Chapter 2.

An Oeuvre?

Ultimately, the objects presented in this thesis are both an artistic and technical, vision and exploration. They are a vision and exploration of how computers can transcend their persistent squareness and become a sculptural medium. They are a vision and exploration of how physical form and computation can interact to create a new expressive language. They are a vision and exploration of how smart materials can change computing technology into intimate and sensual objects. They are a vision and exploration of how computers might become materially *real*, and materially symbolic. They are a vision and exploration of how ornament and decoration can, through computer technology, actually become functional. They are a vision and exploration of how smart materials can change technology design from a remote CAD-oriented process to a more intimate, physical and hands-on process. They are a vision and exploration of how the needs of design and artistic practices can *technically* change computing technology. They are a vision and exploration of how unusual computing materials can change the role and place of computing technology in people's lives. Finally, they are a vision and exploration

of how computer technology can turned toward the enabling of human expression.

The Question Concerning **A**rt

The best answer that I know to the question of "Is it **A**rt?" was given to me by a great artist and wise man, Krzysztof Wodicizko. He said, "This question is irrelevant. **A**rt is defined by the **A**rtist. The relevant question is: 'Is it successful?' "

When I came to the Media Lab it was because I was no longer interested in creating **A**rt for galleries. I wanted to explore the role of art, design and images in the world outside the gallery, in worlds like commerce and mass production. There is famous statement in conceptual art, "To search for the GOOD and make it matter"[1]. This is related to much of the ethical, conceptual and social art being practiced in art schools today. After years of being a practicing artist (going from a formalist painter to a more conceptual, feminist performance artist), I had reached the conclusion that making art with a strong social and ethical message did not have much relevance in the context of the gallery or museum. I did not believe it mattered. I wanted to take that statement and invert it: "Take what MATTERS and make it good." Technology MATTERS. I wanted to make it good. I also believed that technology was a vast unexplored realm for artistic three-dimensional development outside the square and pictorial. Finally, I

[1] Majozo, E., *To Search for the Good and Make it Matter,* from, Lacy, S. (ed.), Mapping the Terrain, New Genre Public Art, Seattle, Bay Press, (1999).

was interested in creating multi-disciplinary and collaborative work that was applicable in many contexts outside the gallery.

Never, from the time I entered the doors of the Media Lab, was I asked to create **A**rt. Frankly, if I had wanted to create personal **A**rt, or **A**rt for galleries, I probably would not have come to the Media Lab. I would have gone to the Whitney program in New York and continued my feminist performance work there. Instead, I participated wholeheartedly in many of the research agendas of the lab, including, the Hyperinstruments group, Things-That-Think, and Toys of Tomorrow. In this context I produced many effective demos, research projects, papers, shows in galleries, performances and patents. My research was successful in many contexts, both as working technology and as a proposal for future technology/design.

Don't get me wrong I am not saying that the work presented in this thesis is not art, nor am I saying that I have been cheated out of making art. I am merely saying that this is not a particularly relevant question for me for two reasons. After years of worrying about what **A**rt is, I had decided, that indeed, **A**rt was not definable, and that the question for me to concern myself with was "Is it successful?" I had also come to believe that **A**rt with a capital **A,** or **A**rt for museums and galleries, was often a highly rarefied practice that was limited in its scope. Through the course of my own artistic development, I had gone from being a strongly formalist painter, to a more conceptual artist, attempting to make the content or social message the

main focus of my feminist performance work. Before I came to the lab, the last **A**rt I created was designed to examine how women participated in their own "feminine" construction. This work was meant to be critical and transformative, to help women see other possibilities in their psychic development. Over time, I began to realize that as long as I practiced my **A**rt in galleries I could not reach any audience, but other feminists, who were already aware. I felt I was preaching to the converted. I tried to free my work from galleries but found it difficult. I found myself consistently meeting the attitude that the gallery was where **A**rt was supposed to be and where I was supposed to practice.

The Media Lab gave me an opportunity to make work with broader boundaries, work that is relevant in more places than the gallery. I see my work today as art and design with a little "a": art that engages and transforms objects that are part of everyday life, whether fashions, toys, musical instruments or computers. While I ultimately believe the distinction between high **A**rt and art is an historical anomaly; within the terms of this distinction, my work is clearly in the tradition of the practical and everyday arts. Moreover, my work is not the product of an individual maker and his or her personal "expression" as fine **A**rt (after the 19th century), is often defined to be. Like many contemporary art forms that engage with technology (for instance film and theater), my work is the product of a highly collaborative process.

My work takes a post-modern position of the question of **A**rt vs. art, asserting that art with a little "a" is

relevant based on its position in everyday life and its social context, while at the same time engaging in more formal questions. On the one hand, my desire to use unusual and unexpected computing materials to transform the meaning of computational objects comes out of a post-modern desire to make meaning and content the focus of artwork. On the other hand, I have found that meaning and content cannot be transformed or even controlled without both the materials and the formal language to do so. Because the physical media and materials of computers are such new territory for artists and designers, my work has often focused on fundamental questions about the formal language of physical form and computation, and on creating the materials necessary to control that meaning and content.

What's in a Demo?

While I am reluctant to draw a box or category around the work I have done at the Media Lab, I can say with little reservation that all the work that I have created, invented and designed at the Media Lab shares the distinction of being a live demonstration of working technology, or what is known at the Media Lab as a "demo". I make no apologies for this. In many ways, creating a demo is one of the most challenging forms of communication, and a truly unique technology design problem.

A demo must tell a highly captivating, clear, and believable story about the future of technology to a diverse audience made up of corporate sponsors,

media, and research or intellectual peers. This story usually needs to reflect at least two or three separate research agendas of the lab. To communicate this story, a demo must be technologically functional. In fact, it is the very functionality of the technology in a demo that enables people to see possibilities that they did not before. Moreover, the ideal demo will invent and demonstrate *new* technology. A demo must then use some sort of sophisticated language, whether visual, audio or narrative to communicate this story. Finally, a demo must function or engage in some external context or sphere of practice outside the lab, like engineering, scientific research or art. It might achieve this by being mirrored elsewhere in the culture, like the fashion world, the toy industry or the world of musical performance. A demo might also achieve this by having an “other” purpose that reflects the alternative or even subversive goals of its maker, as in my case art and design. Achieving and balancing all these disparate goals with one technology project is a truly challenging and creative *meta* design problem.

I believe that the research I made functioned as successful demos. Just as product design endeavors to use physical form and visual information to communicate the purpose of the object, my demos used form and visual information to communicate their story. My research was also unique because of the visual design and artistic background I brought to problems that had normally been confronted from the perspective of engineering, science, social science and HCI.

Making demos provided me with the opportunity to create work that was meaningful in many contexts and to many people with different perspectives. When I was officially an **A**rtist, I felt that my work was limited to the gallery and ultimately seen only by those in the gallery. Demos provided me with the potential to reach and influence diverse industry sponsors (from toy makers to chip manufacturers), media, academics, and researchers in many fields. But more importantly, demos can go out into the world and reach people in many different forms. The demos that I made at the lab were meant to function in interactive musical performances, installations, fashion shows, galleries, and as models for new toys or other commercial items.

Creating demos that could function as both far-flung artistic and technology research, and real-life, working objects is incredibly challenging. For instance, the *Embroidered Musical Instruments* presented in this thesis were designed to be part of larger project, *Toy Symphony*. The goal of this project is to provide kids with electronic music toys that would help them learn about, create and ultimately perform music with a symphony orchestra in a professional performance. Creating these instruments meant balancing a number of disparate criteria. These instruments needed to sound great, and also be meaningful design and technology research. They needed to be durable enough for public performance, relatively cost effective and reproducible in *at least* a limited number. Finally, they were meant to inspire, if not become, actual commercial products.

Frankly, fulfilling all these criteria was not possible. While it is extremely challenging to transform demos from the Lab into permanent public installations, making the transition to product is far more challenging. In the case of the *Embroidered Instruments*, the smart textiles that allowed us to create reasonably cost effective and durable “limited series” items for the performances, were too expensive for actual toys. Moreover, the technology that is cheap enough for actual toys, injected molded plastic, is too expensive for limited run items, and not research oriented. In addition, the process for making a real toy at an established company like Mattel involves a number of marketing tests. Few toys ever make it past these tests, and the reasons seem as much a result of the process and people involved as of the toy itself and the kids reaction to it. For research to truly suggest the future it needs to focus on creating the improbable, both intellectually and practically. Making a product involves creating the probable. Consequently, the path from demo to product is rarely clear.

Utopian Visions of Technology

As a vision for the future, a demo can be a profoundly positive action. Personally, I have found that as a *positive* proposal for the future, the making of demos stands against much of the purely *critical* art practices of today. This is not to say that the making of a demo is not the result of a critical design or thinking process, or that a demo cannot have a critical message. Nor should demos rely on an implied *neutrality* of technology, examining none of the negative aspects of

new technology. Nor should they be a blind vision of technology changing the world. But under any critical message in a demo there must be some new *possibility or proposed solution* to a problem. As a positive proposal, creating demos offers artists and designers a means to making something that is actively forward looking and hopeful and does not rely on the vocabulary of critical theory that dominates the art academy today.

This may put the research presented in this thesis squarely in the line of many unfashionable, utopian design visions of the future, like those of the 1964-1965 New York World's Fair or the design work of Buckminster Fuller. Despite the *extensive* criticism of this type of work, I can live with that. I would rather make a positive design proposal than be relegated to the practice of making art or objects whose main function is to be critical. Like Buckminster Fuller, my work actively uses technology to make a proposal for the future. And like Fuller, some of it manages to be produced in limited run productions and reach the outside world, while some of exists as working prototypes and suggestions. Unlike Fuller, my work is not geared toward using technology to create a sustainable environment. It is geared toward using technology to enable what I believe is a fundamental human activity, aesthetic and artistic expression.

Expressive Objects

One of the main goals of this thesis has been to turn the powerful and extensive tools of computing

technology toward enabling human expression in everyday life. I firmly believe that putting computing technology in the service of human expression will make that technology better, and further human expression. Because I believe that the desire for aesthetic and artistic expression is a fundamental human activity, this is ultimately, a strongly humanist approach.

In a broad sense, all of the objects and materials in this thesis are designed to enable human expression. This can be done in many ways. There are tools and instruments, like paintbrushes and violins, which enable both professionals and everyday people to play music or create a painting. There are aesthetic objects, like pieces of clothing, jewelry or furniture, that enable people to express themselves simply through a choice of style, design and ornament. And there are creative materials, like clay that enable artists to express their ideas. This thesis has produced objects and artifacts in all of these areas, including musical instruments for kids, fashions, and materials for artistic expression.

Everyday and Approachable

One major goal of my research has been to emotionally empower people in relation to computing technology. I have attempted to do this by making computing technology more physically approachable, rather than rarefied or isolated. I have chosen to create computing objects that are part of everyday life, like fashions, tablecloths and instruments. I have also chosen to create objects that speak to people in

aesthetic styles that technology usually does not. My use of visually organic and romantic, decorative elements has been aimed at subverting the standard aesthetics of the beige box and the hard, weapon-like, business-oriented, style of commercial technology. I have also attempted to make technology more approachable through its materials. I have chosen to work in textiles, a material that through its physical intimacy, softness, and warmth is antithetical to the hard plastic of most computing objects. Finally, I have used humor to make computing technology more approachable. I have attempted to create computing objects that are visually surprising and make people laugh.

Multiples

Since coming to the Media Lab, I have always endeavored to create objects that could be mass-produced at some level, and were not single entities or individual works of **A**rt. The history of using the processes and images of mass production to question "what **A**rt is" is extensive. Controversy over the legitimacy of multiples as true art works can be seen in multiple bronze casting of August Rodin[2]. Warhol used what is considered a lesser **A**rt medium, printmaking and the images of mass media (for instance Campbell's soup cans), to question the meaning of the single, handmade piece of **A**rt.

[2] Krauss, Rosalind E., *Narrative Time; the Question of the Gates of Hell*, Passages in Modern Sculpture, Cambridge, MA, MIT Press, (1977).

The objects in this thesis are for the most part multiples; they are almost all reproducible and manufacturable on some small scale. In fact, one reason I was anxious to work with textiles is that they are a wonderful material for producing objects that are both the result of a hands-on material-oriented process, and are capable of being reproduced in a limited series. And As multiples, rather than single *precious* objects, most of the work in this thesis can easily go out into the world and be touched and handled, an essential part of interactive art. The use of multiples has also made my work unique as a demo. Multiples make great demos because people can see that the technology is robust enough to be reproducible. Making multiples also means that the research or project must be created with an awareness of the manufacturing processes by which it is made, something that I believe is essential to any design process.

I have also used multiples to explore a basic artistic question made possible only by computers and mass production. Networking and the mass production of electronic objects are allowing creative people to explore the artistic and expressive potential of a large group of communicating objects. The *Triangles*, with their numerous narrative applications, was an early example of this exploration. Further explorations into the expressive possibilities of networked objects were also done both by Kelly Heaton (both *Nami* and

Peano)[3], and with Gili Weinberg[4] in the networking of the *Embroidered Musical Instruments*. The potential of networked objects remains a large area of expressive exploration yet to be tackled.

Materials and Meaning

My interest in unusual materials and the meaning that they impart to an object has always been fundamental to my work as an artist. My desire to use antithetical or "bad" materials has also always been important for me artistically. When I worked in a bronze factory I longed for plastic. Consequently, it is no surprise that the objects created for this thesis use unusual computing materials to subvert and transform the meaning of computing technology.

My work with computing technology has demanded new computing materials for both practical and symbolic reasons. New sculptural materials are necessary to achieve the practical integration of computing technology into many everyday objects, like clothing. These materials are also necessary to allow artists a hands-on sculptural experience with computing technology. But these are formal and practical issues. New computing materials also bring to

[3] Heaton, Kelly, Physical Pixels, Thesis for the Degree of Masters of Science of Media Arts and Sciences at the Massachusetts Institute of Technology, Cambridge, MA, (2000).

[4] Weinberg, G., Lackner, T., and Jay, J., *The Musical Fireflies - Learning About Mathematical Patterns in Music Through Expression and Play*, Proceedings of XII Colloquium on Musical Informatics, A'quila, Italy. (2000).

the table the ability of an artist to change the meaning of computing object *symbolically*. Artists like Joseph Beuys have put "materials before form"[5], using the chemical properties of their materials to create the meaning of the whole work of art. My reason for using unusual computing materials is not to create *nicer* or *prettier* computers. Instead, my goal has been to invert computing technology and its meaning with antithetical materials. Consequently, one of the specific, sensual, material and sculptural transformations that dominates the work of this thesis is the pursuit of the soft and squishy. I have always seen my work as aligned with the project of *Surrealism*, with conflating reality and dreams[6]. Undeniably, I have been attracted to materials that are organic, squishy, and even transparent because these are sensually opposed to most computing technology. But I have also been interested in working with textiles because they are symbolically *female*. Most people associate fashion and the textile arts with women. Sewing is traditionally seen as women's work. Sewing computers and technology subverts the idea that technology is a man's work and a man's territory.

[5] Borer, Alain, The Essential Joseph Beuys, Cambridge, MA, MIT Press, (1997) pp. 15.

[6] A more detailed description of Surrealism and the work of Joseph Beuys is provided in Chapter 5.

Functional Ornament:
A Modern/Post-Modern Tension

The computing objects presented in this thesis use smart materials to create ornamental and decorative elements that are actually *functional*. The creation of computationally active ornamental elements for this thesis, brings to the fore, the tension between Modernism and Post-modernism that I believe exemplifies the objects created for this thesis. Beginning with Adolph Loos' infamous "Ornament and Crime",[7] published in 1908, modernism scorned the ornamental and decorative as criminal, depraved, and bourgeois.[8] The modernist Bauhaus espoused pure *functionalism* and created what has been since been called *the machine aesthetic* or the square, ornament–free objects and architecture which are associated with the modern design. (Of course, the machine aesthetic has been criticized for being itself a form of superficial ornament or style, while presenting itself as a social solution.[9]) In architecture, Post-modernism revived the ornamental and decorative, looking to non-functional elements to bring meaning and context, if not irony and fantasy, to its work. In Post-modernism, ornament and decorative style were seen as indeed *functional* by virtue of the meaning it added to a piece of design.

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[7] Loos, Adolf, *Ornament und CVerbrechen* in Trotzdem 1900-1930, Innsbruk, Verlag, (1931) pp. 79-92.

[8] Newman, Lenore and Spak, Jan L., *Is Ornament a Crime?,* Eidleberg, Martin (ed.), Designed for Delight, New York, NY, Flammarion and the Montreal Museum of Decorative Arts, (1977) pp. 177.

[9] Reyner Banham, Theory and Design in the First Machine Age, MIT Press, Cambridge, MA, (1996).

The objects presented in this thesis have taken what has been criticized as superfluous (ornament) and made it computationally and practically *functional*. While I have a strong love of ornament and decoration for aesthetic reasons, and for the meaning it can bring to an object, I also have a strong desire to have some functional purpose to my design decisions. *Functional ornament* has given me an opportunity to do both.

A number of computing objects in this thesis clearly use *functional ornament*. For instance, the *Embroidered Musical Instruments* presented in this thesis use electronic embroidery to create ornamental patterns that are not merely visually expressive, but that also function as pressure sensors. When touched and squeezed these sensors play music. Decorative elements and unusual materials like tortoise shell and mother of pearl, have historically played a strong role in the visual design of musical instruments. For example baroque guitars have often used elaborate inlay, painting and color to communicate the status, personal preferences of their owners, or the place and period where they were made. But these designs generally had little influence on the sound of the instrument. Even the elaborate rosettas of early guitars had no acoustic function.[10] *My Embroidered Musical Instruments* are decorated with embroidered ornament that is actually musically *functional*; it is essential to how the instrument creates music. Moreover, the design of these ornamental sensors is an intimately

[10] Kuronen, Darcy, Dangerous Curves, The Art of the Guitar, Boston, MFA Publications, (2000).

linked reflection of both the visual, tactile and the technical needs of the sensor. For instance, the “bumpy” sensor from the *Sound Sculpture Pyramid*, is a huge, embroidered resistive network that functions as a pressure sensor. The decorative swirl underneath creates a broad, flexible, conductive, plane. The bumps and interconnects tie that plane electrically together and also provide an excellent mechanical surface for the player to couple to and a tactile indication that the player is touching the sensor. In this way, both the technical, ergonomic and visual needs of the sensor are intimately tied together.

Conclusion: *Bad* Materials

The ability of what are normally considered the housing materials of computing objects, (the materials that artists and designers of physical computing objects are most concerned with), to participate in computation captured my imagination. To fully understand how making the housing materials of computing objects active, sculptural and smart will improve the design process and aesthetically transform physical computing objects, we must have a better understanding of what the current, commonly-used and *bad* physical materials of computing objects are. It is significant to understand that what I am referring to here is not necessarily the microscopically engineered materials of computers, like silicon. Instead, I am referring to all the human-scale materials that must be assembled to create any physical computing object. After all, it is the sensually perceived that is ultimately the concern of the artist and designer. These human-scaled computing materials

include; output media like speakers, lights and visual displays, input media like buttons and sensors, chips and circuits, wires, power supplies and of course, the housing material that holds it them together, (usually plastic). I refer to them all as computing materials because any designer needs them to make any physical computing object. Active computing materials include anything electrical, and for the most part include everything but the housing material of a computing object. The next chapter of this thesis will take a closer look at these materials and their ramifications for physical computing technology as an artistic material, medium, and form.