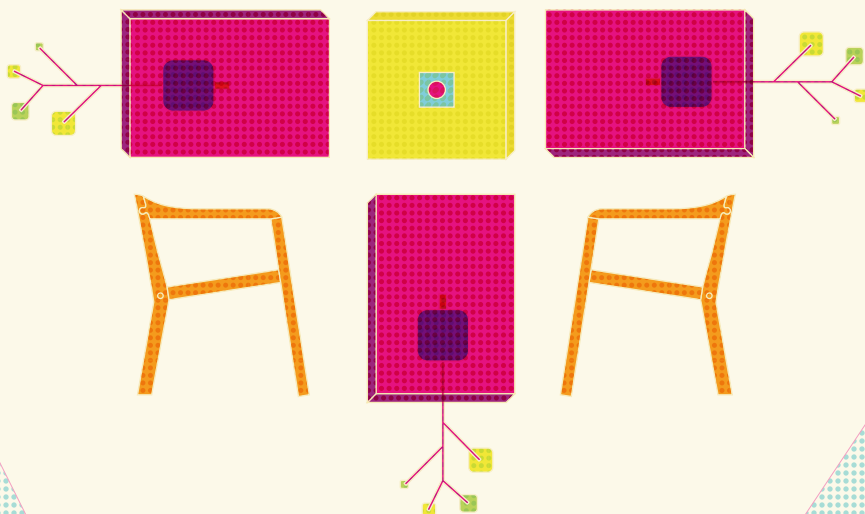


# SPOOKY ACTION AT A DISTANCE: FRAGMENTS OF PRESENCE IN REMOTE OBJECTS

*A Master of Design Thesis by Jackson McConnell*



# SPOOKY ACTION AT A DISTANCE: FRAGMENTS OF PRESENCE IN REMOTE OBJECTS

BY JACKSON MCCONNELL

A thesis exhibition presented to OCAD  
University in partial fulfillment of the  
requirements for the degree of Master  
of Design in Digital Futures

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 Jackson McConnell 2014

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# Fragments of Presence in Remote Objects

Master of Design 2014

Jackson McConnell

Digital Futures

OCAD University

This research project explores the relationship between poetic design and emotional affect. In it I document the creation of four prototypes that each illustrate a different way of physically animating an object with the presence of a remote person. In my reflection on these designs I discuss the concepts that informed their creation, including Ambient Media Displays, Tangible User Interfaces, and Poetic Design. I also reflect on user tests conducted to discern the potential for each design to be emotionally affective, and the qualities of the design that facilitate this. I conclude that experiencing a small fragment of a person's presence through the behavior of an object has significant potential to be emotionally affective. I assert that the poetic significance of fragments is one of the conceptual mechanisms responsible for this affect.

Most of all I want to thank my family for their love and support.

I would also like to thank my principle advisor Kate Hartman for her mentorship and guidance, as well as Nick Puckett, Tom Barker, Stuart Candy and Ian Gwilt for their thoughtful feedback.

And of course I want to thank Blue...for everything.

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# INTRODUCTION

*Personality is something with which you can have a relationship... which is why people return to pencils, violins, and the same three guitar chords.*

– Brian Eno (1999)

I have a background in industrial design, where I have pursued my interest with the interactions between people and their material environment. I am also fascinated with how technologies offer new ways of animating objects with personality and connecting them to a broad social context. However over the past several years I have experienced a growing discontent for the industrial design of commercial electronic products. Much of the development of product design through the mid 2000's, and still today, has been very technologically driven, with innovation being pursued for the sake of innovation itself (Dunne 1999; 2005). At the start of the 21st century many creators of electronic objects were concerned with packing as many technological features and options into a design as possible, perpetuating the myth that more options equates to more freedom

and a better design (Eno 1999). The problem is that through this process of technological determinism an object can lose its “personality,” reducing the likelihood for a user to develop an emotional bond with the object. However throughout the last decade, the emotional design of technological objects has become an increasingly prominent concern for the designers of electronic objects (Spitz 2013). The culture of design and technology is currently recovering some of the expressiveness that was lost through the privileging of functional technological development (Spitz 2013). In the field of interaction design this recovery is being made through the implementing of “affective parameters to designed interactions, making projects functionally affective and therefore analyzable from a distinct viewpoint...of an emotional design methodology” (Spitz 405). This emphasis on the affective qualities of a technological object is one theme that I explore in this research. A major part of my work is to demonstrate that constraining the variety and technological abilities of a design can make interacting with it more emotionally resonant.

The subject of my research also pertains to how objects exist within a broad network of digital communication. Recently my lifestyle has become more nomadic than it has been in the past. My sense of place has shifted from a singular location and become dispersed across a variety of cities. As a result of this shift I have become interested in how contemporary tools and technologies connect remote people, places and objects. The objects that surround us are more networked than ever before. In 2008 the number of objects connected to the internet exceeded the number of people on the planet (Swan 2012). Objects are increasingly becoming readable, recognizable, locatable, addressable, and controllable via the Internet. This ecosystem of networked objects is called the Internet of Things, and with it comes a massive reconfiguration of how we interact with objects, and how objects facilitate interaction between people. Our contemporary landscape is defined by communication where “everybody and everything is conveying content and meaning in all possible combinations from one-on-one to everybody-on-everything” (Antonelli 2011). Within this context



designers are tasked with creating objects that act as a platform for dialog between itself, the users, and the broader networked society (Antonelli 2011).

Throughout the course of this research I have been creating objects with “personality” that are embedded within the networked ecosystem of connected objects. They each explore how design can facilitate emotional connections between remote people. Specifically the project involves the design and prototyping of four objects that illustrate different ways of representing the presence of remote individuals, and addresses the following research questions:

1. How can the behavior of objects enact the presence of remote individuals?
2. What qualities of the object’s design contribute to its emotional affect?

The goal of this research project has been to create novel designs that connect remote people with emotional interactions. The objects that I am creating enable users to experience aspects of each other’s presence across great distances. By docu-

menting the design of these objects and by studying their meaning I hope to stimulate the imagination of creative designers, technologists, and researchers who are interested in emotional affect between people that live remotely from one another. My intention is that these prototypes may also inform the design of future related objects by both myself and by others.

Each design that I have developed facilitates a different way for people to experience an aspect of each other's presence. The prototypes are called Knock-Knock, Peep Show, Quantum Butt, and the Media Mobile:

1. **Knock-Knock** is an object that hangs on the walls of two remote spaces. The object enables two users to communicate with each other by knocking, as if they were on two sides of the same wall. When one person knocks on their object, the other object emits a matching mechanically generated knocking sound.
2. **Peep Show** is also a wall hanging object. It consists of a tiny hole through which the user can peer through and view





a live video feed of a remote location. Similar to Knock-Knock, Peep Show gives the illusion that the user is peering into an adjacent space, and that the two spaces are physically connected to one another.

3. **Quantum Butt** is a design for a pair of chairs that are located remotely from one another. When a person sits on one of the chairs, the other chair changes color to represent the imprint of the sitting person's body. It also becomes warm as a representation of that person's body heat.
4. **The Media Mobile** is a hanging mobile of four different shapes. Each shape is representative of a specific person within a family or group of friends. When one person engages in digital communication with anyone else represented in the mobile, the shapes that correspond to the sender and receiver begin to bounce and wiggle.

The first section of this document describes my research methods, which include prototyping, reflection, and interviews. In research as prototype, the act of designing and creating

prototypes is the central research activity. This process drives the project forward and informs the other methods. My secondary methods are reflective practice and user testing. I have employed these methods to learn about the emotional reactions that people have to each prototype. With this information I have made connections between the emotions that users ascribe to their perception of each object, and the qualities of the design that affect these emotions.

In the Initial Research section of this document I briefly describe my research into remote presence, tangible user interfaces, affect and emotion in design, poetic design, and embodied cognition. This initial work was conducted before beginning the prototyping. The concepts that I explored during this phase are present in aspects of each prototype that I created.

Following the literature review the document is divided into a section devoted to each prototype. Included in each section are (1) descriptions of concepts that apply specifically to the prototype, (2) how the prototype was informed by my experience creating the other objects, (3) a more detailed descrip-

tion of the prototype itself, (4) documentation of the process of creating the prototype, and (5) a discussion of the prototype's significance based off of findings from my user testing and reflection. The prototypes are presented in the chronological order that they have been completed in.

In the conclusion of this document I discuss my analysis of all four prototypes in comparison to each other. Based off of this I describe the conclusions that I have drawn regarding poetics and emotional affect in the context of these prototypes. I conclude the document with suggestions for future research that have arisen throughout the process of this project. I also address the aspects of this research project that require further work in the future.

# RESEARCH METHODS

## RESEARCH AS PROTOTYPE AND REFLECTIVE PRACTICE

Designers are sometimes taught that they should start with a specific problem that needs to be solved, and that designing is the act of solving that problem. Often times the problem is highly constructed, and privileged by designers as being a good starting point for their work (Dunne 2008). However this is not the only approach to design, especially when researching *through* the act of designing. As a form of research, design is not necessarily about solving problems or following a systematic structure of hypothesis and tightly controlled experimentation (Frayling 2012). Research through design is more often about the messy non-linear process of creation and reflection. It can use ideas, concepts, and ideologies as the starting points, rather than problems, technologies, formal research questions or hypothesis. (Dunne 2008; Frayling 2012)

Based off of these views the methods that I have chosen to implement are research as prototype and reflective practice. Research as prototype encapsulates the act of constantly design-



ing in order to illustrate and explore concepts. Reflective practice refers to the act of looking back at these prototypes and discussing what they mean, their impact on my thinking, and how they inform continued exploration and prototyping.

Researching through design involves a level of subjectivity and interpretation that is not common in many types of research. Because the design and construction of artifacts becomes a central activity, my own beliefs and intentions as a designer come into play (Barzdell 2012 ). Through the act of making, my experiences as a designer (in the form of my design related judgments) are equally as important as the analysis and reasoning present in all forms of research (Barzdell 2012).

However designing alone does not constitute effective research. It needs to be coupled with a secondary method in order to articulate and verbalize the tacit knowledge that arises through the experience of making, and to effectively document the process. For this reason I needed to develop a framework for reflecting on the prototyping conducted throughout the project.

In order to develop this framework I looked to Lilligard Hanson's article "Living in the Material World," (2013) which focuses on the activity of reflecting on the process of making. "Naming and Framing" is a key concept from Donald Shon's writings on reflective practice, which are referenced throughout Hanson's article. The concept of "Naming and Framing" means that when reflecting on their work a practitioner must first name their task; which is to say that they are describing an intention, and then frame it in such a way that it is given meaning. Once this is in place the practitioner can then carry out a series of experiments in action. This actual work with materials and techniques is what drives the research forward. When documenting and reflecting on these processes the key is to focus on the unforeseen and unanticipated outcomes of the work. Reflecting on these unanticipated outcomes is crucial because through these reflections the practitioner can find new ways of enriching their work that suggest new directions for the development of the project (Hanson 2013). As Hanson states it is most often when something goes wrong or is unanticipated

that we stop to think about what we did or what we could have done differently. The tacit knowledge that arises from the experiences of making things is what needs to be documented and articulated.

## INTERVIEW PROCESS

After creating the prototypes I have conducted interviews with participants to understand how they interpret and perceive the objects. The format for these interviews is to allow time for the participants to interact with each of the devices in order to understand what it does and what it feels like to use. We then engage in a discussion revolving around their perception of the objects. The key topics that we discuss are:

1. **Desirability:** Participants are asked to rank the prototypes in order of how likely it is that they would use the prototype as part of their everyday life, and why.
2. **Context:** The participants discuss how they imagine using the objects. This includes where they might place them, who they would use them with, and what are the situations where they would be used.

**3. Emotion:** in the process of discussing the desirability and the context of use for the prototypes, the interviews naturally gravitate towards the emotional experience involved in the use of each prototype.

The desired outcome of these interviews is to discern which prototypes have the most potential to be emotionally affective. I am not attempting to identify the precise nature of the emotion that each object affects, because that involves a high degree of subjectivity. I use this information to make connections between the design of the prototypes and their potential to be emotionally affective. However due to the scope of this research project these interviews only constitute an initial study. A sustained long-term study of the objects within the actual spaces that participants inhabit would be a more ideal format for user testing. However this is not achievable in the current scope of this project. A more detailed discussion of the ideal user testing process is included in the Suggestions for Future Research section.

Knock-Knock and Peep Show have both been exhibited in a design show and conference. The feedback that I have received from these experiences have also been folded into my reflections. Reactions to the prototypes and conversations regarding their meaning that have emerged through regular daily interactions with peers have also been included in the reflections and conclusions that I present.

# INITIAL RESEARCH

## REMOTE PRESENCE

There are several terms associated with displacing an individual's presence through digitally mediated environments. The terms telepresence, remote presence, virtual presence, ego presence, social presence and object presence all refer to similar phenomenon but have subtle differences in meaning (Draper 1998).

Telepresence is the most established field of research that relates to connecting a user to a remote space through technological means. It refers to the projection of a person's self perception into a remote environment. This can refer to the ability to operate in a computer-mediated environment, an index for quality in human-machine interfaces, and the actual feeling of being present in a computational or remote environment. (Draper 1998) From a technological perspective Sheridan has written most widely on the subject of telepresence (see Sheridan, 1992a, 1992b, 1996). Through his perspective telepresence refers to the phenomenon where an operator has more

awareness of being in a remote space than they do of their own local environment. Technological factors such as the richness and amount of information about the remote environment that they experience, the dexterity of control over the tele-operating system, and their physical ability to affect change in the remote place are all contributing factors in the degree to which a system achieves the feeling of being telepresent.

While there is a vast amount of research on telepresence, I have found that the term is not appropriate for describing the prototypes that I have been creating. my prototypes do not actually extend the users awareness of themselves into a remote space, as is the case with telepresence systems. Instead, the prototypes translate various attributes or actions of a person into the behavior of a remote object, without actually extending self-awareness into that place. When a user interacts with an object in their local setting, a paired remotely located object translates or enacts an aspect of that interaction. Because of this distinction between my work and conventional understanding of telepresence, I have found it more appropriate to

refer to my work as facilitating remote presence. In this context the word presence refers to some characteristic or capability of a person's body that comprises their embodied existence in the world. This could include biological characteristics like heat, appearance, a heartbeat, or breathing. It could also refer to the conscious capabilities of the body like movement, speech or the senses. For example imagine hearing someone walking around in the room next too you. Even though you cannot see them, you are still experiencing their presence. Or imagine rolling over to your partner's side of the bed after they have left. They are no longer present but you can feel the latent heat from their body in the sheets. Like these two examples, in the context of my research presence refers to traces of a person's existence in the world.

Part of the title for this project is *Spooky Action at a Distance*, referring to the phenomenon of *action at a distance*. In physics this is the concept that an object can be moved, changed, or otherwise affected without being physically touched by another object. It is most often associated with



early theories of gravity and electromagnetism to describe the influence that two objects have on each other when separated by space. More recently the term is used in conjunction with quantum mechanics theories that challenge the assumption that physical process should obey locality. I have embraced the term in association with the prototypes created as part of this project. With the exception of the Media Mobile, all of the prototypes consist of two remote objects that affect each other at a distance. I have employed the term because it refers specifically to the remote relationship between two objects that react to one another across space. I find this preferable to telepresence because it does not insinuate the transposition of self awareness into a remote place, only the effect that two remote objects have on one another. The name for the Quantum Butt chair draws directly from this concept.

#### PRIOR WORK

Much of my motivation for exploring this research topic has arisen from some thematic threads that I identified in my recent works. The first of these projects is called “Heartstrings,” (2012) which deals specifically with technologically mediated

connection between remote people. Heartstrings is a design for a pair of sweaters that each contain a heart-rate sensor and a vibrating motor. They were created in order to accompany video conference conversations between two people. When each user plugs their sweater into the USB port of their computer their heart rate data is sent to the remote sweater. The vibrating motor on your sweater then pulses in rhythm with the other person's heart enabling the two wearers to feel each other's heartbeat. Our intention when designing the sweater was to add a layer of embodied connection to the remote person. This project was my first attempt at designing for emotional connection across distance. I wanted to continue this conceptual thread as part of my thesis research.

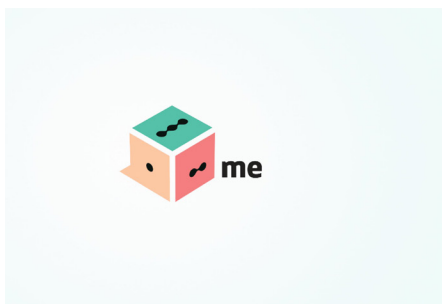
The meCube is another project that informed my research. It was the culmination of an experimental design process that began by interpreting a science fiction text into a graphic image and short film. I first selected a passage of work from Phillip K. Dick's *Ubik*, which details a man's conversation with a door. In the novel everyday objects are literally in con-

stant conversation with their users and with each other. This makes the novel a fascinating speculative precursor to ubiquitous computing and the internet of things. The next step in the process was to design a poster based off of a passage from the text that I selected. Based off of that image I then filmed a five minute movie that interprets themes from both the text and the poster. The film is a documentary style series of interviews with a variety of objects that belonged to their recently deceased user, Leonard. The final stage in the process was to create a prototype for a product that emphasized commercial viability. The prototype (which I created with my colleague Hudson Pridham) is called the meCube. The object collects snippets of a person's social media activities and displays them through a singular tangible interface. It displays different information depending on what side it is resting on, and the user can navigate through content by tapping on top of the casing.

The meCube and Heartstrings projects both introduced me to the themes of Tangible User Interfaces, Internet of Things, and technologically mediated emotional connection



"HEARTSTRINGS" (2012) WITH IMAAN PIRANI



MECUBE (2013) WITH HUDSON PRIDHAM

across distance. These are all themes that I continued to explore throughout my research. The meCube in particular directly influenced the design of my fourth prototype, the Media Mobile. Later in this document I will describe the meCube and its influence in greater detail.

## TANGIBLE USER INTERFACES

In his book *Sensing the Past: Seeing, Hearing, Tasting and Touching in History* (2007), psychologist Mark Smith asserts that there is a definitive privileging of sight in interaction design. According to Smith this emphasis on sight is due in large part to “the association of sight with both scientific rationalism and capitalist display, and to the expansion of the visual field by means of technologies of observation and reproduction – from the telescope to the television” (19). Smith argues that this emphasis on vision has created a general tendency to ignore interaction with the so-called lower senses.

We see this tendency towards visual interaction in the predominance of the graphical user interface (GUI), the dominant paradigm for human-computer interaction. In a GUI the

control devices (keyboard, mouse, touchscreen) are decoupled from the graphical display of information on screen (Ishii 2009). This allows for great range and control over the information being displayed. At the time of its introduction the GUI was a significant improvement over the command line interface, at least in terms of usability (Ishii 2009).

While GUI's are clearly an effective model for human-computer interaction there are inherent drawbacks, most notably a disconnection between the user's interactions on screen and how they interact in the real physical world. When we use a GUI we are not utilizing the range of dexterity and capabilities of our bodies. They also do not invite possibilities for interacting with the diverse aesthetic qualities of physical materials.

The current alternative model to the GUI is the tangible user interface (TUI). TUI's have been the subject of significant research over the last fifteen years. The Tangible Media Group at MIT led by professor Hiroshi Ishii has been a central force in much of this research. By physically embodying digital infor-

mation into the physical world TUI's allow us to perceive and interact with that information using a wider range of our senses and abilities than is possible with GUIs (Ishii 2009). The aim of the TUI paradigm is to weave together the fabric of the digital and physical worlds. TUI research is a rich field that invites interesting explorations for the merging of design and technology.

Tangible telepresence is a sub-genre of TUI research that applies specifically to remote presence. As Ishii puts it, tangible telepresence refers to “inter personal communication taking advantage of haptic interactions using mediated tangible representations and control.” (xix) The underlying premise of tangible telepresence is a desire to improve upon current GUI implementations of telepresence like video conferencing by creating tangible interfaces for interacting with remote people, tools, environments and virtual spaces. Some examples of tangible telepresence projects are lumiTouch (2001), SoftAir (2000) and Air (2005). An extensive list of projects relating to this research can be found in the research by Hassenzahl (2012).



### LUMI TOUCH (2001)

Lumitouch system consists of a pair of interactive picture frames which measure the distance of a person to the picture and transmit the distance as the brightness of an LED on the remote frame (Chang 2001).



### "SOFT AIR" (2000)

Sensors in the inflatable chairs detect weight and movements, which are then transmitted to a remotely located chair through light and sound (Tollmar 2000).



### AIR (2005)

The device consists of two sets of blue and red lamps connected over a network. One person controls the blue lamp and the other, the red lamp. When a colored lamp is turned on at one end, the same color lamp on the other end is also turned on (Ogawa 2005).



Examples like these differ from the types of interactions possible when using a GUI in many ways, most importantly because the designers use physical objects in order to represent aspects of a person's presence. Many of these projects discuss the capacity for tangible telepresence devices to affect feelings of relatedness, closeness and intimacy with remote people and settings (Hassenzahl 2012).

Based off of my review of this research I believe that there is an overall lack of co-evolved integration between digital technologies and the rich material and aesthetic vocabulary of the physical world. I also noted that many of these projects are not developed to the point where they look believable as objects that people genuinely want to use. This has raised doubts in my mind regarding the capacity for such objects to genuinely affect emotion. I believe the field can benefit from more developed designs that facilitate connective emotional relationships between remote users, and that cohesively integrate digital and material components. For this reason I have placed heavy emphasis on continuing my prototypes beyond a simple proof of

concept. Each one has been developed to a point where it is a fully constructed prototype as opposed to a rapid proof of concept model.

## EMOTIONAL DESIGN AND THE POST-OPTIMAL OBJECT

In the relatively short history of design, practitioners have held rationality and functionality as central tenants. The discipline of design first grew out of a need to establish order on the visual cacophony immediately following the technological breakthroughs of the industrial revolution (Antonelli 2005). Designers of the time achieved this by repressing the excessive qualities of objects that were deemed irrational. This perspective can perhaps best be seen in Adolf Loos's famous 1908 essay "Ornament and Crime," in which he equates functional and rationally designed material culture with the development of intellectual civilizations.

Decades later this perspective persists and is celebrated by modernist design ideologies. The central tenant of modernist design is that objects should be easy to use. According to the

modernist cannon the design of an object should communicate its use so clearly that it sinks into our everyday background and is effortlessly integrated into our everyday life. The role of the modernist industrial designer is that of a semiotician. They use rational design thinking to create a visual language for objects that simply and clearly communicate their own function. The earlier writings of design critic Donald Norman, such as “The Design of Everyday Things,” (1988) perpetuates the perspective of form follows function.

However by the beginning of the 21st century the culture of design began to shift towards an appreciation for the emotional dimensions of objects. Norman’s own work reflects this through his 2005 book “Emotional Design” which proposes the thesis that emotion plays a big part in the ways that we relate to objects. This updated understanding of the psychology of design deals not just with the functional qualities of objects, but with their capacity to affect the emotional states of the user.

In her 2011 introductory essay to “Talk to Me” exhibit of

design and communication between people and objects at the Museum of Modern Art in New York, Paula Antonelli describes a new landscape of objects that do not only serve as functional tools, but that engage users in affective and emotional exchanges. Antonelli asserts that after years of functionalism and rationalism, designers are becoming more aware of ascribing meaning and parameters to objects that are constantly communicating with users. Antonelli states that the relationship between people and objects has always been filled with sentiments like attachment, love, possessiveness, jealousy, pride, curiosity, anger, friendship and even partnership. She argues that contemporary designers are increasingly concerned with not just the functional aspects of objects but also with facilitating emotional exchange between people and material artifacts. Due in large parts to ever more sophisticated software and hardware, objects are being transformed from tools into companions (Antonelli 2011). This new generation of designers creates objects that are not isolated entities, but exist within vast networks that connect people, places and other objects, and are constant-

ly in conversation with the environment around them.

In his 1999 book “Hertzian Tales: Electronic Objects, Aesthetic Experiences and Critical Design,” industrial designer and theorist Anthony Dunne argues that most contemporary designers have accepted the role of semiotician, and are essentially a companion of package designers and marketers. The industrial designers of most contemporary commercial electronic products are primarily concerned with creating semiotic skins to communicate technologies that the user is unable to comprehend (Dunne 1999; 2005). The industrial design is essentially treated as a package for the technology. This assertion holds true to the contemporary state of affairs where commercial products are concerned. Although the book was first published in 1999, Dunne writes in the preface to the 2005 addition that very little has changed in the world of design since the books first publication: “design is not engaging with the social, cultural, and ethical implications of the technologies it makes so sexy and consumable.” (2005).

While industrial designers appear to have settled into

the role of semiotician, Dunne asserts that the development of products themselves has become almost completely technologically driven. Electronic products exist within a culture of relentless innovation for its own sake, developing from what is technologically possible and semiotically consumable (Dunne 2005). He argues that this development of electronic objects has led to a point where optimal levels of performance have been achieved for commercial products. The thesis of Dunne's book is that the more meaningful role for industrial designers is to experiment with the metaphysical, poetic, and aesthetic dimensions of electronic objects, especially within the context of research. As Dunne puts it, design research should explore the new role for the electronic object, one that facilitates more poetic modes of habitation, particularly in a landscape of commercial products where practicality, functionality and technical proficiency have been optimized to the point of being taken for granted.

Objects of design that exist in the fabric of our everyday life do not have to satisfy strictly functional ends. Designers can

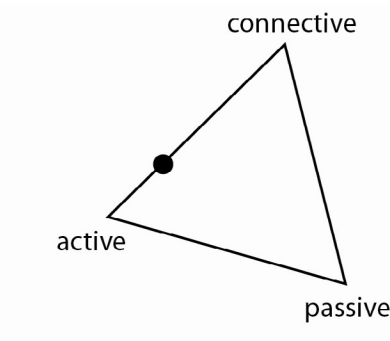
challenge the emphasis on "smart" technologies that aim to be evermore seamless, faster and more efficient. There is much to explore in how technologies can be more poetic, fluid and ambiguous. Part of the problem is that markets determine the development of products, so they are created to satisfy only very superficial levels of need and desire (Dunne 2007). The metrics for success in design are popularity and economic viability, which relegates design to a superficial layer that helps to sell products to an overly consumerist culture. But the perspective and abilities of designers is more valuable than that, and explorations into creating products that engage users emotionally through poetic sensibilities and critical intentions are increasingly being explored (Dunne 2007).

One way in which designers are exploring these post-functional facets of objects is through the design of objects that engage the user in affective relationships. In their essay "Beyond Rationality: Affect as a function of User Interfaces," (2013) design researchers Schorr and Spitz discuss the emergence of affective computing in design. Put more generally

affective computing relates to, arises from, or influences emotions. When applied to the field of interaction design affective computing involves designs that “allow for affective influence on the user by the product, on the object by the user, or design that facilitates affective exchanges between users” (Schorr 2013).

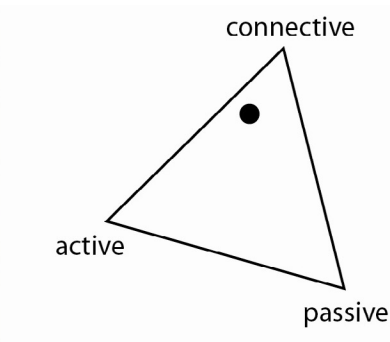
In order to further elucidate affect in interaction design the authors create three categories for affective interaction design: active, passive, and connective. Active refers to designs that actively influence changes in the users emotional state. Passive refers to designs with behaviors that are triggered by the users emotional state. Connective refers to designs that facilitate emotional exchanges between multiple users. These categories are not mutually exclusive, and objects that affectively engage users will usually be a combination of the three types (Scholl 2013). My research project specifically explores the connective category of affective design. Through creating objects with behavior that articulates the presence of remote people, I am interested in illustrating ways that design can facilitate





### CALL ME, CHOKE ME (2010) GUNNAR GREEN

Whenever the user/wearer of this object receives a phone call or a text message the collar tightens, linking mobile technologies and erotic asphyxiation. The project is primarily active in how it facilitates affect. (Schorr 2013).



### PRAYER COMPANION (2010) INTERACTION RESEARCH STUDIO

Prayer Companion is a communication device that alerts nuns in the UK to issues that need their prayers and works by scrolling a constant feed of issues on the screen across its top. The project is primarily connective in how it facilitates affect (Schorr 2013).

emotional exchanges between people living at a distance.

In the 2012 article “All You Need is Love: current strategies for mediating intimate relationships” the authors (Hassenzahl et al.) review the design of electronic artifacts that mediate feelings of relatedness in individuals living apart from one another. In the outset of their article the authors state that most long distance communication between close relations takes place over telephone, messaging, and video chatting. The authors argue that these technologies privilege explicit communication and are not designed to engage users in affective emotional exchanges, or to facilitate the subtle communication typical of close relations. They state that technologies such as video conferencing “are built with functionality in mind (i.e. transmitting sound and video), not with [emotional] feeling and experience...[while] they may be used to achieve emotional relatedness they are not built primarily with relatedness in mind” (Hassenzahl 2012). However they go on to propose that there is increasing interest among interaction designers in creating artifacts that mediate relatedness in loved ones living apart

(Hassenzhal 2012). These design explorations investigate affect and emotion and do not necessarily privilege functionality and pragmatism the way that prevailing commercial products do.

## POETIC DESIGN

Part of my intention in carrying out this work is to explore the poetic dimensions of our interaction with electronic objects. However this requires that I first discuss what exactly “poetics” refers to in relation to design. Poetic design has predominantly been written about in architectural theory, most notably in “The Poetics of Architecture” (1992) by Anthony C. Antoniades. The concept refers to an additional layer of meaning within a design that does not necessary provide any pragmatic or functional value. Instead it imbues the design with, symbolic, metaphorical, critical, or otherwise intangible channels of creativity (Antoniades 1992). There are many ways that a design can have poetic significance, and there is no one definition or documentation of this process. Metaphorical meaning, fantasy, critical intention, and literary mechanisms are all channels through

which a design can be poetic. The ways that an object enacts poetic behavior depends on the function of the object, it's form, the contexts in which it is used and a multitude of other characteristics. Within the context of this project I have created each prototype with some level of poetic significance relating to presence in a remote object. The specific mechanisms of poetics that I employ in each prototype are discussed in more detail later, but they include metaphor, allusion, abstraction and ambiguity.

## EMBODIED COGNITION

Embodied cognition was the final subject of my preliminary research. According to Andy Clark, a leading psychologist in the field of embodied cognition, there are essentially two perspectives on the ways in which cognition is enacted between the brain, body and material environment. The first is called brainbound, which posits that all cognitive activity takes place within the brain alone, suggesting the body is only the sensory system for the brain, and the material environment is simply the

arena within which cognition takes place (Clark 2008). According to the brainbound perspective all that really matters in the mechanisms of human cognition is what goes on the brain. In contrast to brainbound is what Clark calls extended cognition. According to the extended perspective, cognition is constantly distributed between the brain, the body, and the material environment. As Clark puts it:

According to EXTENDED, the local operations that realize certain forms of cognizising include inexorable triangles of feedback, feed-forward and feed-around loops: loops that promiscuously criss-cross the boundaries of the brain, body, and world. The local mechanisms of mind, if this is correct, are not all in the head. Cognition leaks out into the body and the world. (Clark xxviii)

The notion of extended cognition is important to designers because design plays a significant role in shaping our material environment, which in turn shapes cognition. Extended cognition matters for designers because it “drives home the degree to which environmental engineering is also self-engineering. In building our physical and social worlds we build (or rather, we

massively reconfigure) our minds and our capacity for thought and reason.” (Clark xxviii) Embodied cognition plays a role in understanding how we can experience the presence of others through the behavior of objects.

In his article “Tectonoetic Awareness and the Extended Self,” (2008) archaeologist Lambrous Malafouris discusses how an individual’s sense of self can be extended into material artifacts, and how others can perceive an individual’s identity as being embedded in artifacts. Malafouris posits that an individual’s notion of the self is constantly enacted between brains, bodies, and things, and is irreducible to any one element in isolation. In his article he calls this concept the “extended self” (2008).

These effects can be seen in the plastic relationship between extra-personal space and peri-personal space. Extra-personal space is the space that we perceive to be outside the reach of our own bodies, and peri-personal space refers to what we perceive to be within reach of our own body (Malafouris 2008). Malafouris discusses how the possession and use of objects has the effect of remapping the boundary between these two spac-

es. For example holding a hammer extends people's perception of what is within the reach of their own body. Space that was previously perceived as being extra-personal becomes peri-personal (Berrti & Frassinetti 2000). This implies that when we use an object our perception of ourselves can be extended into the space that that object occupies.

In his article on embodied cognition and interaction design David Kirsch (2013) elaborates on the blending of the body with objects. Kirsh states that when we learn to use a tool the specific neurons in our brain that fire in relation to a body part change to include the object as part of the body (Kirsch 2013; Iriki 2009). Because that object extends our perception of our own body, the length of that tool extends our peripersonal space. If an interface provides enough feedback to actions then it is even possible for our perception of self to be extended into remote geographic environments (Kirsch 2013)

## CONCLUSION TO INITIAL RESEARCH

As I began to create the actual prototypes throughout the course of this project some of my initial research became more

prominent, while I deviated away from other concepts. For example emotion and affect is a fundamental premise to all of the work I have done. I have also continued to explore poetic design, which has manifested itself in different ways for each prototype. On the other hand my early research on embodied cognition soon fell to the wayside as I explored the unexpected outcomes of each design activity. This deviation is a desirable consequence of my prototyping directed process. The following sections of the document describe my process of creating each prototype, and include my reflections on their meaning and how they contribute to the overall narrative of my project.



# KNOCK-KNOCK

At this point in the project I began to create designs that materialize my understanding of the concepts that I had researched. The first of these designs is an experiment in facilitating non-visual, tangible, and poetic communication across long distances. This first prototype is called Knock Knock.

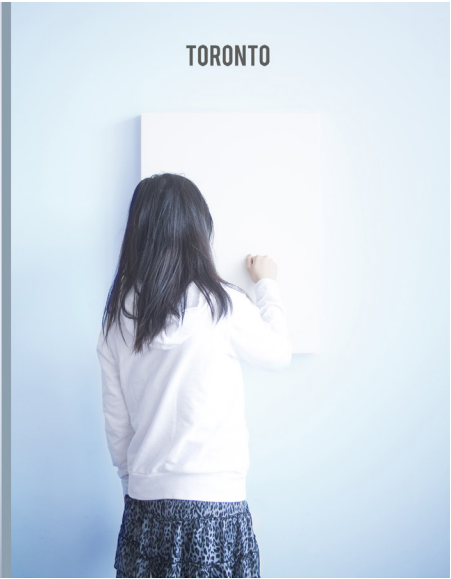
## DESCRIPTION

Knock-Knock consists of two wall coverings that gives two users the sensation that they are on opposite sides of the same wall when in fact they can each be anywhere in the world. When one-person knocks on their wall, that knock is translated to the other wall, which emits a matching knock. Anything from gentle rapping to loud banging can be communicated. The prototype is designed to blend in with the wall behind it in order to enhance the illusion that the other user is in an adjacent room.

Rather than explicitly communicating presence through video and sound, this prototype communicates a peripheral



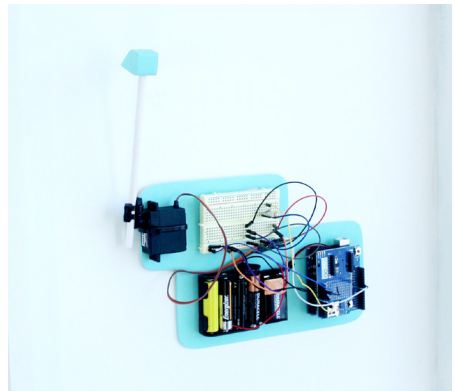
NEW YORK



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the inside of the prototype  
contains an arduino with wifi/  
xbee shield, a piezio sensor and a  
servo with fixture attached.



awareness of the individual's presence in a domestic setting. The transference of different types of knocking allows for emotionally varied communications such as a soft tapping or an urgent bang. Through these knocks the two users can draw each other's attention and engage in playful communication. The tactile nature of the interaction establishes a sense of physical connection to the remote setting. Each object constructs a very specific representation of the remote setting, and allows you to interact with the remote person through the embodied act of knocking.

## PROCESS

My idea for the design was inspired by the experience of hearing someone in another room, and interacting with someone through a wall. I thought the way a wall mediates the exchange between two people might be an interesting thing to expand across long distances because it plays with the feeling of being close to someone, yet still being separated by a barrier. I believe that there is poetic significant in this interaction that is worth exploring through design.

In order to prototype the object there were a number of small technical challenges that needed to be solved. The first was to mechanically articulate the knock. My first approach was to position a solenoid against a surface, however I decided that this was not ideal because it could not articulate a range of sounds. Alternatively I found that using a servo with a fixture attached to the arm produced a better result because I could program a range of speeds in order to create different types of knocks.

I then needed a sensor that would effectively detect a variety of knocks. I first used a piezo element to detect vibrations on the surface of the wall. Although it could detect vibrations, the user had to knock directly on the sensor to get usable readings. Instead I found a more specialized piezo sensor with a weighted tip in order to increase its sensitivity. This component was able to effectively detect knocks anywhere on the surface it is attached to.

In order to establish a communication channel between the two walls I first used an open source web API called cosm.

While this did allow me to transfer that data from one object to the other, it did so with about a five second delay which is not ideal for demonstration and testing purposes. I settled on using XBee radios in order to locally transfer the data. These worked quickly and with virtually no lag, which made them perfect for displaying and testing the prototypes within a moderate local range of each other.

When designing the objects themselves, I wanted to create an exterior that was as minimal as possible, so that the objects would integrate with the wall that they were placed on. This was to try and enhance the illusion of the other person being just on the other side of the wall. I believed that colorful or dynamic shapes would draw attention to the object itself and away from the interaction of knocking. I also created a wooden fixture in order to attach to the servo arm, which would generate the knocking sound itself. As part of this process I experimented with a variety of material textures and densities in order to find the ones that produces the most desirable sounds when knocked.

## REFLECTION

In addition to my initial user testing interviews, I have gathered feedback on this prototype from its inclusion in two design exhibitions. The most common response from users after interacting with the prototype is that it is playful and fun, and that participants most often would want to use the objects with friends. When probed further about why the interaction is engaging and playful, multiple users have referenced the constraints that the object puts on communication. When people use it they naturally gravitate towards creating a codified language within the vocabulary of knocking. The fact that the object only allows you to communicate via knocking is a big part of what makes it engaging to use. This observation lends insight into the relationship between constraints and emotion when interacting with a design. Knock-Knock is an example of how a design can be engaging without being technologically innovative or practical. The experiment indicates that reducing the vocabulary of an interaction can sometimes have the effect of making it at least temporarily more playful.

While using the object one participant referenced the mobile application Snap Chat. Snap Chat is a picture and video messaging service for smart phones. However unlike the picture messaging that is built into the operating system, Snap Chat only allows the recipient to view the image for a predetermined number of seconds. After a countdown the image is permanently deleted. This feature is largely responsible for the applications enormous popularity. Similarly to Knock-Knock, Snap Chat puts constraints onto the function of the system in order to make it more conducive to playful communication.

Based off of my personal reflections on the objects, as well as feedback from participants and viewers another insight about Knock-Knock is that rather than feeling like an extension of the user's body, it actuality feels more like an extension of the space that the user inhabits. The user's perception of their body remains the same, however they perceive the object as a mediating threshold between two remote spaces. This has many similarities to the virtual windows that populate our surroundings. Architectural spaces are filled with virtual windows that

connect physical and digital space (McCullough 2013). These virtual windows were first proliferated on the desktop as graphical user interfaces, then by ubiquitous and situated smart phone and tablet displays (McCullough 2013; Friedberg 2006). Just like a real window these virtual windows expand viewer's perception of the space around them. For example think of a video conferencing link between two people. The screen displaying the window acts as the mediating threshold between not just the two people, but between the spaces that they inhabit. Each of the viewer's perceptions of their space expands to include the window into the other person's space.

Knock-Knock is also a virtual "window," only it is different because there is no visual connection between the two spaces. It expands an individual's embodied perception of their space by appealing to their senses of hearing and touch. Just like the virtual and real windows, the Knock-Knock object is a mediating threshold between two spaces and two people. The two users interact with each other's presence through the act of knocking, and the experience of hearing the other person's



knock. These interactions expand their own perception of the space they inhabit to include the space that the “window” is connecting them to.

This realization was important because it differed slightly from my initial intentions. I had set out to design an object that extended a person’s perception of their body into a remote location. In that endeavor I do not think that the prototype was successful, however the unanticipated result is that I realized how media technologies embedded in our surrounding environments could expand our perception of space, and that this effect could be used to create feelings of connection between remote places and people.

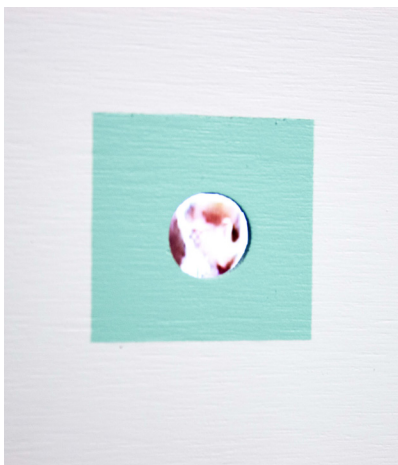
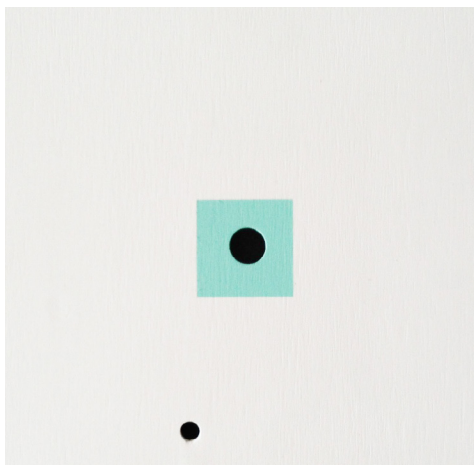
# PEEP SHOW

Based off of my reflections and feedback on Knock-Knock I became interested in designing a new prototype that:

1. Increased the constraints on an existing technology in order to make the interaction more playful and engaging.
2. Acted as a mediating threshold between two remote spaces, and allowed remote people to interact with each other through that threshold.

## DESCRIPTION

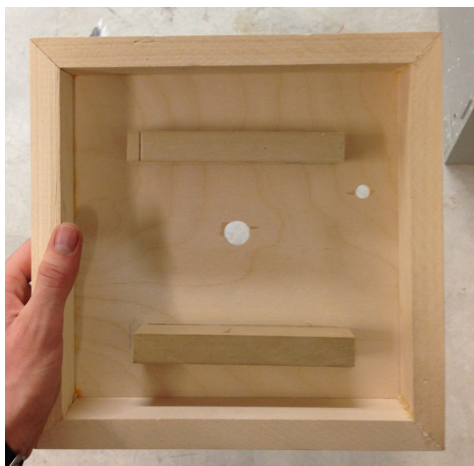
The prototype that I created in response to this is called “Peep Show.” Similar to Knock Knock it is another set of wall mounted devices. However Peep Show has a small hole in the center through which the user views a screen displaying a networked camera feed from the remote location where the other object is located. The interaction is akin to peering through a hole in the wall into an adjacent room. Like with Knock-Knock I have conceptualized Peep Show as a way for two people living in a different location from each other to engage in an interaction



Peering through the  
hole lets you look in  
on a web cam feed  
into a remote setting.



Knock Knock and peep  
show mounted side by side.



Housing built to  
encase the tablet.

with each other.

The housing for the prototype encases a tablet with an open video conferencing channel to another tablet, also encased in housing. There is no audio signal between the two, only video. Because there is no sound, and because the housing limits the field of view of both the viewer and the camera, the objects cannot be used for two people to communicate directly with one another. They can only be used for one user to watch or observe the other behaving naturally in their space. My intention was to create an interaction that forced the user into the role of a voyeur, rather than an active communicator, and to put the user into a situation where they felt as if they were peering into a remote yet adjacent space.

## PROCESS

I decided that designing a housing for an existing tablet was the simplest and most effective option for creating the prototype. I could simply open up a video conferencing channel between the two devices with no other technological development necessary.

My first attempt at designing “Peep Show” was to enclose the tablet inside a singular object that rests on top of surfaces, rather than appear to be part of a wall. My intention was to make the user feel as though they were holding their partner’s world inside their hands. The objects were designed as playful and illustrative housings that would rest on shelves or desktops. An important part of this design is that it separates the camera and the screen such that they face opposite directions at all times. This makes it physically impossible for the devices to be used to communicate because if you are looking at the screen, you would need to be out of view of the camera, and vice-versa. While this was an interesting idea, the experiment was not successful on several accounts. Most notably the object was not something that the user wanted to pick up or hold in their hands, and it did not bear any semiotic associations to peering into a remote location.

However, based off of this first design I decided that a better approach would be to make the housing similar to Knock-Knock. This second iteration is a more appropriate



The original design incased the tablets in an object that sat on surfaces, rather than hangin on a wall. After creating and using this version I decided that it made more sense if the hole looked like it was part of the wall. This related more to the act of peeping.



In the early version the tablet slid into the bottom of the housing and was held in place using chicago screws.

design because it creates semiotic links to peepholes and the feeling of peering through a wall into the other side. It also makes it easier for the user to understand that they need to peer through the hole. The final addition to the design was to apply a blue square around the peephole in order to differentiate it from the smaller hole through which the camera peers out.

## REFLECTION

Users have stated that the prototype is the least desirable of the four objects, and that they are least interested in using it. The general response is that if they wanted to visually experience the presence of someone else, they would just use a regular video conference link. In its current state the prototype has been an unsuccessful experiment in adding constraints to an existing technology in order to affect its meaning. Although I did add some constraints by limiting the field of view you have when looking at the screen, these constraints are extremely minor when compared to Knock-Knock. There is still a live web cam feed through which you can actually see and watch the other person. With Knock-Knock your interaction with the other

person is much more constrained because it is limited all the way down to the simple act of knocking. This could be part of the reason why Peep-Show appears to be less able to emotionally affect users.

Another insight regarding this prototype is that it is not actually a remote object in the same way that the other prototypes are. While the other objects enact the presence of remote people, Peep Show is a mediating device through which you can observe the presence of others. There is nothing about the behavior of the object that enacts presence, it is simply a tool that allows you to observe the other person. This is not something that I intended on doing, and it only became clear to me in hindsight after a participant called it the “black sheep.” This could be a contributing factor to the lack of emotional affect that it has demonstrated.

I believe that it would be better received if I permanently integrated it into an architectural space, so that it became a permanent part of a wall, rather than an object that hangs on a wall. I also think that experimenting with the object in differ-



ent contexts would better stimulate the imagination of users. For example if I placed the interaction in public spaces so that you could spy on strangers, it would be perceived very differently than if it were used between two remote partners in private. Before continuing to study the significance of this prototype I think that it would be beneficial to further develop both the concept and the prototype. Although the feedback that I have gotten on Peep Show has been resoundingly negative, it is a very useful project for comparing to the other prototypes which are generally more successful at affecting emotion.

# QUANTUMBUTT

## AMBIENT MEDIA

After completing Knock Knock and Peep Show I began to research ambient media displays. I wanted to experiment with creating ambient and calm technologies in order to create emotional affect. The concept of ambient media is a defining characteristic of both the Quantum Butt and Media Mobile prototypes.

As architecture theorist Malcolm McCullough writes in his book *Ambient Commons*, our lived environments are currently filled with a superabundance of information, most of which is trying to steal our attention, as if attention is a resource to be fought over. This information is delivered through an “invasion of glowing rectangles – ever more computer screens of ever more shapes and sizes.” (8) When designing these displays and the content for them, interaction designers tend to focus on “how users apply technology in the foreground of attention, as a deliberate task, for a specific purpose.” (8) As these displays compete for our attention they disconnect us

from our non-mediated physical environment. It is very common to see people transfixed by screens of any size while paying very little attention to their tangible surroundings.

An alternative strategy for designing interfaces is to design for the ambient. Interfaces that are ambient do not actively compete for attention and are not designed for a user to complete a singular specific task. Instead they can be integrated into the tangible environment without demanding attention or intentionally trying to distract. An ambient display or interface can move fluidly in and out of the center of your attention. They invite the user to tune in, rather than force the user to tune out through cognitive filtering.

There is a big difference between attention as something you pay, and attention as something that flows (McCullough 83). For example sitting alone in a room in front of a computer screen, you are paying attention to that display. It is demanding your attention, and in order to interact with it it must be your focus. On the other hand, imagine taking a walk through a forest path, where your attention flows to the trees. The trees

exist as comfortably within the periphery of your vision as they do in the center. This type of attention can be called effortless attention (McCullough 83) Embodiment is the primary mechanism through which an interface becomes ambient. For one, just to exist in the periphery of the senses depends on the embodied state of the viewer. Furthermore embodying information places it into the context of everyday life, where it assumes the form of familiar objects, and is woven into the fabric of the environment. From there a user can interact with it through situated actions of the body that have direct connections to the information being transmitted. This helps to reestablishes the connection between the user and their non-mediated physical environment.

When researching ambient displays in McCullough's book, I made a connection to some of my early research on tangible user interfaces. At the early stages of TUI research, there were two general approaches to extending interaction techniques into the physical world (Ishii 2008). The first was allowing users to manipulate physical interfaces in order to navigate

digital content. The second was to enable users “to be aware of background information in the peripheral, using ambient media in an augmented space.” (Ishii xx) In any environment people subconsciously process information from their ambient surroundings without specifically attending to it. Ambient media is designed to fit into this method of information processing. It is designed for smooth transitions between the users foreground and background of attention. Ambient media in TUI research creates “simple mappings that give easy to read form to cyberspace information and represents change in a subtle manner.” (Ishii xx)

Ambient media has been applied to remote presence by designers and researchers in interesting ways. This intersection is often referred to as ambient presence or ambient awareness (Gaver 2002; Jianting 2009; Hasenzahl 2012). Designers in this field aim to create devices that give individuals a peripheral awareness of the activities of their loved ones, “awareness devices enable the exchange of continuous implicit information(-such as children’s laughter) to create a feeling of relatedness” to

remote people and settings (Hassenzahl 4). The ambient approach to remote presence devices communicates information about the activities of a person without causing disruptions or explicitly enabling communication. These objects exist primarily in the periphery of user's attention and can move in and out of focus fluidly. I wanted to create a third prototype that was based off of my research on ambient media.

## DESCRIPTION

The third prototype that I created is a design for a chair called Quantum Butt. My intention in designing the chair was to poetically translate presence into a physical object that existed in the ambient environment surrounding an individual. I wanted to design an interaction that directly related to the context of use. My response to this was to conceptualize a design for two chairs that had a wireless link between them. Each chair is placed in the personal spaces of two people living remotely from one another. When one person sits on one of the chairs, the other chair reacts by changing color to reveal the imprint of the sitting person's body. My reasoning for designing a chair is



NEW YORK



TORONTO



because sitting is an embodied interaction. Aspects of the other person's sitting body are experienced through the person's own situated action of sitting. There is a contextual link between the two actions.

I also knew that I wanted to indicate the presence of the other person through the materials of the chair, without using digital displays or LEDs. In the process of designing and prototyping the chair I collaborated with designer Devin Hobbins. Our work together proved to be a fruitful collaboration to which I attribute much of the success of the prototype.

## PROCESS

I began researching thermo chromatic pigments, and various materials that I could use them with. Thermo chromic pigments are pigments that become transparent at specific temperature thresholds. I liked the idea of thermo chromic pigments because they would provide both a visual indication of presence through the color change, but also a tactile indication because of the heat necessary to make the pigment react. I created a matrix for testing the pigments with various materials and record-



ed the rate at which the material would change color, and also general notes about the aesthetic of this reaction. Among the materials tested were ash and maple veneer and several colors of wool felt.

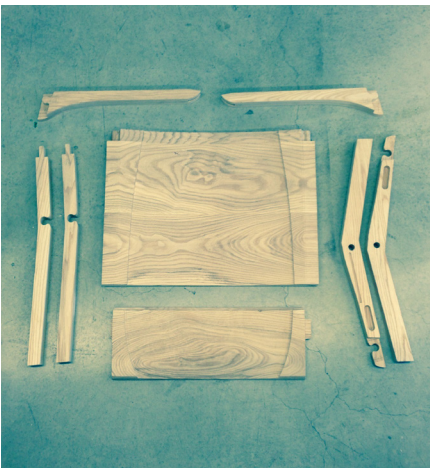
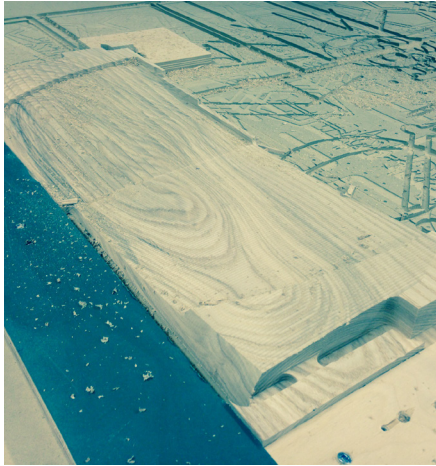
While I knew that I had the option of retrofitting an existing chair with electronics and pigment, I felt that it was important that I designed and built the chair myself. This was important to me because it would ensure that all the elements of the design were integrated seamlessly with each other, rather than the electronics being added on top of an existing object.

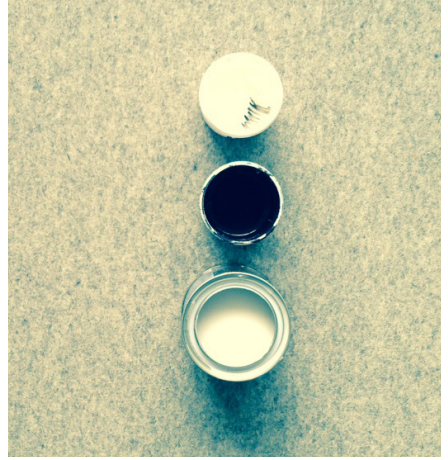
One of our earliest intentions for fabricating the chair was to mix the thermo chromic pigments with plastic and use rotational molding. However we quickly abandoned this because it would require too much time and effort to fabricate. Following that we began experimenting with different forms that could be manufactured using hardwood. We also experimented with wool felt as a potential material to dye with thermo chromic pigments. The first concept design for the chair consisted of two pieces of CNC milled ash hardwood, with

both sides of each piece getting milled. A pocket was to be milled in both the seat and the back in order to lay the felt into. While we both appreciated the form of this design, it proved impractical and difficult to fabricate.

We then created a simplified iteration of the design but continued to use ash and wool felt as the primary materials. This design was comprised of eight CNC parts, plus two pieces of dyed felt. The joinery details were cut using the CNC, and resemble puzzle pieces fitting together. Puzzle pieces were an attractive metaphor to us because it suggested two entities fitting together as one. The dimensions of the chair are low, wide and slightly backward leaning, making it suitable for lounging or reading. This type of form was more appropriate to the project than a stool, for instance, which is generally not used for sustained sitting. Channels were cut into the inside edges of the chair in order for us to inlay wires to connect both the backrest and seat to a power source.

After having designed and fabricated the chair, I began the process of dying the felt. The first felt that I dyed was a



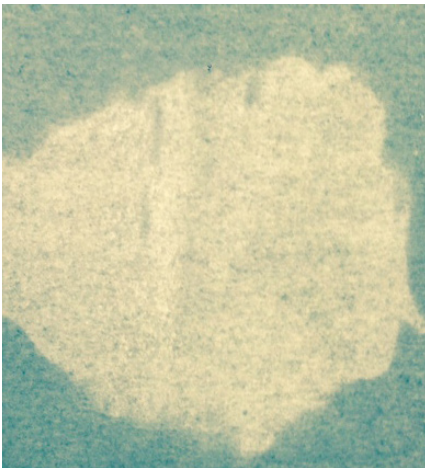
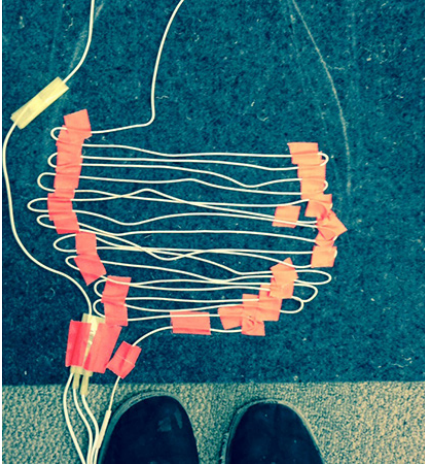
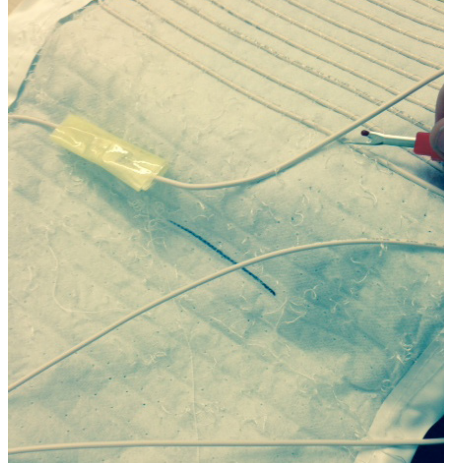




light gray color, which turned a dark charcoal when dyed using black pigment. While this was a good first attempt, I felt that something was missing in the color transition. It was a little less subtle than I had hoped, and in the dying process it had lost some of the richness and texture that I wanted. In my second attempt I used a different gray felt that had a slightly warmer tint to it. This felt proved to be much nicer looking after being dyed and produced a result that I was pleased with.

In parallel with fabricating the chair, I was also solving the problem of how to deliver heat to the back and seat of the chair. I first tried small 5cmx15cm heating pads, however these proved not to be the best solution to the problem because they were too small and used a lot of current. A simpler solution was to hack two commercially sold electronic heating pads by removing the heating wire from the soft casings. One pad was used for the backrest and one for the seat. I attached both ground wires to a solid-state relay so that I could control them using an Arduino.

My initial tests with the heat on the dyed felt produced



too drastic of an effect. The borders of color were very harsh and I preferred a softer and subtler boundary. To address this I first put a layer of aluminum foil and soft batting between the wires and the felt in order to diffuse the heat as it approached the surface. I also adjusted the code to cycle the heating pads on and off repeatedly rather than being constantly on. This gave a nice effect because it created a gradient with subtly shifting borders.

## REFLECTION

My reflection on Quantum Butt has revealed insightful connections between the ambient design of the chair and the emotional affect that it causes. After interacting with the chair participants stated that the gradual shift in color gives the feeling that “someone is there or has been there recently.” This creates a passive reminder of a person’s presence that has generally been perceived as having reassuring and comforting qualities. Because of this people have tended to express that they would use the chair in conjunction with very close loved ones. One participant expressed that:

“I would want my mom to have the other one because knowing whether she is hanging out and reading is more meaningful to me than [it would be] if a friend were using it. Feelings of reassurance and comfort come to mind. Once you move away [from parents] that is a big part of your life that is missing and this helps to fill that void.”

Thus far my interviews with people who interact with the chair indicate that the ambient design can reassure someone they are not alone in a very passive and poetic way. Participants have also stated that the heat plays a very big part in this effect because it forms a connection with the embodied presence of the other person. When you sit in the chair and experience the heat, you feel a connection with the body heat of the other person sitting in the chair.

The chair is poetically significant because it represents a very specific fragment of someone’s presence. By doing so it alludes to the whole presence of the person, rather than explicitly representing it. As Ian Balfour puts it in his article “The Whole is the Untrue,” a fragment is an entity “of immense fas-



cination and curiosity, as much for what it leaves to the imagination as for what it presents” (Balfour 87). The poetic value of a fragments is that it invites the viewer to construct a narrative around it (Balfour 2009). When you see the chair change color you know that someone is sitting on the same chair in a different place. You can’t help but conjure an image of them in your mind and reflect on what they may be doing, how they are feeling, or what they are thinking about. The significance of the interaction comes from everything that it causes you to think about and imagine regarding the other person. By representing that one fragment the chair invites you to create a narrative around the other person, and to speculate about what they may be thinking, feeling or doing.

A related example of a similar poetic mechanism can be found in flash-fiction literature. Flash-fiction is a form of writing that tells stories in as few words as possible (Flash Fiction n.d.). An example is the six-word story often attributed to Hemingway: “Baby shoes for sale. Never worn” (Baby Shoes n.d.). The story operates by using a small fragment in order to suggest

a larger whole. As a reader you create a larger narrative around the smaller fragment. While this example is from literary fiction and not design, you can see how a similar poetic effect is at work with the chairs that I have created.

# MEDIA MOBILE

The fourth and final prototype that I completed is called the Media Mobile. This prototype builds off of a variety of conceptual threads that I had been following throughout my work on the first three prototypes. Specifically it continues to explore how presence is fragmented by communication technologies.

## VIRTUAL PRESENCE AND FRAGMENTS

The book *Radical Alterity* (2007) documents a conversation between economist Marc Guillaume and critical theorist Jean Baudrillard held in 1990 regarding how technologies mediate communication across long distances. In the book Guillaume introduces a concept called spectral communication. Spectral communication is when a person's full presence is distributed into discreet facets through a communication technology, similar to light being distributed into a spectrum when it passes through a lens. For example the voice of a person coming through a telephone is one spectral facet of their presence. However spectral communication "is not the destruction or

disappearance of the subject... it is the dispersion of the subject” (Guillaume 39). Rather than destroying the person communicating, communication technologies use specific fragments of presence to build a model of that person. While being incomplete on its own, the fragment suggests the entirety of the person.

The concept of fragments and spectral communication relates directly to all of the prototypes that I had created up until this point, however it also has distinct implications in the contemporary landscape of networked media and virtual presence. Virtual presence refers to presence within virtual or computer generated environments, which I had not yet explored through a prototype. The concept of an avatar is generally well known and is often used when discussing virtual presence. The most common understanding of an avatar is that it refers to a computer-generated version of a person controlled via a computer (Coleman 12). However within the contemporary landscape of networked media the concept of an avatar can easily be expanded. Beth Coleman argues in her book *Hello Avatar* (2011)

that our understanding of what constitutes an avatar can be expanded to include “a wider array of media forms and platforms such as voice over internet protocol, instant messages and short service messages (SMS), as well as uses of social and locative media.” (12) Through media like these individuals are constantly externalizing their utterances, thoughts and activities. Emails, messages, posts, tweets, and photo sharing activities constitute a real-time representation of ourselves. As Coleman puts it “we are becoming experts at taking bits and pieces of people we know well – a text message, a photo, a song – and transposing that into a connected real-time presence (119).

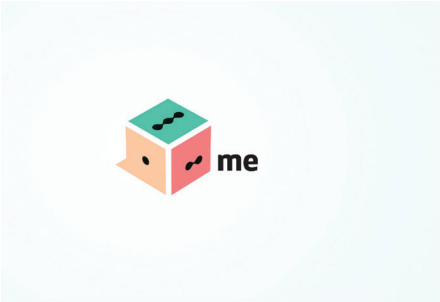
Within the current landscape of social media, the presence of individuals is distributed into fragments. By experiencing these fragmented facets of presence, one can maintain an ambient awareness of the lives of friends. (Mucholough 12) Clive Thompson, a columnist for the New York Times wrote about this presence through social media networks:

Each little update – each individual bit of social information – is insignificant on it’s own, even supremely mundane. But taken together, over

time, the little snippets coalesce into a surprisingly sophisticated portrait of your friends and family members lives, like thousands of dots making up a pointillist painting. This was never before possible, because in the real world no friend would ever call you up to tell you the details of a sandwich she was eating. The ambient information becomes like a type of E.S.P... an invisible dimension floating over everyday life. (Thompson)

Each individual text message, post or email is a fragment of a larger whole. I felt that it may be interesting to experiment with collecting and synthesizing these spectral fragments in order to construct a representation of a person's presence and identity.

During the summer of 2013, shortly before beginning this study in earnest, I collaborated with Hudson Pridham on a project with the aim of constructing this cohesive portrait of a person by gathering together the various fragments of a person located across a wide array of media platforms. The project was titled the meCube and was developed during a six-week placement at the Canadian Film Center Media Lab. The object that we created collected snippets of a person's social media activities and displayed them through a singular tangible user



interface that existed outside of the desktop computer. The object displayed different information depending on what side it was resting on. One side displayed text posts from a person's Facebook and twitter accounts, the second side displayed image posts from their Facebook, Twitter, Flickr and Instagram profiles, and the third side displayed news headlines and the weather from the city where they live. Resting the object on the fourth side was the off position for the device. The user could navigate through a timeline of the posts by tapping on the top of the casing, and return to the beginning of the timeline by shaking the device. They could also choose what content to display by selecting different media services from a website.

While the meCube illustrates an interesting way of representing a person's virtual presence, it is very explicit in how it displays presence. It is also not very ambient because to discern meaning from the object it needs to be the focus of the user's attention. I thought it would be interesting to design a second iteration of the meCube that is more ambient and poetic in how it represented virtual presence. Instead of gathering all of



these fragments of social media communications by one person and explicitly displaying them, I wanted to explore how this translation could be more abstract and interpretive. I also felt that this would be an interesting opportunity to explore how presence can be communicated within a small group of friends or family, as opposed to the one -one relationships that I had designed for up until this point.

## DESCRIPTION

To explore these issues I designed a hanging mobile called the Media Mobile. MM consists of hanging shapes that are representative of people within a family. Each shape symbolizes a specific person. When the person communicates through their virtual self with anyone else represented in the mobile, the shape that corresponds to them begins to bounce and wiggle. This gives the viewer of the mobile an ambient awareness of digital communication within a family.

I chose to design a mobile because it is a very eloquent metaphor for a family. It consists of a group of shapes that are visually distinct but still share a common family resemblance.



#### THE MEDIA MOBILE

Each shape represents a specific person within a family. The shape bounces and wiggles in conjunction with their virtual activity.

When one of the shapes in a mobile is agitated, this send ripples of motion across all other shapes because they are connected by a networked structure. The qualities of a mobile are applicable to the relations between members of a family. This use of metaphorical form is part of what gives the Media Mobile poetic significance.

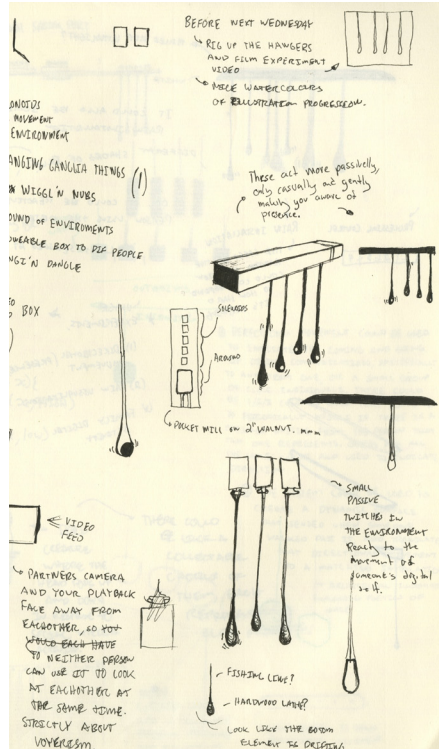
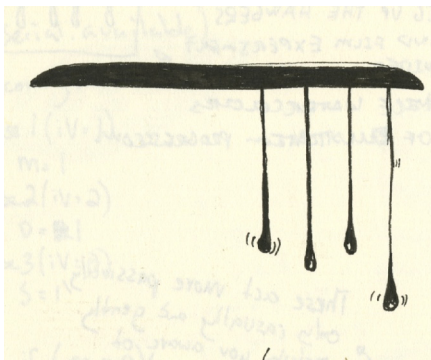
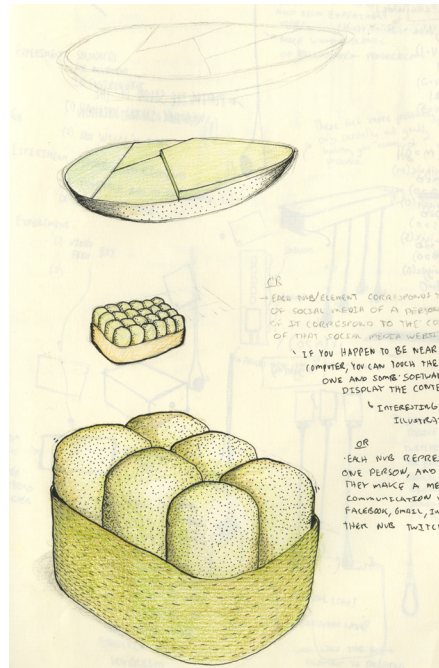
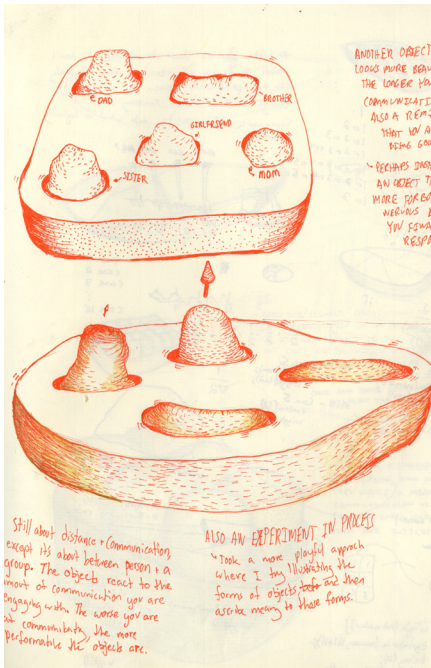
## PROCESS

When beginning this prototype the first challenge I addressed was how to create simple movement in an object. I became very interested in low voltage solenoids that can create about six millimeters of linear motion. I thought that linking this movement to social and locative media data might make for an interesting translation of virtual presence into an object. The design challenge of how to create expressive movement in an object with that small amount of travel was also engaging to me. I began sketching illustrative and bizarre groups of objects that could be animated by embedding solenoids inside them.

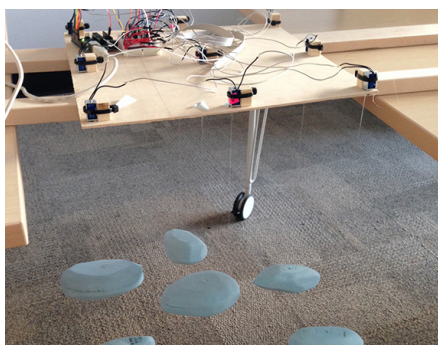
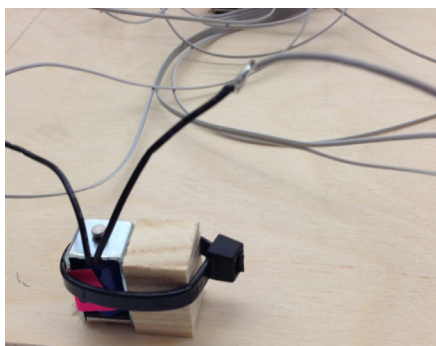
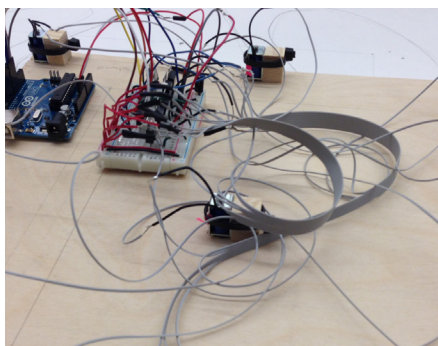
The first model I made consisted of lightweight objects suspended from an array of solenoids. When the solenoid is

triggered the suspended shape bounces up and down and dances expressively. Anchoring the shapes from different points and manipulating the objects shape affects how they move when the solenoid is triggered. For example anchoring them from the center produces a more subdued and subtle bounce, whereas anchoring them from the edges makes them behave more expressively. Triggering them in linear order is also interesting because it looks as if you are sending a wave of motion through the objects. Based off of this first model I made a second iteration using a 3x3 matrix of solenoids controlled with an Arduino. I also explored different shapes to hang, and experimented with how changing these shapes would effect their movement.

The final design that I arrived at consists of a hardwood cube that houses the solenoids and an Arduino Fio with a wireless radio attached. A branching structure made from aluminum tubing extends off of one side of the cube. Colored shapes made from ultra light basswood hang from the ends of each branch. The strings that the shapes hang from run through the alumi-



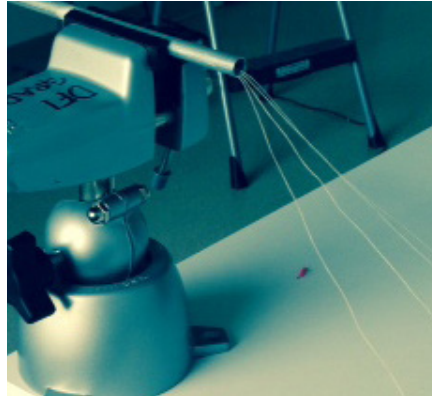
## THE MEDIA MOBILE Sketches.







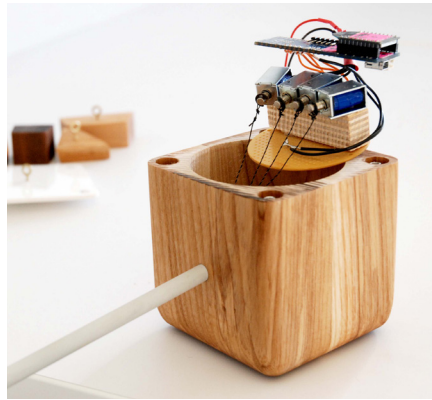
DRILLING VOID IN HOUSING



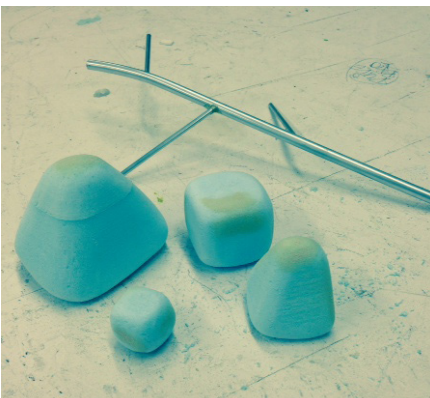
THREADING THE STRINGS



SOLENOIDS INSIDE HOUSING



ATTACHING STRINGS TO SOLENOIDS



SCULPTED LIGHTWEIGHT SHAPES



ALTERNATIVE DESIGN FOR SHAPES

num tubes and are attached to the solenoids inside the cube.

On the other side of the cube from the branch there is a piece of stainless steel rod. This acts as a counterbalance so that the whole object hangs evenly while it is suspended.

## REFLECTION

The response to the actual physical form of the object has been very positive. Viewers can clearly understand that the hanging shapes bare a family resemblance to one another, and that they are representative of people within a family. The general perception of the object has been that, like Quantum Butt, the Media Mobile is a reassuring reminder of the presence of family members. However the way that the object represents virtual presence has been met with mixed responses. One participant stated that they are “not exactly sure what an awareness of the virtual activity of family members would mean to [them].” Based off of the reactions thus far to this prototype, the way that it represents virtual presence is not very emotionally affective. This is based off of very preliminary discussions and will need to be investigated further in order to elucidate more in-



formation about the impact of the design on emotional affect. I am not prepared to make any conclusions based off of this, but it is possible that the reason it is not as emotionally affective as Quantum Butt or Knock-Knock is because it represents virtual presence as opposed to the embodied physical presence of the remote individuals.

One useful insight that has arisen is that the shapes could also be changed to symbolize a variety of social groups. Currently the sizes and shapes of the object are reminiscent of a family. An interesting design exercise would be to re-design the group of shapes such that they are representative of a group of friends, roommates or co-workers. Experimenting with different permutations of shapes, as well as different ways of enacting aspects of virtual presence may produce variations on participant's reaction to the object.

# CONCLUSION

Creating a summary of the qualities of each prototype is helpful in order to compare and contrast them to each other. It is also useful in order to understand how these qualities frame the experience of using the objects.

1. Knock-Knock exists in the focus of the users attention while it is being used. It communicates the physical presence of the individual by translating the act of knocking to a remote space. It facilitates direct communication between two people, but constrains the interaction to the act of knocking. The most common reaction to the prototype has been that it is playful and fun but unsuitable for sustained practical communication. The prototype has demonstrated clear potential for emotional affect in users, at least for a short duration of time.
2. Peep Show must be the focus of the users attention in order to be used, making it the least ambient. It represents the physical presence of a remote individual by enabling users to view a screen based video feed of the person. It can be

used for observation and awareness but not for direct communication. The interaction with the prototype is predominantly visual. Of the four objects it reveals the most information about the other person because you can directly see them. Of the four objects it has demonstrated the least potential for being emotionally affective.

3. Quantum Butt can exist in the periphery of the users attention and is among the most ambient of the prototypes. It represents the physical presence of someone by expressing when they are sitting on the other chair. The design facilitates an ambient awareness of the other person and has been described as having reassuring and comforting qualities. It has clearly demonstrated potential to be emotionally affective. The chair constrains the amount of information about the other person to whether or not they are sitting in the other chair. This information is poetically translated into the behavior of the chair when it heats up and changes color.
4. The Media Mobile exists in the periphery of the users at-

tention and is also among the most ambient of the four prototypes. In contrast to the other prototypes, the Media Mobile represents the virtual presence of remote individuals. Like Quantum Butt it facilitates an ambient awareness of presence. Though it has demonstrated potential to be emotionally affective, it is not as definitive as Knock-Knock and Quantum Butt.

Part of the value of these prototypes is that they demonstrate the relationship between constraints and emotional affect. In this context constraints refer to the ways that the objects translate presence into specific aspects of the objects behavior. Quantum Butt, Knock-Knock, and the Media Mobile all constrain how you experience a person's presence by enacting it through specific behaviors. Knock-Knock constrains presence to the knocking noise that it emits; Quantum Butt Constrains presence to the shift in color and the heat on the chair; and the Media Mobile constrains presence to the bouncing of the shapes. Each of these behaviors enacts a specific fragment of a

person's presence. The consequence of these constraints is that presence is represented in poetic and ambiguous ways. There is nothing inherently poetic about seeing a video feed of a person, because you are being presented with too much information about them. However as these objects suggest the presence of someone through their material behavior they become much more emotionally resonant because more is left to your imagination.

The Peep Show prototype provides a point of comparison against the other three designs because it places very few constraints on how you experience presence. Through the interface you directly observe the other person via a live web cam feed. In this interaction there is very little poetic translation of presence because it is simply a screen based display. This is why it has been described as the least intriguing in terms of how it represents the presence. In the context of two people using it who live remotely from one another, it is likely that it would demonstrate the least emotional resonance. However it is important to keep in mind that these observations are only based

on the limited context of use thus far. Peep Show, like all the other objects, is very context sensitive. Exploring how it could be used in different ways, in a variety of places, by a variety of people would constitute a more complete assessment of its meaning. However for the time being these prototypes form a foundation for discussing the role of fragments in their design.

The poetic significance of fragments is the primary mechanism responsible for the emotional resonance that these objects demonstrate. A fragment is poetic when it subtly alludes to a greater whole, without explicitly revealing it. This makes it alluring because it leaves the remainder of the whole to the imagination of the viewer. An object that is embedded with a fragment of a person's presence can be emotionally affective because it alludes to that person without explicitly revealing them. This is why Quantum Butt and Knock-Knock are both poetic and emotionally affective. Alternatively Peep Show is more explicit in how it represents the other person

This conclusion is worth considering when designing other devices that represent remote presence. As the design

provides more information about a person and allows you to interact with them directly the interaction becomes more suitable for functional communication but less inherently poetic. Conversely as a designer creates constraints that poetically translate presence into the material behavior of a medium, emotional resonance becomes the primary function of the design.

## SUGGESTIONS FOR FUTURE RESEARCH

In my opinion the most important suggestion for future research is to continue to identify poetics in relation to interaction design. The term is often used in discussions of design, however it is seldom the primary subject of the research. When researching affect, emotion, and poetics it would be beneficial to the interaction design community to further explore what exactly are the qualities of a design that makes it poetic and how does that relate to the affect experienced when using the object? Building off of this research designers can continue to explore the poetic significance of fragments. What are other designs that could employ fragments as a mechanism for causing emotional affect, and what could these fragments allude to

besides the presence of remote individuals?

Another suggestion for a future research would be to begin exploring the potential negative emotions that these objects can affect. When discussing Quantum Butt and Knock-Knock with a participant, they mentioned how much different the experience of using these objects would be if you lost contact with the other person, or even if that person were to die. The participant stated that if the chair went cold after the other person's death they would probably never be able to sit in it again. Throughout this project I have focused mainly on how these objects are experienced when they are turned on and in use. However the question of how they could be perceived when they are stagnant is interesting. In general much of the research on emotion and affect that I have cited focuses on positive emotions that can be experienced from objects. More research could be conducted on the emotional significance of these designs that are not as positive. For example do they have the capacity to affect loneliness? And what are the scenarios when this affect could take place?



The conclusions that I have drawn from the work up until this point are very much dependent on the contexts that myself and other participants have used them in. However exploring them in different contexts over a greater amount of time would produce a greater variety of affective responses to the objects. The clearest suggestion for future research is to move forward with a more sustained and thorough user testing process. This would involve multiple pairs of participants who lived with the objects and were asked to use them over an extended period of time. Ideally each pair of participants would have a prior relationship with one another and would live remotely from each other. Time plays an important role in augmenting the experience of using these prototypes. It would be very interesting to learn about the relationships that form between the objects and their users over an extended period of time. A more sustained study of this type would help give a more thorough understanding of what it is like to live with these objects and use them on a daily basis.



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## Research Ethics Board

February 24, 2014

Dear Jackson McConnell,

RE: OCADU 132, "Spectral Communication through Post-Optimal Objects."

The OCAD University Research Ethics Board has reviewed the above-named submission. The protocol and the consent form dated February 24, 2014 are approved for use for the next 12 months. If the study is expected to continue beyond the expiry date (February 23, 2015) you are responsible for ensuring the study receives re-approval. Your final approval number is **2014-14**.

Please note that your offer of a meal should not be presented on your Consent Form as a benefit to participants. It is in fact a small offer of reciprocity on your part, as thanks to participants for volunteering to be part of research that will earn you a degree.

Before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required. It is your responsibility to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the OCAD U REB prior to the initiation of any research.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided before you graduate. The template is attached.

Best wishes for the successful completion of your project.

Yours sincerely,

A handwritten signature in black ink, which appears to read 'Tony Kerr'.

Tony Kerr, Chair, OCAD U Research Ethics Board

OCAD U Research Ethics Board: rm 7520c, 205 Richmond Street W, Toronto, ON M5V 1V3  
416.977.6000 x474