Organ-machine Hybrids (Artificial Animals)

Thesis

Presented in Partial Fulfillment of the Requirements for the Degree Master of Fine Art in the Graduate School of The Ohio State University

By

Doo-sung Yoo
Graduate Program in Art

The Ohio State University
2010

Thesis Committee:
Professor Ken Rinaldo, Advisor
Professor Amy Youngs
Professor Todd Slaughter
Abstract

This research explores the aesthetic application of humankind’s ongoing attempts to surpass the boundaries between humans, animals, and machines in our technological and scientific society. This work strives to create and discover the aesthetic possibilities that can exist between art and science. The purpose is to develop organ-machine hybrids and promote the repositioning and re-contextualizing of discarded biological materials. Discarded materials, such as pig hearts and pig bladders, create metaphors and multiple associations within my interdisciplinary projects, which involve a host of practices including robotics, dance, music, video and visual performance.
Acknowledgments

My thesis committee members, Professor Ken Rinaldo, Professor Amy Youngs, and Professor Todd Slaughter

Dr. Steven Moeller and Dr. Harris Kagan

My collaborators and staff, Justin Luna, Ross Baldwin, John Cairns, Cullanete Bloom, Caroline Kapple, Bernice Lee, Stephanie Danyi, Ellen Maynard, Andrew Blankenship, JR Gualtieri, Cameron Sharp, Scott Neal, Don Hamilton, Leslie Bowling, and Jeremy Stone.

All other people who have interacted with me during my study at OSU

My family.
Vita

2010..............................M.F.A. Art and Technology, The Ohio State University
2007.................................B.F.A. Art and Technology, The Ohio State University
2003......................................M.F.A. Multimedia Animation, Sejong University
2000.................................B.F.A. Industrial Design, Kwandong University
2010.....MFA Exhibition: Me and You and Everyone We Know, Urban Arts Space
2009.....................................................Art Squatters, Downtown Columbus
2009.....................................................Prospectives.09, University of Nevada

Fields of Study

Major Field: Art
Contents

Abstract.................................................................................................................................................. ii
Acknowledgments.................................................................................................................................. iii
Vita ........................................................................................................................................................ iv
List of Illustrations ............................................................................................................................... vi
List of Table .......................................................................................................................................... vii
Introduction............................................................................................................................................. 1
Historical and Theoretical Background............................................................................................... 4
Project 1: Robotic Pig Heart-jellyfish (Aqua001.c02).......................................................................... 13
Project 2: Pig Bladder-clouds (Flying Pig Bladders).......................................................................... 22
Project 3: Interdisciplinary Performance (Pig Bladder-clouds in Rainforest)................................. 36
Conclusion.............................................................................................................................................. 51
References............................................................................................................................................... 53
List of Illustrations

Illustration 1. Robotic Cow Tongues [2007] .................................................................9
Illustration 2. Kinetic Pig Stomach [2007].................................................................10
Illustration 3. Aqua001.c02 (Robotic Pig Heart-jellyfish) [2009].........................14
Illustration 4. Aqua001.c02 (Robotic Pig Heart-jellyfish) [2009].................... 19
Illustration 5. Aqua001.c02 (Robotic Pig Heart-jellyfish) [2009]....................... 21
Illustration 6. Pig Bladder-clouds (Flying Pig Bladders) [2009] Columbus, OH.....24
Illustration 7. Pig Bladder-clouds (Flying Pig Bladders) [2009] Columbus, OH.....28
Illustration 8. Pig Bladder-clouds (Flying Pig Bladders) [2009] Reno, NV.........31
Illustration 9. Pig Bladder-clouds (Flying Pig Bladders) [2009] Columbus, OH.....33
Illustration 10 Pig Bladder-clouds in Rainforest [2010]............................................35
Illustration 11 Pig Bladder-clouds in Rainforest [2010]..........................................38
Illustration 12 Pig Bladder-clouds in Rainforest [2010]..........................................39
Illustration 13 Pig Bladder-clouds in Rainforest [2010]...........................................41
Illustration 14 Pig Bladder-clouds in Rainforest [2010]...........................................44
Illustration 15 Pig Bladder-clouds in Rainforest [2010]...........................................46
Illustration 16 Pig Bladder-clouds in Rainforest [2010]...........................................49
List of Tables

Table 1 The Cast of Pig Bladder-clouds in Rainforest [2010]........................................50
Thesis Introduction

Defining the human body is very difficult in an advancing technological society because human beings attempt to exceed their own capacities and biological limitations with technological augmentations. These attempts include redesigning the human organism by recovering disabled functions caused by natural and postnatal problems and adding new prosthetic devices to the body, despite the great risks that often accompany this research. These issues conceptually frame my thesis project, Organ-machine Hybrids.

The Organ-machine Hybrids project has allowed the creation of artificial robotic animals while researching the ongoing tendencies and attempts towards this end. Researching and creating works that combine biological and technological materials involves expertise encompassing many different fields: art, engineering, biology, physics, chemistry, and robotics. My thesis explores these ideas and explains my dialogue within modernist and contemporary art, particularly to explore the trend of using biological materials in new media art practices.

Past educational experience with creating media art have helped me to embark on the Organ-machine Hybrids project. These studies included modeling design, for industrial products at Kwandong University in South Korea, which helped me design the artificial animal bodies’ mechanical design. My Master of Fine Art studies in Multimedia Animation at Sejong University in Korea also helped me physically reanimate objects,
organs and electronic devices in a series of artificial animals. Furthermore, my experience in the study of new media and robotics with Ken Rinaldo at The Ohio State University in the Art and Technology program developed a further conceptual understanding as well as the necessary technical processes to produce this work. This work combined robotic components to reanimate dead biological materials in my kinetic and robotic projects.

The Robotic Cow Tongues [2007] and Kinetic Pig Stomach [2007] are early works in my Organ-machine Hybrids series produced at Ohio State. These early works of combining animal organs with machines have prompted me to create more conceptually and technologically advanced artificial hybrids, during my study in the graduate program at OSU.

To develop my concepts, I was inspired by historical and theoretical backgrounds surrounding definitions of the human and animal body, which have emerged in this decade because of the advancements in science, technology and the philosophy of science. I will reference significant theories and artworks that have influenced my research, such as Marcel Duchamp, Andy Warhol, Stelarc, and Alan Kaprow.

In “the progress of the project” section, I will discuss in detail the Robotic Pig Heart-Jellyfish, Pig Bladder-clouds, and my interdisciplinary performance, Pig Bladder-clouds in
Rainforest, which I have undertaken in the graduate program at OSU. I will also talk about the technical details and processes in each work.

It is therefore necessary to explain how my early works, such as The Dynamic & Vital Media [2003] in Seoul, Korea, and, the Robotic Cow Tongues and Robotic Pig Stomach have influenced my current project. I will then explain how I conceptually and technically developed the Organ-machine Hybrids project and how metaphor and narration play a key role in my work.

In the conclusion I review the significant points in my thesis and suggest new questions raised by this work.
Historical and Theoretical Background

From primitive man’s simple tools to current advanced technology, mankind has enhanced his own body through prosthetic devices. For example, an Egyptian mummy’s 3000-year-old artificial toe, the Cairo toe, a wood and leather object, is considered the world’s earliest prosthetic device according to research from The University of Manchester, U.K. (Tozer, 2007). In our own era, humans have extracted substances from their own bodies to create new living things, as in human-animal embryo research and in stem cell research. These attempts, made possible by technology, prompt many new questions about how to define the human body, the boundaries between species, and the differences between the “higher” animals and “lower” animals. Attempts to extend the limits of human body also spark many controversial religious and ethical debates regarding human and animal rights.

Genetic Engineering tries to reprocess, regenerate, cross, and copy living things. Some experiments have been successful, such as Dolly, the first mammalian clone from an adult somatic cell, a sheep who was born in 1996 and died in 2003 (Dolly, 2003). Meanwhile, animal organs have been successfully transplanted into the human body, such as heart valves from pigs. Although xenotransplantation (cross-species transplants) is still subject to problems, such as organ rejections and risks of infection, experts have
been trying to transplant organs with different species each other since the seventeenth century (Frontline, n.d.).

The first attempt to transplant chimpanzee kidneys into the human body was performed in 1963 and 1964. The patients survived between nineteen days and nine months (Xenotransplantation, 2000). Moreover, more than eighty models of prosthetic heart valve devices have been invented since 1950 (Kardon, 2010). The use of animal organs and robotic organs is a sign that mankind is evolving into a hybrid and artificial living entity, becoming posthumans and transhumans.

According to Nick Bostrom (2003), a faculty of philosophy at Oxford University, on the website of The World Transhumanist Association, “posthumans” are humans who need “either the redesign of the human organism using advanced nanotechnology or its radical enhancement using some combination of technologies such as genetic engineering, psychopharmacology, anti-aging therapies, neural interfaces, advanced information management tools, memory enhancing drugs, wearable computers, and cognitive techniques”. Also, Bostrom defines a transhuman in this way: “in its contemporary usage, transhuman refers to an intermediary form between the human and the posthuman” (Bostrom, 2003).

In this thesis some of the questions I wish to address are as follows: Have artists successfully elaborated on scientific attempts to surpass the human body’s biological
and physical capacities? How can the agenda of extending the human body be explored with aesthetic statements? These two core questions stimulated my Organ-machine hybrids projects, in which I have made experiments, reusing and transforming discarded animal organs within artworks such as the Pig Bladder-clouds and transplanting the real organs into artificial bodies, like the Robotic Pig Heart-jellyfish. As I researched this work I realized there was a connection to one of my cultural heroes Marcel Duchamp because he also reused discarded objects and in the process repositioned and re-contextualized their use for aesthetic commentary.

For me, my animal organ-machine hybrids are related to Duchamp’s notion of the ready-made. Marcel Duchamp’s “ready-mades,” repositioned, reused, and recycled found objects into art and demonstrated the philosophical and aesthetic possibilities of modifying the original context into a new different context. As Duchamp repositioned the urinal, Fountain [1917], as artwork, animal parts are now moved into the art context as fine art material in the creation of my organ machine hybrids. The Organ-machine Hybrids also reference Stelarc’s idea of human-machine hybrids and redesigning human organism as a posthuman. Stelarc’s experimental biotechnological performances—which involve mounting a robotic hand and arm on his body and creating a third ear on his arm through implanting the kidney shaped silicon and a tissue-reconstruction scaffold, also view the positive side of the technological progress in exceeding human
body (Zylinska, 2008; Smith, 2007). For me his works are biological successors to Duchamp’s concepts of using the ready-made into art. Stelarc has tried to extend and transform the human body to hint at the ambiguous boundaries between human and machine.

In my organ projects, the re-contextualizing of animal organs questions the definition of the human and animal body and its context. In these works, dead flesh from animals are combined with electronically animated devices. These artificial hybrids, combining organs and machines with electronic motion serve as metaphors for mankind’s struggle to physically transform himself with technological augmentations.

Allan Kaprow’s concept of the happening and Merce Cunningham’s improvisation in dance were also considered. In my final project, Pig Bladder-clouds in Rainforest [2010], I was interested in the juxtaposition of sculpture, dance, and music within one performance. Allan Kaprow’s concept of “happenings”, where viewers participated in the performances, emphasized the connection between art and its environment (Packer, & Ken, 2001). This concept influenced the performance of Pig bladder-clouds in my choice to exhibit and perform the piece in “very” public places outside of the art gallery. This was for me different than when viewers and I paraded with the pig bladder-balloon sculptures on urban streets therein, blurring the lines between art and life.
The Artist Merce Cunningham has experimented with interactions through the juxtaposition of abstract dance and experimental music in his dancing performances.

According to Anna Kisselgoff’s review of Cunningham’s Rainforest in "Dance: Merce Cunningham's RainForest" (1988), “Its implication of free-wheeling anarchy through floating decor that cannot be controlled and choreography that does not play by conventional rules, its animal and nature imagery in both the score and the dancing”.

Pig bladder-clouds in Rainforest [2010], were applied to connect its environment in public places with viewers and to harmonize (and clash) with dancers and the musicians’ improvisations throughout my experimental performance.

My early works in the Organ-machine Hybrids series included the Robotic Cow Tongues [2007] and Kinetic Pig Stomach [2007]. These works explored the notions of the artificial hybrid as a form of art. Combining organs and machines in my early works brought forth technical and conceptual ideas surrounding further development of artificial organ and machine animals.
In the Robotic Cow Tongues, real cow tongues (a biological readymade), were combined with electronic motors and motor controllers, all controlled by programmed software coupled with a microcontroller.
In the Kinetic Pig Stomach, I used a cam mechanism and a pig stomach, different-shaped discs, which all rotated on a crank powered with a gear-head motor. I made many smooth plastic discs to avoid damaging the thin skin. The plastic plate and motor with discs on the shaft were screwed to a pan which held the stomach to avoid rolling. While performing this work I needed to spray water constantly to prevent the tissue from drying.
Applying biological discarded material such as parts of dead animals to artwork was also partially inspired by Nam June Paik’s first solo exhibition, Exposition of Music - Electronic Television, Wuppertal, Germany, 1963, in which he hung an ox’s bleeding head on a gateway of the gallery (Media, n.d.).

For me the use of disembodied organs that move and react through the use of robotic and electronic devices was a kind of experimental physical (3-D) animation, set in a sculptural medium, instead of flat cinematic animations.

In my previous experimental animation and dance project, The Dynamic & Vital Media project [2003], I have explored interactions between virtual cinematographic techniques and the dancer’s choreography within a simultaneous performance. Also, I tried to create harmony between virtual motion images, music, and dancing narrations.

This experience of collaborating with dancers helped me design Pig Bladder-clouds in Rainforest’s complex narratives. My experience of teamwork with other staff in The Dynamic & Vital Media project has given me invaluable experience in understanding how to collaborate and build large scale, which helped me direct a large staff and manage the Pig Bladder-clouds in the Rainforest project.

From my early works, I acquired technical processes to control electronic devices using computer hardware and software. Also, I realized the aesthetic possibilities that
discarded or “disgusting materials” offer within the art world. These raised questions, such as how can I create aesthetic statements with discarded everyday-materials, especially biological components from natural organisms.

After my experiences in the process of combining animal organs and machines, I wondered how my hybrids could change with different backgrounds, atmospheres, movements, and environments. I have undertaken these experiments in the graduate program at OSU.
Project 1: Robotic Pig Heart-jellyfish (Aqua001.c02)

Aqua001.c02 (Robotic Pig Heart-jellyfish) is a robotic jellyfish, which is also one of the artificial animals in the Organ-machine Hybrids project and the first project completed in my graduate research at OSU. The artificial jellyfish combined a pig heart with electronic devices that allowed the hybrid to be submerged and gave the appearance of beating heart inside work.

While I had a diverse set of motivations in this work, involving the pig heart in my robotic jellyfish represents a wish for more hybrid medical solutions for the lack of replacement organs in cross-species transplants. For years, pig hearts have been used to foster life in human bodies. According to Kirsti Dyer (2006), in “Organ and Tissue Donation”, more than 92,000 Americans were on the waiting list to receive a transplant organ in 2006 and 6,500 people died before getting new organs in 2005. Furthermore, creating a robotic pig heart-jellyfish was an attempt creating an environment where I could explore the movements between the artificial creature, programmed by electronic devices and software, and the “real” environment of the fish and the water current. Combining real and artificial movements in this installation raised questions about the harmony between nature and machine.

In my project, a pig heart returns to life within a machine, a different body. The pig heart was pumped by the machine that is set in two transparent plastic half domes.
These were held together with screwed metal bolts and plastic tubes. Human hair was attached around its new body to emulate jellyfish stingers.

Illustration 3. Aqua001.c02 (Robotic Pig Heart-jellyfish) [2009]. Photo by Cameron Sharp.

The Robotic Pig Heart-jellyfish, Aqua001.c02 was upgraded from the first model, Aqua001.c01. Aqua001.c02 was developed through adding a water level sensor, a signal conditioner and a vacuuming water pump to Aqua001.c01’s mechanical system, which includes an air compressor, three way valves, relays, an air pressure controller, and a microcontroller, Basic Stamp 2.
During testing for the first model, Aqua001.c01, I encountered unexpected problems, which included electronic, mechanical, material, and construction problems in the complex submerging and the breathing process. I changed my original idea many times and solved issues.

My original idea was that the robotic jellyfish would have a transparent silicon body, inspired by the form of Coione limacine, sea slugs that are common non-shelled Pteropods in the sea. Unfortunately, using silicon was problematic and expensive. Silicon tends to absorb water when it is submerged for a long time, which can alter the shape of the model. Moreover, transparent silicon is especially expensive. Also, silicon is a relatively weak material, which makes it difficult to repeat forms. For those reasons, I decided to switch materials, in favor of a stronger and easier alternative. Transparent plastic half domes were more stable and successful for use in the mechanical process. I have broken many expensive plastic half domes during the testing and assembly.

The reanimated pig heart can be submerged because of programmed software within the Organ-machine Hybrid’s body computer and other components. This programmed artificial movement of the robotic jellyfish is simultaneously displayed with the real movements of the fish and water currents in the tank. Sometimes, the fish follow and play with the robotic jellyfish, which I feel illustrates the harmony that can occur between nature and machine.
The 90-gallon fish tank is ornamented with small rocks and different types of lighting. Two red heat lamps serve to regulate water temperature within the tank. The blue lighting below the fish tank theatrically highlights the submerging procedure and also emphasizes the juxtaposition of my artificial creation with the natural creatures residing in the tank.

The signal conditioner with changing numbers monitors the robotic jellyfish by translating signals, for me referencing a heart rate monitor. The machines therefore animate my hybrid to emulate a living creature. All of the machines and electronic devices make noises that in some way reference natural noises. The vacuum water pump, coupled with electronic relays, reference a real pumping heart. The air compressor pushes air at a rate that sounds like breathing. These noises simulate the natural environment and atmosphere.

The programmed microcontroller regulates the air pressure in the pig heart and the plastic body, as well as the rate of water intake and release, which helps control breathing and submerging speeds.

In order to produce this work I researched submarine diving procedures, which helped me develop a successful model. The robotic jellyfish has a ballast tank that serves as the bottom chamber and allows the operator to change the amount of buoyancy within the
body. I created many sketches of different types of submarines’ diving processes to
direct this process.

In the first test of submerging the model in water, I calculated the weight of the water
so that I could calibrate the pumps in order for the model to reach the top of a fish-tank.
I needed to research physics formulas to get the exact rates of pumping. I switched to a
different water pump, the reversal D.C. pump, to minimize the complex mechanical
problems. It was difficult to design the model because I was struggling to calculate the
exact measurements for a ballast tank’s buoyancy in the model’s body for submerging it.
I also tested an inflating and deflating toy balloon by the air compressor for the
appearance of breathing pig heart.

The first model Aqua001.c01’s submerging process was unstable and did not last long.
The first model made many bubbles in the fish tank because the microcontroller could
not offer details of the time to switch shifting the water pump and the air compressor,
which made unbalanced sucking and releasing water in the ballast tank. Sometimes,
water was leaking through the air pressure tube because of overfilled water inside of
the ballast tank. Furthermore, increasing the pumping rate combined with the irregular
airflow inside of the heart tore the pig heart tissue.

To produce the advanced model and materialize the stable breathing and submerging
mechanical system, I worked with a specialist, Ross Baldwin, the instructional laboratory
supervisor in The Department of Materials Science and Engineering at OSU. Ross Baldwin earned his BFA in the Ohio State Art & Technology program. Aqua001.c01 of my original design was upgraded by Baldwin’s suggestions, such as using a water vacuum pump instead of a reversal water pump and adding a water level sensor in the submerging mechanical system to provide feedback to the microcontroller.

When the air compressor floats the model, water enters through a hole in the side, which weighs it down. The water vacuum pump helps speed up the water coming in the ballast tank, in order to speed up the process of submersion. Adding metal weight in the ballast tank helps reduce time for sucking and releasing water and pressing the air in the ballast tank as well. Moreover, the water level sensor supports stability of regulating submersion with the microcontroller.

Baldwin and I designed a plastic panel in AutoCAD computer software for detail measurements and degrees of the water and air passages. This was the core component for sucking and releasing water and air in the ballast tank of the robotic jellyfish. The panel was created through CNC Milling Machines in the Materials Science and Engineering Laboratory.
In the submerging mechanical system, when the air compressor pushes air into the ballast tank, water inside of the tank is released through the water passage on the plastic panel, which lessens the weight of the body. When the air compressor stops pushing air, water enters through the water passage, which weighs it down because of the difference in water pressure between that of the fish tank and the model.
The water level sensor is connected to the microcontroller to send details about the water pressure outside of the body in order to regulate submersion. When the model floats at the top of the fish tank, the water level sensor sends signals to the microcontroller to operate the water vacuum pump and temporarily cut off the air supply, which restarts the submersing process. When the model submerges at the bottom of the fish tank, the water level sensor sends signals to the microcontroller to increase the air supply and to stop the water vacuum pump, which starts to float the model.

Aqua001.c02 (Robotic Pig Heart-jellyfish) will evolve continually into different forms as I add new organs and implement new technology, reflecting my inspiration from the transhumans and posthumans’ radical technological innovations for the human form, though here applied to artificial hybrids integrated with living animals.
Illustration 5. Aqua001.c02 (Robotic Pig Heart-jellyfish) [2009]. Photo by Cameron Sharp.
Project 2: Pig Bladder-clouds (Flying Pig Bladders)

My next idea for an artificial animal project, Pig Bladder-clouds, began with my reading of the scientific news from CBS NEWS.COM, in which an old man in Ohio, Lee Spievack, re-grew his wounded fingertip. His finger, sliced in the propeller of a model plane, was repaired using special medicine extracted from the powder of a pig bladder (Andrews, 2008). Dr. Stephen Badylak of the University of Pittsburgh is developing the process of extracting the medicine from pig bladders (Andrews, 2008).

From the true saga of an old man, I was inspired by regenerating and recovering a human organism through a material organ from a different species, a swine. This unbelievable incident has influenced experts to investigate regenerating human organs using genetic materials from animal organs. This human-swine hybrid organism stimulated my concept of creating a new hybrid.

The Pig Bladders-clouds (Flying Pig Bladders) celebrate the possibilities offered by xenotransplantation, reusing living tissues, cells, or organs to regenerate damaged organs of a human being (non-human), though they also become an ideal material in the creation of my artificial hybrids. For me the project also references cross-species hybrids created by Genetic Engineering. These hybrids include transgenic animals, which are created when a gene from one species is transplanted with recombinant technology to another species to express a new characteristic.
I conceptualized and created Pig Bladder-clouds (Flying Pig Bladders), constructing it out of dried pig bladders, Helium-filled plastic bags, tree branches, dried moss, and electronic LEDs (Light-emitting diodes) with batteries. The piece was installed and presented as a performance in downtown Columbus, Ohio, in Art Squatters during September 5th, September 19th, and October 3rd (Walker, 2009). Also, the performance with the flying bladder sculptures was exhibited at Prospectives.09, an international digital art festival hosted by the University of Nevada, Reno, on November 12th, 2009 (Lanier, 2010). In both performances I dressed as a butcher and made the sculptures float using helium.
Illustration 6. Pig Bladder-clouds (Flying Pig Bladders) [2009]. Columbus, OH. Photo by Cameron Sharp.
My original idea was that pig bladders could grow mold, lichen, or moss on the rotten surface. I believed that spraying water on the surface of the dried bladder would provide chemical nutrition. I was trying to find possibilities for growing different species on the bladder skin. My hope was that the visual combination would suggest the positive side of crossing species like the efficacy of the bladder powder for regenerating humans’ organs.

Unfortunately, I failed to grow mold on the bladder surfaces. I also tried to embed moss seedlings on the bladder surface. Despite my efforts and my research about fungus, it was very difficult to create an environment for growing mold and moss on the surface because the surface and moss rotted quickly. Moreover, I learned that most molds grown from flesh are very toxic for human health, which would pose safety issues with the viewing environment. I also researched preservative drugs for addressing the quick rotting of the bladders, with assistance from Andrew Bonnell, a senior undergraduate student in Biochemistry at OSU. I tested Borax, a kind of dry preservative and a laundry booster, on the bladder and still this research let to my conclusions that generally molds cannot live with chemical preservatives.

As another original idea for the model design, some helium-pig bladders float by themselves without any balloon construction. After I researched the physics formula, assisted by Dr. Harris Kagan, a professor in Department of Physics at OSU, I figured out
that the pig bladder is too heavy and has too little capacity for helium gas to float by itself. For that reason, I needed to add a balloon construction on the bladder in order to float it. I also dried the bladder in order to reduce the weight for the floating process.

For these reasons, I changed my original idea. Connecting tree branches and attaching dried moss on the dried bladders conceptually worked because the combination of plant materials and the animal organ created a visual metaphor to represent cross-species hybrids.

A tree branch connects many helium balloons (plastic trash bags) with a dried bladder, which moves in the air. The flying bladders sculptures’ synchronous movements by the natural current looked like moving clouds and were for me visually referential to Andy Warhol’s Silver Clouds [1966]. Warhol showed many silver Mylar pillow-shaped helium balloons tumbling in the Leo Castelli Gallery in New York City in 1966 (Andy, 2006). Many experts and meat companies supported the project by preparing materials for my performance. I have collected more than three hundreds pig bladders from slaughterhouses and the Department of Animal Science at OSU. Moreover, Dr. Steven Moeller, a professor in the Department of Animal Science at OSU helped me treat the pig bladders and other organs, and provided butcher tools and equipment for the performance. Also, observing the butchers’ harvesting work helped me design my performance scenario and set-up butchering environments for my performance.
Making balloon shapes and drying pig bladders in flying sculptures was significant for reducing the weight for the floating process and combining other materials, such as inserting electronic devices in the bladders. After washing the bladders, I put toy-balloons inside of the wet pig bladders, which were then transformed into balloon shapes by an air compressor. The balloon shape of the pig bladders were dried in a dark room for more than three weeks. After the bladders had dried well, I made a tiny hole using a needle on the surface of the toy balloons, to slowly release air that molded the balloon shape. To connect the tree branches with the dried bladders, I sewed and imagined medical surgery. In this work, the flying bladders are restricted by fish wire, like floating toy balloons. They are weighted down by metal bolts. I recollected the bladders after each performance for the next performance.
Illustration 7. Pig Bladder-clouds (Flying Pig Bladders) [2009]. Columbus, OH. Photo by Cameron Sharp.
I showed the test model of the flying bladder sculpture in the Art and Technology exhibition at OSU on June 4th, 2009 and sought audiences’ responses to the work as people moved about and interacted. Most people were curious about the hybrid of living moss with the pig organ which was floated by Helium plastic bags. Some viewers who interacted seemed to feel disgusted that the dried animal organ gave real plants a habitat. These uncanny and grotesque features evoked strong reactions. However, some people enjoyed and interacted with the floating model as they tried to blow on the work to help it move and float again. With this work I realized my personal aesthetic statement and for me they also referenced scientific breakthroughs, which can emerge from materials that are often discarded (and therefore ignored).

The performance has created a strong visual metaphor with its images of floating clouds and flight; I hope it will enhance people’s awareness of the positive potential of hybrid living things. I will again dress as a butcher for the performance, and this should also raise awareness and questions regarding an often-invisible profession. I intend to suggest that the work of butchers could yield more than just food, and one of the messages in my performance is that butchering animals may aid medical research and thus provide more than just nourishment.

In the project, I explored different harmonies between nature and manmade objects in which the natural air current controls the movement of artificial animals, Pig Bladder-
clouds. While Andy Warhol experimented in his Silver Clouds [1966], helium-filled silver pillows’ movements were created from many electronic fans. My Pig Bladder-clouds’ movement, by contrast, is subject to natural air currents, a characteristic that embodied the “lower” animals because they are at the mercy of their environments.

Similar to Warhol’s attempt for interaction between his Silver Clouds and viewers, I also tried to include viewer participation in Pig Bladder-clouds, by presenting the piece in conjunction with a performance in which I dress as a butcher and release the flying pig bladder-sculptures in public places. The performance with viewers raised many questions about interaction with viewers, the boundary between high-class art and popular culture, and the boundary between seriousness and fun in art.
Illustration 8. Pig Bladder-clouds (Flying Pig Bladders) [2009]. Reno, NV. Photo by Justin Luna.
I felt different nuances during my “crash” performance in a public place (on the streets of Columbus and Reno). When I was “flying discarded animal organs” behind a building, it illustrated weird, bizarre, grotesque, and fantastic visual environments. However, when I began “flying the disgusting organs” in public places such as a street, it elicited people’s cheers and their enjoyment and illustrated different metaphors that the public environment could bring forth, such as the spectacles of celebration, hunting, parades, and carnivals.

My performance with flying pig bladder sculptures and parading with viewers in public streets is also related to Allan Kaprow’s notion of the “happening”, in which the performance requires viewer participation to manipulate the art form and encourage improvisation by the artist, which depends on the engagement and reaction of the viewers and an artist’s spontaneous and natural behavior.

The parade of Pig Bladder-clouds with viewers created many unexpected situations. For example, some participants suggested that I take my performance to visit other artist’s performances in the gallery, such as performance artist Aaron Hibbs’ hula-hoop record attempt in Skylab gallery in downtown Columbus. The pig bladder-sculptures and other random participants in my parade, who brought the pig bladders, occupied some parts of his performance space, much like a Flash Mob, which is a group of people who
suddenly exhibit unusual behaviors for a short time, at the same time, within the same space.

My “happening” in the performance – including the parade down Gay Street - exactly followed one of Kaprow’s guidelines for happenings, in which “The performance of a Happening should take place over several widely spaced, sometimes moving and changing locales.” (Packer, & Ken, 2001)
There were many paradoxes in my performance with Pig Bladder-clouds. Religious music by the Russian composer Sergei Rachmaninov played loudly throughout my performance, and for me represented and created a sense of the “high class” and a place of dignity, absolutism, and traditional customs. On the contrary, my butcher costume in the context of the public-place represented “low-class”, silliness, killing and destroying. For me there was also irony here, in the as the H1N1 flu was a hot when the piece was performed and this flu strain from pigs was a current and scary context for people to see and associate to the work.

The combination of Helium balloons, electronic devices, plants such as tree branches and moss, and the pig bladders illustrate how hybrids can transcend the original functions of their parts. The metaphorical surpassing of the original functions of the individual parts (the pig bladder, the tree branch, the moss, the trash bags) of the flying pig bladders’ mirror the human being’s attempt to add new functions and abilities to their own body.
Project 3: Interdisciplinary Performance - Pig Bladder-clouds in Rainforest

My next performance with Pig Bladder-clouds involved dance and experimental music. I continually investigated the notion of artificial animals, as I had experimented with in the past, though here working on different movements, nuances, metaphors, and synchronism between my sculptures and the constructed environment.

Many collaborators including visual artists, dancers, and sound designers modified came together and explored choreographic relationships between floating sculptural works and a group of dancers while remixing Merce Cunningham’s Rainforest [1968] and manipulated David Tudor’s music, Rainforest [1973]. Pig Bladders-clouds in Rainforest was shown in the Master of Fine Arts Exhibition of the Department of Art in the Urban Art Space Gallery of OSU during the opening reception on Saturday, May 8th in 2010.

The visual artists’ created and installed the bladder sculptures, the dancers’ performed interactive choreography with the flying bladders, and the sound designers’ manipulated original music and added noise performed in various categories - all at the same time and in the same place.

For the Pig Bladder-clouds in Rainforest project, I worked to explore harmony, inharmonic-collision, confluence, paradox, and the cross between different species, flying pig bladder sculptures and dancers. I was inspired by Merce Cunningham’s ideas, which were to create “inharmonic” situations between dance and music. I was also
inspired by David Tudor’s many “collisions” in his electronic music.

In the spirit of Cunningham and Tudor I reused, recreated, remixed and modified their works in my project. I enjoyed thinking about Warhol copied pop icons and Duchamp’s use of ready-made objects. The performers were also encouraged and changed elements of the choreography and music. Therefore, all of the performers showed improvisations during their performances and changed the choreography, sounds, music, visual environment, and other situations as was also true with Cunningham’s Rainforest.

The sound designers Tristan Seufert and Eddie Ostrander manipulated the original music of David Tudor, John Cage, Gordon Mumma, and Nam June Paik. The music became different music because of the remix and the new context in which it was performed. This manipulation of the artists’ original music relates to remix culture, where a society allows to changing preexisting work to create derivative works, such as Duchamp’s ready-made work, *L.H.O.O.Q [1919]*. According to Professor Richard Stern (2001) in the George Washinton University Law School, *L.H.O.O.Q [1919]*, is most famous legal concept of derivative work because Duchamp transformed the perception of Leonardo da Vinci’s *Mona Lisa* through drawing in a moustache and goatee, in order to deface bourgeois notions of seriousness in art.
The sound designers’ remixes are synomynous with sampling within hip-hop music. This sound is also similar to my use of the pig heart and pig bladders, which were repositioned and changed its context as the robotic jellyfish’s organ. My repositioning of Tudor, Cage, Mumma, and Paik’s music in my project mirrors my repositioning of animal organs into my hybrid project. In producing this work, I coordinated the efforts of two visual performers, six dancers, and two sound designers during the project. A commercial fashion designer and a former professional dancer, Cullanete Bloom,
designed the dancers’ costumes. I coordinated all of the participants’ organizations, such as the dancers’ choreography and the sound designers’ music.

During our rehearsals, I directed the relationship between dance, costume design, music, and visual art. For this reason, all of the content is related to the Pig Bladder-clouds’ metaphors. For example, in the dancer’s choreography, the dancers illustrated gestures of animals, machines, and animal-machine hybrids. The male dancer’s robotic gestures and some female dancers’ repetitive machine-like gestures reflect the stilted, yet oddly natural-looking movements of animal-machine hybrids. In the musicians’ music, they
manipulated animal sound as in electronic sound in robots. In the dancer’s costumes, dancers’ costumes illustrate human-animal-machine hybrids’ figure through adding electronic materials such as LEDs and a propeller.

The fashion designer Bloom and I had many discussions about how to create the costumes with the dancers’ choreography and the flying pig bladders in order to harmonize the two. The dancers’ costumes referenced animals’ body morphology and the human body muscle patterns. Each of dancers had a different fabric pattern with different color, which symbolised the existence of different species. The dancers’ costumes featured electronic LEDs, just like the bladders’ blinking LEDs, which illustrated the relationship between the natural living things and the sculptures. The electronic LEDs on the dancers’ costumes and the electronic propellers on the male dancer also represent posthuman’ enhancements of the body. Also, the mounted electronic propellers on the dancer’s body represented that human beings have enhanced their own bodies though prosthetic devices with technology.
Illustration 13 Pig Bladder-clouds in Rainforest [2010]. Photo by Cameron Sharp.
I will now break down the chronology of my third performance.

Introduction: The invitation from the pacific Rainforest

The sound designers’ opening music attracted viewers’ attention. The opening show represents the “Rainforest” set, which invited human beings and the artificial species in this natural yet theatrical world, which illustrates the harmony of all species and artificial things in the world. The opening music reminds the crowd of their connections and relationships between natural and manmade environments.

Opening Performance

The sound designers manipulated David Tudor’s music from Rainforest [1973] and added music by Cunningham’s friends, such as John Cage, Nam June Paik, and Gordon Mumma. During the music mixing, butchers came onto the stage and released the Pig Bladder-clouds for flight.

Main Performance

Dancers performed based on Cunningham’s unique dancing techniques. Sometimes the movements harmonized with each other and with music. However, most of the time,
the dance movements and music created an inharmonic atmosphere through the
dancers and the sound designers’ improvisations. Randomly flying bladders above the
dancers’ performance contributed to the chaotic environment. Some bladders, which
were moved by the dancers and butchers’ movements on the floor, represent the
harmony and crossing of their movements. Sometimes, the butchers established order
and stability within the bladders’ chaotic movements through the connecting wire which
weighted them down. The butcher’s everyday movements contrasted with the dancing
movements. Adding noises and manipulated sounds made a much more chaotic
atmosphere. During this section, the butchers assembled the bladder models, which
contributed sound effects to the background music, such as noises from inflating
balloons.
End: Release

After the dancers left the stage and the chaotic music faded out, the butchers released the remaining flying bladders by cutting the wires. The rainforest is peaceful again. The release of the bladders, which were disconnected from the wire, reference Cunningham’s abstract choreography. For me the releasing of the remaining flying bladders also references that Cunningham will also be released from this world in the near future. Two electronic propellers were mounted on the male dancer after other dancers left the stage. The propellers created an artificial air current that influences the bladders’ flight. The butchers and the male dancer finally left the stage and sound designers’ music faded-out.

Ending Music: New era

As the sound designers played fast tempo music with electronic sounds this muillustrated the celebration of what is for me the birth of new era with new artists who are descendants of the Modernists. The dancers’ costumes and the electronic propellers were designed to enhance the visual narration and the choreographic relationships between the artificial hybrids and the human body.
Illustration 15. Pig Bladder-clouds in Rainforest [2010]. Photo by Cameron Sharp.

While I received much positive feedback from viewers, I still wished I could have perfectly recreated my ideal performative timeline.

In retrospect there were miscommunications with the musicians, which created unexpected developments during our performance. The main issue was the musicians’ improvisation, which created an unexpected sound that was different from what we had in our rehearsals. This threw off the timing of the cues and prolonged the running time of the performance. The dancers were confused and could not figure out the cue sign
from the musicians’ sound to enter the stage. I had to repeat my butchering
performance until the dancers arrived onstage. I intended not to show the prolonged
butchering performance with pig guts, like Herman Nitsch’s very violent butchering
performance, because this disgusting visual environment could negatively influence my
intended metaphor of beneficial (and therefore not senseless) butchering of animals in
my performance.

It is very important that the metaphor of killing animals in my performance is not a
negative message. Instead, I intended to suggest that butchering animals offers more
than just nourishment, as in regenerating human organs from animal substance,
replacing animal organs within the human body, and recovering disabled functions of
the human body. The choreographic harmony between the flying pig bladders and the
group of dancers in the performance was meant to make this positive message
apparent. This visual metaphor also would suggest the positive side of the controversial
issues concerning extending the human body and creation of human-animal hybrids.

Although this improvisation was unexpected, I have not yet received complaints about
the prolonged butchering section of the performance. I felt that the prolonged
butchering performance actually influenced viewers to think only about the negative
side of using animals. For me, this prolonging and consequent delaying of the dancers’
entrance was disappointing though also illuminating.
It is very ironic that in order to pay homage to Cunningham, Tudor, and Kaprow’s improvisation in performance, I encouraged my collaborators to improvise. I think that the main issue was creating a balance between the rehearsed scenario and dealing with unexpected problems caused by improvisation, like a tightrope walker against the breeze.

Although the music problems occurred during our performance, the other scenes were fantastic and were, for me, spectacular, (especially the interaction between the dancers and the bladder balloons). The dancers’ entrance behind the viewers and the dancing recession beyond the viewers’ place created multiple associations and new meanings and forged connection between performers and viewers.
<table>
<thead>
<tr>
<th>Title</th>
<th>Pig Bladder-clouds in Rainforest [2010]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total running time</td>
<td>Approximately 30 – 40 minutes (one time performance)</td>
</tr>
<tr>
<td>Performing place</td>
<td>The Galleria outside the Urban Art Space Gallery of OSU, 50 W. Town St. Columbus, Ohio 43215</td>
</tr>
<tr>
<td>Date and Time</td>
<td>During the opening reception at 7 PM on Saturday, May 8th</td>
</tr>
<tr>
<td>Cast</td>
<td></td>
</tr>
<tr>
<td>Director:</td>
<td>Doo-sung Yoo</td>
</tr>
<tr>
<td>Visual performers:</td>
<td>Doo-sung Yoo, John Cairns, and Leslie Bowling</td>
</tr>
<tr>
<td>Sound designers:</td>
<td>Tristan Seufert and Eddy Ostrander</td>
</tr>
<tr>
<td>Dance performers:</td>
<td>Caroline Kapple, Bernice Lee, Stephanie Danyi, Ellen Maynard, Cullanate Bloom, and Andrew Blankenship</td>
</tr>
<tr>
<td>Costume designer:</td>
<td>Cullanate Bloom</td>
</tr>
<tr>
<td>Still camera:</td>
<td>Justin Luna and Cameron Sharp</td>
</tr>
<tr>
<td>Video:</td>
<td>JR Gualtieri, Don Hamilton, Colin Foster, and Jeremy Stone</td>
</tr>
</tbody>
</table>

Table 1. The Cast of Pig Bladder-clouds in Rainforest [2010]
Conclusion

My Organ-machine Hybrids project has several significant purposes. It is intended to create and help in understanding the overlapping connections between art and science, and between the formal, sensual, and physical aspects of materiality. It explores the living ready-made, which is a metamorphosis of forms common in both art and science. The project attempts to push the boundaries of art, very much in the tradition of the modernists such as Duchamp and pop artists such as Warhol, and similarly engages with materials and processes that have been discarded. The project also questions the definition of the original body and suggests new possibilities of hybrids between “artificial life” and “natural life.” Moreover, my Organ-machine Hybrids project engages the public to develop conversations that spark new understandings of life, art, and technology.

In my Organ-machine Hybrids series, I have explored different movements, nuances, metaphors, and synchronism between my artificial animals and environments. Also, I have experimented with harmony, inharmony collision, confluence, paradox, and cross between the interactions of different species, artificial animals and humans. These experiments have raised new questions for me, such as how I deal with improvisation, spontaneous, and natural behavior in a real time performance, and how I re-contextualize discarded organs as materials in performative art. My research of Organ-
machine Hybrids suggests an emerging aesthetic in creating new works, environments and performances which suggest and metaphorize how technology, science and art can expand the limits and connections of the human and animal body.
References


Xenotransplantation: The Benefits and Risks of Special Organ Transplantation.
Biotechnology Industry Organization, Retrieved from
http://www.bio.org/bioethics/background/xeno.asp