting for a contemporary art museum; it attracted a vastly diverse crowd. On one hand you had the students, artists and museum regulars and on the other were the locals and casual visitors. It was the latter that really intrigued me. I spent a lot of time talking with and observing the random museum goers. Their observations really led me to reevaluate my concept of what makes a work of art successful. It

[1] Sam Hunter, John Jacobus, and Daniel Wheeler. *Modern Art*. 3rd ed. (New York: Prentice Hall, 2004), 196-214.

was here that I began to understand the diversity of my potential audience and would strive to create works that could be appreciated universally.

I began my studies at Missouri State University in the fall of 2004. Having dabbled in many different mediums, it was there that I settled into sculpture as my primary focus in art. I flexed my artistic muscles and learned every new sculptural process and technique that was available. It was at this time in my life that the dilemmas of modern society began to give me pause and I decided that my artwork would investigate these issues. I truly began to study my own place in society and my society's place in the world. With this new direction for my artistic expression I developed a new body of work.

Early Works

Overview

In the years prior to entering graduate school here at Stony Brook, my work concentrated on the vast and varied issues of society, politics and the environment. My aesthetic, drawn largely from my experience in architecture, consisted of geometric, interactive, and kinetic forms exploring space, order, physics, statics, and structure. Through my sculptures I sought to scrutinize mankind's relationship with the environment and questioned the socially and politically influenced system of values in the modern world. I invited physical interaction with the sculptural object by the viewer. Simultaneously, I was inviting the viewer to contemplate their physical connection with the sculpture as an implication of their personal responsibility as an agent of the particular social / environmental / political consequence a given sculpture expressed.

My concern with audience interaction was rooted in my prior experience working in the Daum Museum and observing the patrons. I wanted to involve the viewer on a physical level, with the intent of engaging their tactile sense and creating a more wholly encompassing experience. Considering the social nature of my work, I thought of this physical interaction between the viewer and the sculpture as a sort of handshake, like in the binding of a contract or the acknowledgement of a mutual understanding.

While I was creating these works I was simultaneously studying the works of other kinetic artists, specifically Jean Tinguely and Arthur Ganson. Tinguely's motorized sculptures, also referred to as Metamechanics, were rooted conceptually in Dadaism and focused on scrutinizing greater social issues within modern society.[2] His work definitely had a profound effect on me and expanded my fascination with kinetic sculpture. I also connected with his criticism of the modern world of his time and felt that I could expand upon his ideas in the context of my time. Ganson, a contemporary of Tinguely, also built motorized kinetic sculptures. Conceptually, his work didn't influence me greatly; however, his raw aesthetic treatment of his machines and his passion for tinkering and building did inspire me.

[2] Sam Hunter, John Jacobus, and Daniel Wheeler. *Modern Art*. 3rd ed. (New York: Prentice Hall, 2004), 329-330.

Fluctuate, 2006

The first sculpture from this series, titled *Fluctuate*, came about in response to the ever-changing price of gasoline in the western world. The sculpture consists of a sealed PMMA (Plexiglas) box filled with water and used motor oil mounted atop a steel structure that resembles the scaffolding atop an oil well. A steel hand-crank extends from the front of the sculpture, requiring physical interaction from the viewer. When the piece is "activated", the box slowly pitches from side to side, sloshing the oil and water inside. The structure is very sparse and all of the mechanical parts are exposed. All of the materials are bare; nothing is painted nor treated in any manner as to conceal its true nature. This was the first piece in which I made use of the hand-crank as a means of interaction. I decided against motorizing the sculpture because I felt that removing the viewer from the kinetic process would lessen their connection with the piece. This sculpture would become the basis for the rest of my work throughout undergraduate school (and beyond).

Fluctuate - 2006

Squander, 2007

I often employed used motor oil in my sculptures. One reoccurring theme of my early work was the pillaging of natural resources and the

Squander - 2007

violation of the environment. In 2007, the city in which I was living (Springfield, MO) was planning construction of a new coal power plant. There was a tiny outcry from a small minority of the public that was opposed to this plan. My sculpture, *Squander*, was a direct response to this situation. Feeling a need to expose the implications of the proposed plant, I began by combining natural elements (a tree stump) with my own man-made machinery to emphasize this conflict. When the viewer turns the crank, a large hollow cylinder repeatedly penetrates the top of the stump in a very suggestive and not-so-subtle manner. On top of the stump, at the point of penetration, is a pool of used motor oil which spits and sprays making a mess and filling the air with its foul odor.

Cyclical, 2007

Cyclical - 2007

In the sculpture *Cylclical* (2007), I was examining one proposed theory that climate change (global warming) is part of a natural cooling and warming Earth cycle. I cut a tree branch into twelve six-inch segments and attached each to the end of long rods. The hand-crank operates a long camshaft that spans the length of the sculpture. When the crank is turned, the rods move up and down in a predetermined sequence. The motion of the tree segments are that of a sine wave, a linear graph of a cycle over time. The machine squeaks and clicks as the dead tree branch undulates in a rhythmic calculated pattern. *Cyclical* was another example of my somewhat subtly cynical observation of society's attitude toward the environment.

Cyclical - detail

A Patriotic Act, 2007

A Patriotic Act - 2008

The last sculpture I built prior to graduating from Missouri State was *A Patriotic Act*, 2007. With this being my final sculpture of undergraduate school, my goal was to create a greater depth of meaning in my work while maintaining a small degree of ambiguity and irony. Although I had been focused on exploring environmental issues in my work, I chose to turn my cynical eye to the U.S. government. This sculpture combines the somewhat meaningless gesture of flag waving with an overly complex and contrived mechanical procedure in order to sarcastically criticize the role of the individual in the government. The viewer turns the handle which is attached to a bicycle crank and wheel. The wheel turns a heavy concrete drum at the base. Through a series of belts and pulleys, the drum slowly turns the flag and also stores inertia so that the flag will continue to wave after the viewer has gone.

While conceiving this sculpture I was simultaneously entrenched in the study of Dadaism. I began considering my work more in an art-historical context and felt that an allusion could add some artistic depth that it had been missing. Through my studies I began to discover a deep connection between my work and that of the Dadaists. I felt that my "useless machines" were embracing the Dada concept of meaninglessness and reflecting their rather bleak critique of the modern world.[3] The aesthetic appearance of *A Patriotic Act* was certainly influenced by Marcel Duchamp's *The Bride Stripped Bare by Her Bachelors, Even*, and my use of the bicycle wheel was a direct homage to Duchamp.

[3] Sam Hunter, John Jacobus, and Daniel Wheeler. *Modern Art*. 3rd ed. (New York: Prentice Hall, 2004), 151-152, 163-173.

Oil Drum, 2007

Oil Drum - 2007

When I first arrived at Stony Brook I found great difficulty in deciding on a new path for my art, or if I was even going to follow a new path. After a great deal of confusion and pondering I surmised that I had no new direction and any drastic change in my art at this point would be entirely contrived. Although I had no new direction I still needed to produce artwork, so I continued with what I knew. *Oil Drum* would be the first sculpture of my graduate career.

Oil Drum was intended as an outdoor sculpture, and aside from this fact it very much falls in line aesthetically and conceptually with my work from undergraduate school. The central object is an old, worn, empty steel drum suspended from a wooden frame by springs. Above the suspended drum is a camshaft with ten eccentric wheels (similar to the camshaft of *Cyclical*, 2007). The eccentric wheels raise and lower long steel arms with hammers of different sizes attached to the ends. When the viewer turns the crank the hammers fall in sequence, hitting the drum and causing a horribly noisy racket.

Oil Drum - detail

Unlike the titles of my previous work, *Oil Drum* is simply a physical description of the central object rather than a conceptual allusion to the work's underlying theme. The

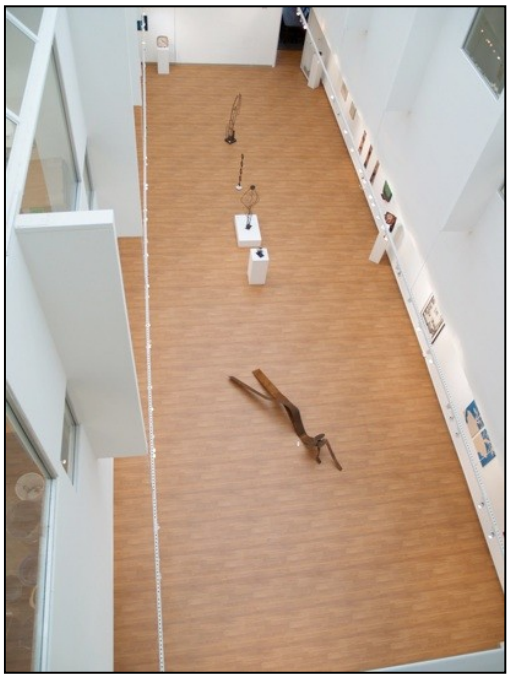
purpose of this piece is to call attention to the empty barrel, but rather than allow the viewer to imagine the original contents of the drum, the title is meant to alter the viewers' perception of the work.

Once again I employed a hand-crank as a means of activating the piece, considering the viewer as a participant. The sheer volume of noise produced by the sculpture and the proximity required to operate it alters the viewer's experience into an almost masochistic encounter. My audience in the rural Midwest seldom grasped all of the ideas presented in my interactive works, rather, focusing on the interaction itself as a novelty. The interactive aspect of *Oil Drum* was far more successful than previous works and the novelty was replaced with realization. The response from my new audience was of a greater understanding of my underlying concept.

Although I had intended for the piece to be displayed outdoors, because I used mild steel in the fabrication of all of its components this was not possible. I left it outdoors for almost a year and let all of the steel parts rust and weather to match the condition of the drum before I brought it back inside and returned it to operational status. Originally I conceived of the *Oil Drum* as a sort of musical instrument with the hammers tapping out a gentle rhythm. However, in the end I felt that this approach didn't fit well with the concept of the piece and decided to approach it as an alarm bell rather than an instrument and raised the hammers so they would fall violently onto the drum. The noise that echoes through the hollow steel container serves as a signal, a reminder that one day every barrel of oil could be empty.

Lightwell Gallery Proposal, 2007

In my attempt to reinvent my work, I briefly considered site specific installation as a possible new focus. This consideration was instigated by my discovery of a call for proposals for the Lightwell Gallery in the Fred Jones Art Center at the University of Oklahoma. Rather than using my own interests and concerns as a conceptual starting point, I would now have to begin my consideration at the site of the work (pictured on the following page). In order to begin with this approach, I had to draw upon my architectural training and combine it with my training as a sculptor.



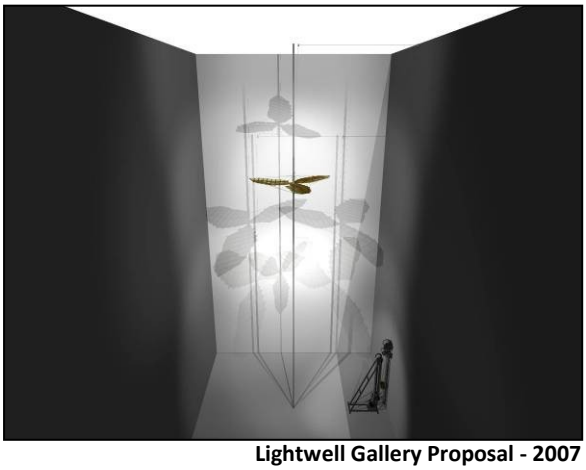
Images from www.ou.edu/lightwellgallery/

The gallery is simply a long rectangular space on the second floor in the center of the building; its most impressive feature is the two stories of open space above. The call for proposals stated that they were seeking projects that specifically took advantage of the gallery's height. With this as a starting point, I set off conceiving of all manner of mechanical sculptures that I could use to highlight the vertical space.

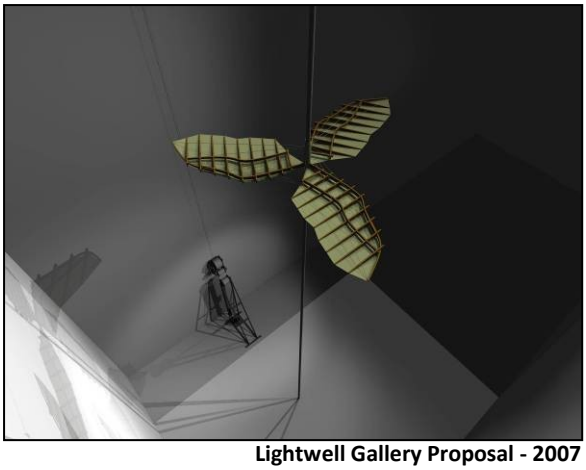
My final proposal was to create one (or more) winged machines that would be repeatedly pulled up to the ceiling along poles and then slowly lowered back to the floor. These machines would have three balanced wings that would cause them to spin during their descent. As inspiration for the design of the wings I looked at Leonardo DaVinci's drawings of human-powered flying machines. The wings would be constructed of lightweight wood and covered in a lightweight fiber (paper, gut, leather, etc.). To facilitate the vertical motion of the winged machines I planned a separate machine on the floor. This machine would use an electric motor and a series of ropes and pulleys to perform this action. With multiple elements and the piece's physical integration into the space I was now designing an installation, rather than a sculpture.

The design process began with drawings of the physical elements and detailed diagrams and descriptions of how each would work. The next step would be to create a visual representation of my proposed project in the actual space. I started to make scaled perspective drawings of the gallery based upon photos and measurements specified on the gallery's website. With the deadline fast approaching I decided to resort to my architectural past and create a three dimensional digital rendering of my proposed work in the space. Using a computer program that I learned in architecture school (Form-Z), I built this virtual model and was able to easily render multiple views rather quickly. Although I could render somewhat believable still images for the proposal, I was limited by this software and unable to animate the virtual sculpture to produce video.

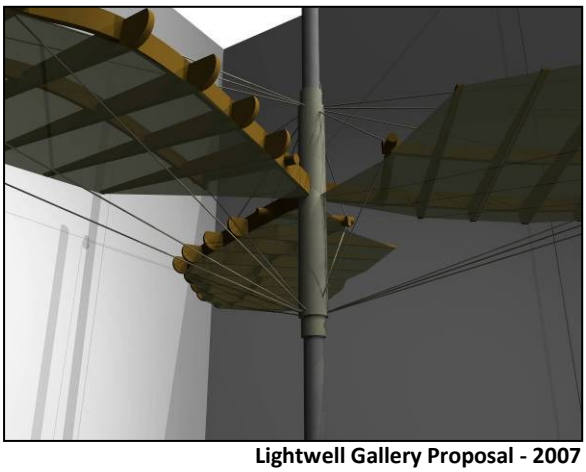
I began constructing the actual installation near the end of my first semester. This was short-lived, however, as I ceased construction when I received a letter rejecting my proposal



Lightwell Gallery Proposal - 2007



Lightwell Gallery Proposal - 2007

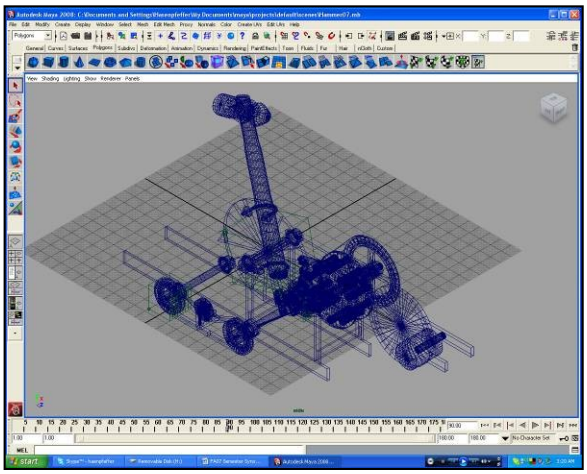


Lightwell Gallery Proposal - 2007

several weeks later. It was described as “too complicated” and I am certain the selection committee was unsure of my technical skill relative to my highly ambitious proposal.

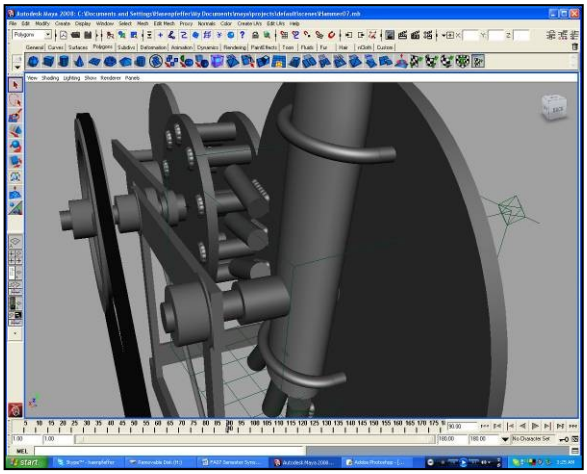
Egg and Hammer, 2008

In my second semester I chose to continue this idea of using the computer as a design tool in the creation of my sculptures. I used this semester to learn Maya, a three dimensional digital animation program designed specifically for animation (rather than architectural design).



Egg and Hammer, in process - 2008

I abandoned the idea of site specific installations (for the time being) and returned to creating sculptural objects. I was beginning to find difficulty adjusting to life in Long Island and being 1,200 miles from my home, my family and all of my friends. I felt very isolated. I decided rather than letting my isolation wear me down or get the best of me, I would use it as inspiration for my next sculpture. I wanted to create a self-portrait or a personal narrative that had a very specific meaning to me but also maintained enough ambiguity that the audience could create their own interpretation.

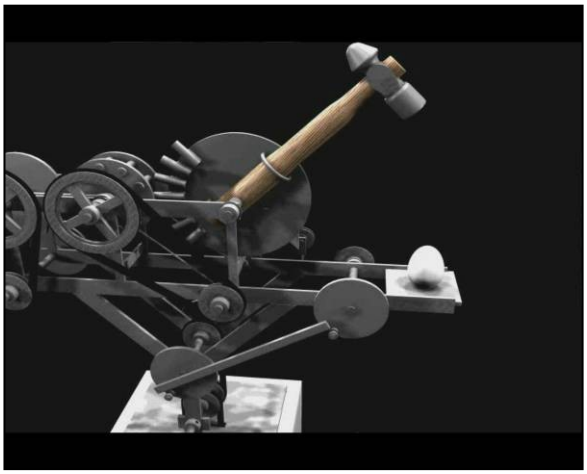


Egg and Hammer, in process - 2008

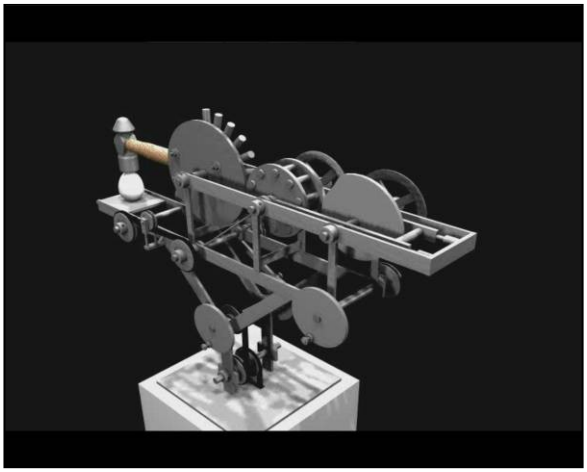
I began drawing a mechanical sculpture that was aesthetically similar to my earlier works. The drawings explored the relationship between two objects, an egg and a hammer. Once I felt comfortable enough using Maya, with my

drawings as a reference, I began creating a three dimensional animation of the sculpture, *Egg and Hammer*. Initially I regarded Maya as merely a tool for the design process. After completing the animation and seeing the sculpture brought to life I truly considered the work to be complete, a virtual sculpture.

In the digital animation, *Egg and Hammer*, the virtual camera flies around a highly complex motorized machine wielding a hammer. The hammer continually strikes at an egg poised on a small platform and always stops immediately before impact. Through careful observation the viewer can examine all of the moving elements and connections and determine that the virtual object is a physical possibility, meaning, that the machine can exist and function in reality as it does in the animation. Through the use of digital animation it would be possible to create a machine that could not exist in reality, but in following my original purpose for the animation as a tool, the machine is quite complete.



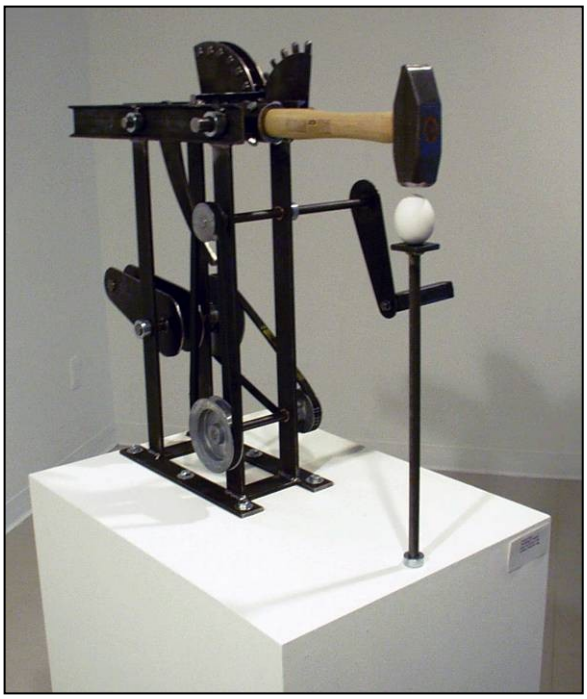
Egg and Hammer, video still - 2008



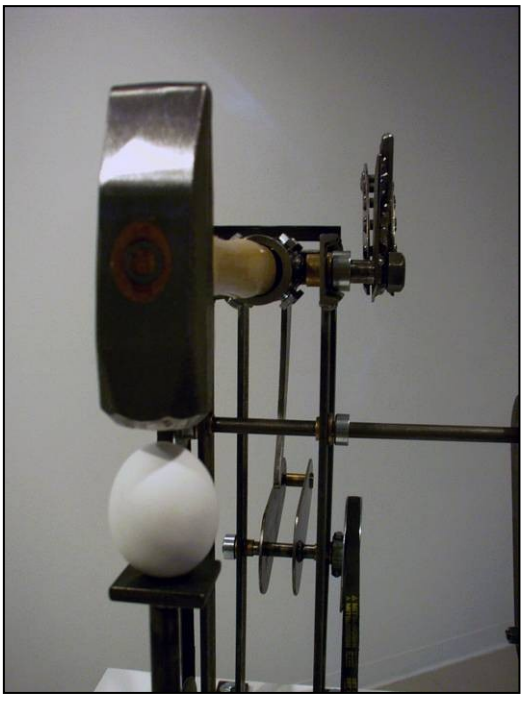
Egg and Hammer, video still - 2008

With the end of the semester approaching I needed to decide what I would exhibit in the first year MFA group exhibition, *…this is what we came with*, at the Lawrence Alloway Memorial Gallery. Initially I considered showing the animation as my contribution. However, my inner sculptor decided otherwise and in 2008 I constructed *Egg and Hammer*.

Although the title of the work remained the same, I did make many changes to its physical appearance. The sculpture I built was much simpler in its mechanical configuration. The level of complexity in the virtual sculpture was simply unattainable given the amount of time and resources available to me. Also, rather than being motorized, I returned to the use of a hand-crank. Although a great deal of philosophical implications can be inferred from the sculpture's interactivity, this element was simply a concession to the deadline. The animation shows the hammer coming to an abrupt stop, bouncing a little, and then coming to rest practically touching the top of the egg. One of the most confounding aspects of translating this virtual behavior that I created into reality is the fact that I never accounted for the flexing of the wooden handle of the hammer. I destroyed many eggs before I concluded that there would have to be a small gap between the hammer and the egg when it's at rest.



Egg and Hammer - 2008



Egg and Hammer - 2008

Sudden Origin: The Digital Leap

Overview

With a body of work from my first year that was really lacking focus; I set off in my second year with the express purpose of finding the new direction in my work for which I had been fruitlessly searching. My primary focus was on creating a solo exhibition for the Lawrence Alloway Memorial Gallery that was scheduled for immediately after the winter break (at the start of the spring semester).

It was around this time that I discovered a kinetic sculptor name Theo Jansen. He constructs large mobile kinetic sculptures powered by the wind. His sculptures are akin to living organisms; they are designed with complex mechanical logic systems that act like a brain. These creatures have many legs that allow them wander the beach and their logic systems serve to protect them from the elements (i.e. if the creature wanders into the water it will change direction or if the wind becomes too strong it will stake itself into the sand). I appreciated Jansen's ecological approach, powering his sculptures with wind, and I was very intrigued with this idea of building sculptures that emulate simple life forms.

Indicator 1.0, 2009

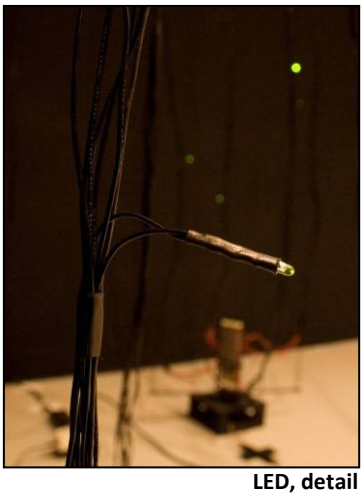
During the summer recess between my first and second year I was afforded enough time for a short visit back to Missouri. I spent my time catching up with my family and friends and simply enjoying the rural setting to which I was accustomed. I returned to spend the rest of my summer in Long Island. One warm evening while sitting on the front porch and reading I noticed a firefly in the yard. I turned my attention from the book to the yard and started counting the fireflies. After waiting for hours and hours I only ended up seeing about five or six. This was a really poor showing in relation to my experience from my recent trip back to Missouri. Dismayed by the relative absence of fireflies that night, I spent the subsequent evenings walking around my neighborhood. I did this for about a week with no better results. This greatly piqued my interest, so I began doing some research.

After talking to many native Long Islanders I found that the most common answer to my question as to the whereabouts of the fireflies was that there used to be many more. I needed to find a more scientific explanation. My research revealed that fireflies are very susceptible to water and ground pollution because they spend the colder months hibernating underground. Water pollution and pesticides are no strangers to Long Island, but the most prevalent pollution that is affecting the fireflies is light pollution. These insects use their bioluminescence to attract mates. Here in the suburban sprawl, with every other yard being lit up all night, the fireflies can't find potential mates and their population is dwindling.

My conclusion was upsetting. Was this the fate of the fireflies in Missouri as well? I can recall with great clarity my childhood experiences of gathering fireflies in mason jars from the great swarms in the back yard or in the woods. Would my generation be the last to experience this?

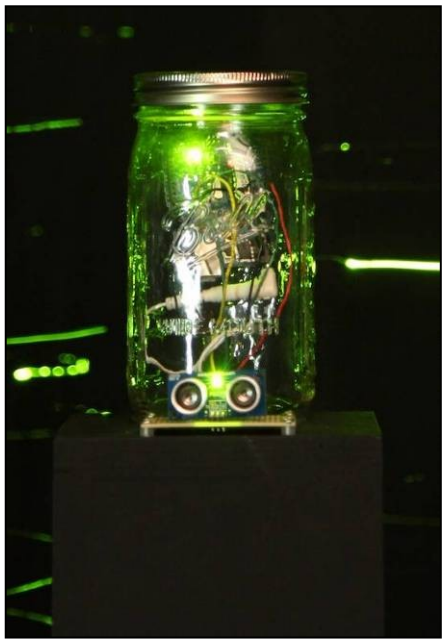
I decided that for my solo exhibition, *Indicator*, I would recreate my experience of a swarm of fireflies from my childhood in Missouri as an installation. At first I had no idea how I was going to go about this. I knew that blinking green LEDs in the dark would somewhat mimic the bioluminescence of fireflies. To simulate the movement I would suspend these blinking LEDs from an array of sideways rotating bicycle wheels at the ceiling. Beyond these two features of the installation I was still clueless about how any of the rest of it would work. Also, considering that mankind's influence on this natural phenomenon was what sparked the idea, I felt a strong need for some level of interactivity of the sculptural installation with the audience.

After a couple months of trying to figure out how to proceed on my own, I was introduced to an undergraduate student named Alexander Reben. Alex gave a workshop on basic electronics, sensors and how to use an Arduino microcontroller. After the workshop, I met with Alex and he helped me to design a plan for my installation. The plan was to use ultrasonic sensors linked to microcontrollers to make the fireflies react to the audience's presence in the gallery. An ultrasonic sensor is a device that emits sound waves that bounce off of solid objects and return to the sensor. It uses this data to



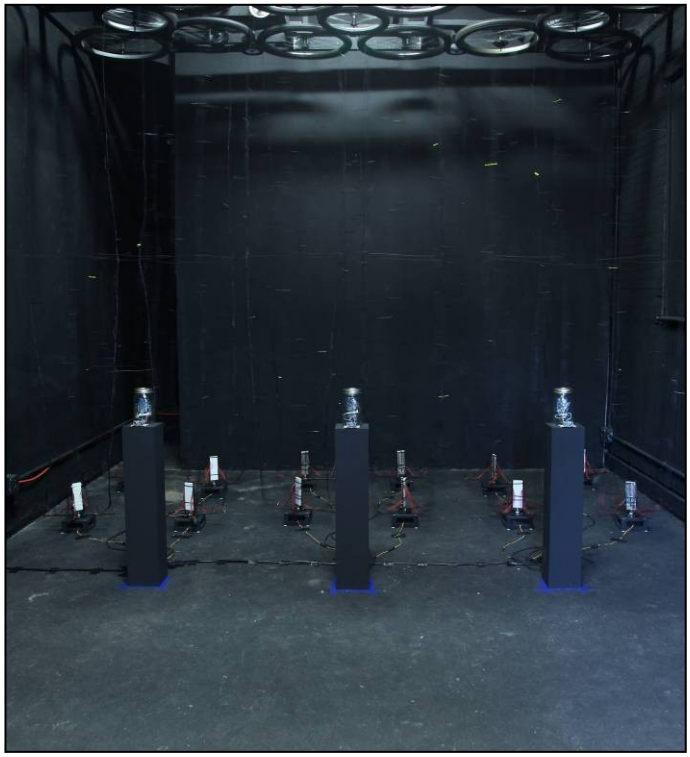
LED, detail

determine the object's proximity. A microcontroller is like a miniature computer that can be uploaded with purpose-specific programming to perform any number of functions. The microcontrollers have a limited number of outputs, meaning that each one would not be capable of operating enough LEDs to fill up the space of the installation. To overcome this limitation I would have to build custom circuitry to parse the microcontrollers' signals over multiple channels (one for each LED, nearly 200 in total). Also built into these custom circuits were a series of capacitors that were used to make the fireflies appear more realistic. Rather than just blinking on and off, the capacitors temporarily store the signal from the microcontroller and release it to the LEDs mimicking the way that fireflies light up quickly and fade out slowly.



Mason jar, detail

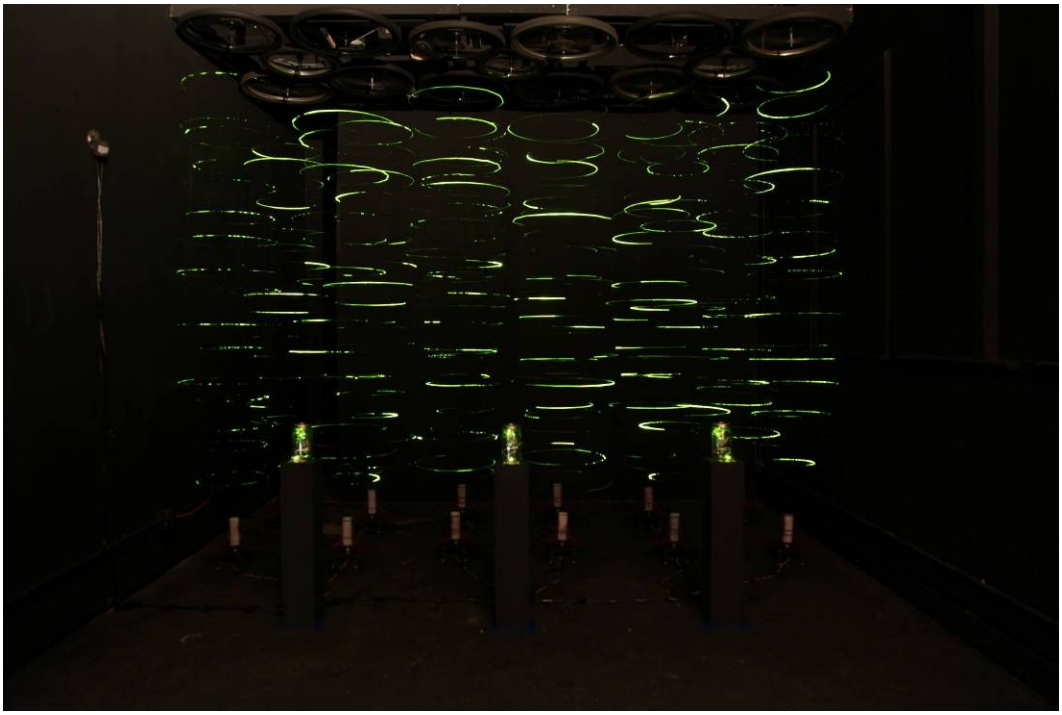
The installation had three continuous sections. The electronic components for each section were placed inside mason jars with holes poked in the lids, making reference to the experiences of my childhood. As the viewer approaches each section, the fireflies' flashing would slow in frequency and shorten in duration until finally they darken completely. The result was large scale interactive installation that mimics, as closely as one could with

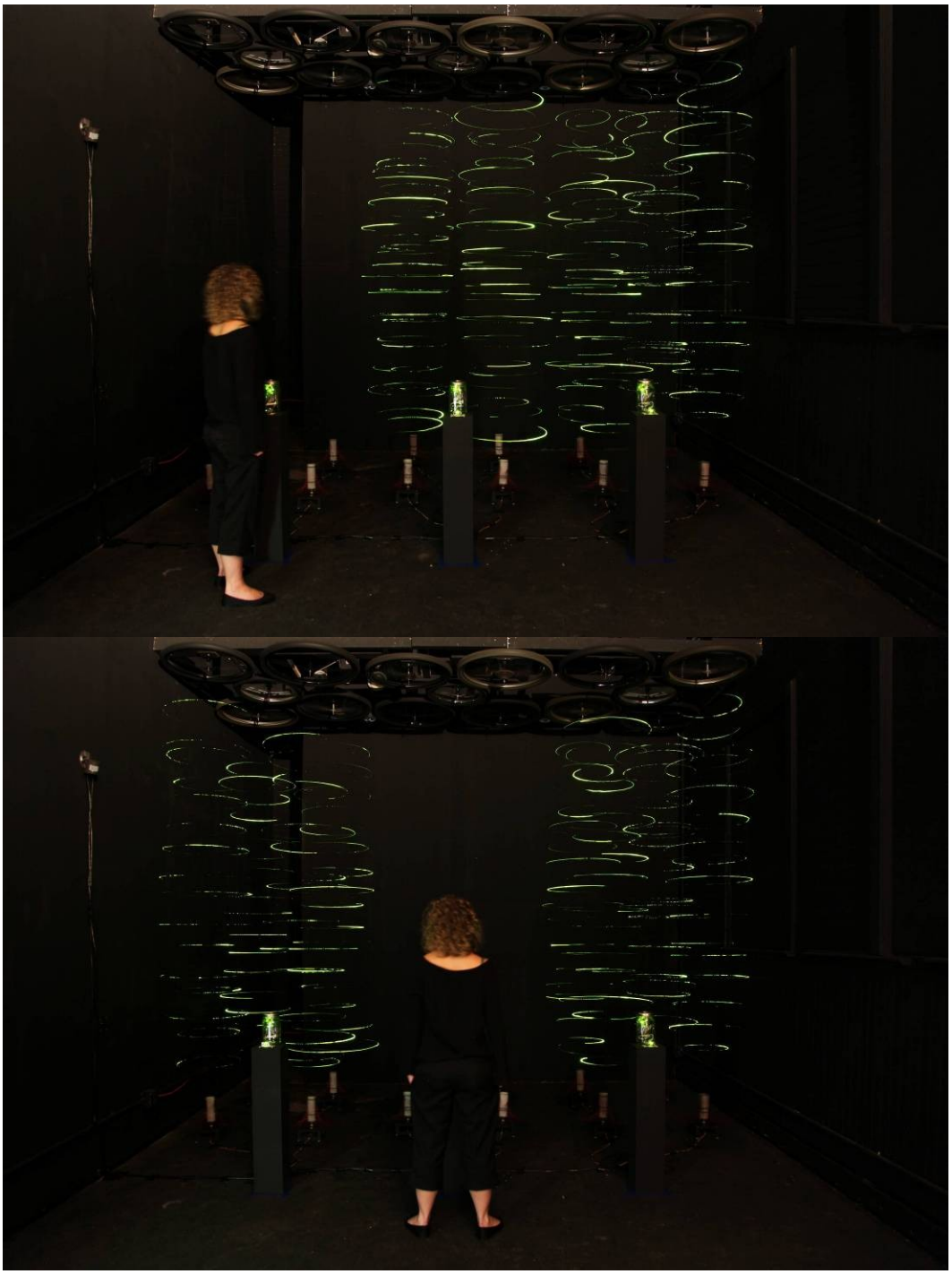


Indicator 1.0, with lights on - 2009

technology, the experience of being in a swarm of fireflies. This revelation in digital media would be the evolutionary leap that pushed me into a new series of work. *Indicator* (later titled *Indicator 1.0*) would become the basis for the rest of my work done at Stony Brook.

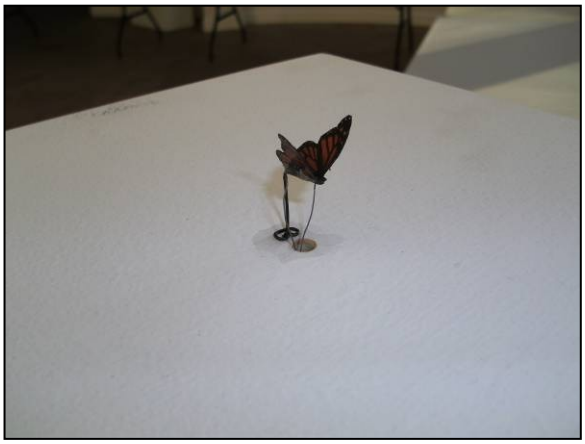
(The following images depict the installation's interactive element.)





Ephemera 2.0, 2009

While building and installing the *Indicator* exhibition I had already begun to consider my next installation. With new technology at my disposal, the possibilities were endless. I decided to continue my exploration by investigating similar wondrous natural occurrences. Desiring another subject whose existence was as equally precarious as the fireflies of Long Island, I chose the North American Monarch Butterfly. The fragile monarchs instinctually migrate yearly from all over North America to a forest in Central Mexico. All along their epic journey, the flock of butterflies swells, creating a larger and larger swarm the father south they travel. Finally, the monarch population of nearly all of North America ends its journey at the Monarch Sanctuary in Michoacán Mexico to spend the winter. Although the Monarch Sanctuary is protected by the Mexican government, the forests that surround it are subjected to illegal logging operations which are endangering the monarch's fragile ecosystem. The outer forests serve as a thermal brake that insulates the sanctuary; an alarming number of monarchs die yearly from freezing to death in the sanctuary. The idea of recreating another swarm of insects threatened by humanity appealed to me and felt as if it would be a logical next step.



Ephemera 2.0 - 2009

Ephemera 2.0 - 2009

Before I could figure out how to animate potentially hundreds of butterflies, I first needed to figure out how to animate one. While I was exploring different ways to accomplish this I came across a call for artwork that sought pieces smaller than one and a half inches

in any dimension, so I decided that my “test” monarch would be tiny.

Although the butterfly itself (a two-sided inkjet print) was less than one and a half inches, I had placed the batteries, motor and mechanical parts into the base below. The motion of the butterfly was triggered by a tiny button (it is almost visible in the right image, above and to the left of the butterfly). The motion was driven by a small DC motor that continually moved the wings up and down as long as the button was depressed. The motion was not at all realistic and I considered the piece as more of a study model than an actual work.

Indicator 2.0, 2009

Not entirely satisfied with the unconvincing results of my tests using the DC motor, I decided to experiment with a stepper motor. A stepper motor utilizes multiple individually controlled magnets that allow it to move forward and backward in small increments. Unlike a DC motor that requires only a power source to operate, a stepper motor requires a controller. I would use microcontrollers to operate the stepper motors. This would allow me to create a program that specifically mimics the natural movement of a butterfly at rest, enhancing the illusion.

Indicator 2.0 - 2009

As a stage for my swarm of monarchs I built a tree that stood from the floor to the ceiling. I had originally conceived of the tree as being as realistic as possible, but when I considered the results of *Indicator 1.0*, I came to the realization that it is not possible for me to recreate these natural occurrences through the use of technology. At least not to create them in a way that is convincing enough for me to attempt to

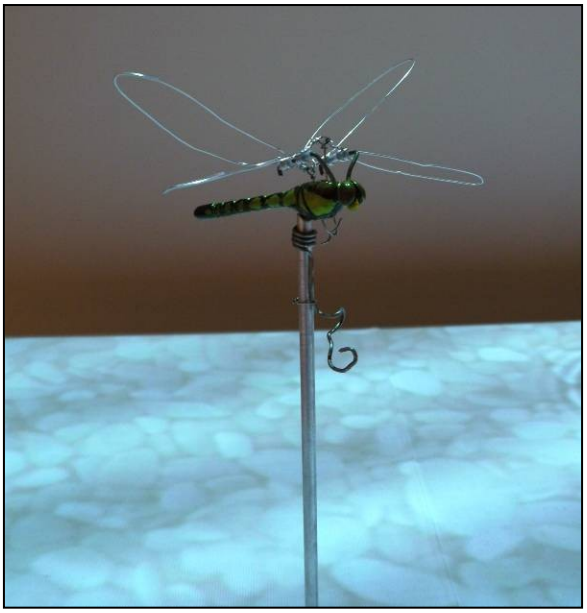
conceal the electronic and mechanical nature of the installation. So I decided to embrace this fact, as it lends a deeper meaning to the work. The fact that the installation is obviously a facsimile of the real occurrence in nature alludes to a possible future where the facsimile is the only place in which it exists. I compare this to the future equivalent of seeing a saber-toothed tiger or a wooly mammoth at a natural history museum. They may appear realistic, but the experience is just as real as experiencing Niagara Falls through a television screen or from a postcard.

Indicator 2.0 - 2009

Indicator 2.0 - 2009

My first installation of *Indicator 2.0* was at my solo exhibition, *Arrival,* at the Lawrence Alloway Memorial Gallery. I used recycled cardboard to create a rough impression of bark on the surface of the tree. The butterflies were two-sided inkjet prints similar to that of *Ephemera 2.0*. The rear of the tree and branches were left uncovered, allowing the viewers to examine its inner workings. The experience of the installation began with a frontal view of the obviously fake tree and the subtle and sporadic flapping of the monarchs' wings accompanied by the ratcheting sound of the stepper motors and hardware. The sound and motion invited the viewers to explore the work further, and as they circumnavigated the piece, their perception of the installation was altered upon viewing its electronic and mechanical interior.

Indicator 3.0, 2010

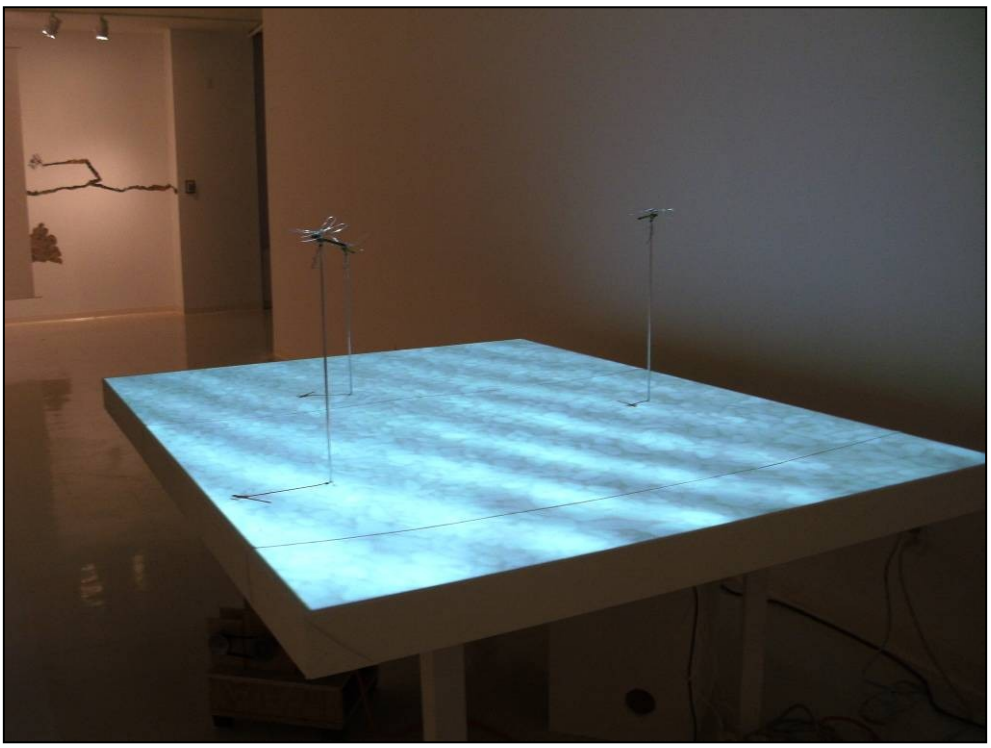


Indicator 3.0 - 2010

For the group MFA thesis exhibition, *…this is what we leave with*, I decided to construct an entirely new installation rather than re-showing any previous work. The subject for *Indicator 3.0* was the Emerald Dragonfly. During a spring trip upstate to Storm King Art Center I was mesmerized by these creatures. When I returned home I did a little reading about them. There are several types of Emerald Dragonflies; however, the one that caught my eye was Hine's Emerald Dragonfly. It is native only to Illinois, Michigan, Missouri and Wisconsin and is an endangered species. In Missouri it is the only insect on the endangered species list. Dragonflies are aquatic or semi-aquatic insects and are also indicators of a healthy aquatic biome.

I had observed these insects years ago, in high school, during a water ecology class that I had taken during one summer vacation. They would hover above the water and occasionally dip down to the water's surface. I was never really certain of what they were doing; I always imagined they were taking a drink. This is partially true. What the dragonflies were actually doing was cooling off in the water. I remember how mesmerizing this was, and decided to recreate this swift and elegant behavior.

I created small dragonfly bodies from polymer clay on the end of long brass tubes and painted them to match Hines Emerald Dragonflies. I fashioned two pairs of mechanical wire wings for each and attached them to the insects' bodies. The stage for the dragonflies was a large flat white surface onto which I would project a three dimensional animation of water that I created in Maya. The dual wings were moved up and down rapidly (in opposing directions) with a constantly running AC motor. The brass tubes atop which were mounted the



Indicator 3.0 - 2010

dragonflies moved up and down via stepper motors controlled with microcontrollers. The looped animation was being played from a laptop that simultaneously communicated with the microcontrollers via a program called MAX/MSP. The surface onto which the animation was projected was raised off of the floor several feet to allow clearance for the brass tubes during the dragonflies' descent. This also served to expose all of the mechanical and electronic elements located beneath, maintaining conceptual and aesthetic continuity with the *Indicator* series of installations.

The dragonflies would hover randomly above the digital water with their wings swiftly humming. At a predetermined moment the dragonfly would slowly descend to the surface and when it reached the bottom, a ripple in the digital water would radiate from that point and then the dragonfly would hastily ascend back to its hovering position.

Although *Indicator 3.0* was the final installation of my graduate career, it is not the last in this series. I feel that there is still a wealth of similar investigations left to explore.

Conclusion

As much as the past is linked to the present, the present informs the future. In my future works I will continue to examine the natural world and humanity's impact upon it. I may expand my concerns to broader topics in ecology and environmental sustainability.

I will continue to build sculptural objects as well as installations and maybe also explore smaller scale works that I would have formerly considered to be only study models. I would like to explore building my installations outdoors, to confuse the boundary between my creations and the surrounding environment. I would also like to explore placing my work in the public realm and creating site specific sculptures. I want to find new ways of powering my sculptures. Rather than plugging in, I'd like to take my work off the grid, to build more eco-friendly sculpture.

I plan on maintaining the presence of electronics and software coupled to my hand fabricated machinery in my work. As new technologies arise and increase in complexity more possibilities may appear. I will have to keep expanding my knowledge and awareness of the technologies that become available to me. I will have to continue to evolve alongside my art.

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