PASS: Protocols for Alternative Sexuality and Sensibility

by

Gemma Shusterman

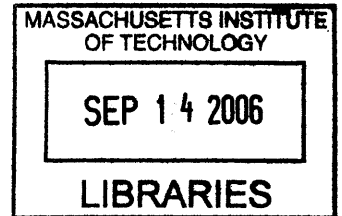B.A. Computer Science
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Abstract

It is often said that we live in a network society. Increased familiarity with technical networks has brought the concept to the forefront of public imagination making the network a dominant trope. Whether inherent or ascribed, topologies seem to appear in social theories, transportation systems, technological structures and biological systems to name only a few examples. Often descriptions of networks combine semantics reflecting both conceptual and physical meaning. Regardless of content, be it conceptualization of power, information between computers, relationships between people or neurons; networks rely on topologies and protocols that locate nodes in relation to one another. In the field of technology certain networks are apparent - the internet and the world wide web constitute easily identifiable examples. In the social sciences, descriptions of relationships between people and even of self identity lend nicely to nodes, edges, curves and vertices. In the blurring of boundaries between disciplines the language of the network also becomes a node of interconnection. Technology, sociology, and various branches of theory reference each other in a search for deeper meaning within disciplines.

Protocols for Alternative Sexuality and Sensibility or PASS is a wireless networked system designed to function with a multidisciplinary description of a network in mind, incorporating conceptual implications and technical implementation of networking. PASS is a system which visibly tracks connections in public space based on the embodiment of protocols associated with sexual identity. These user configured devices exchange information with other devices in order to uncover the often hidden interconnections created by the internalization of sexual identity. Sexual identity is represented by several alternative paradigms in addition to the culturally predicated homosexual/heterosexual binary. The resulting connections are made visible via independent graphical displays that indicate the various paradigms and connections at play.

PASS shows how dominant cultural networks necessitate counter spaces which exist simultaneously in time and space with the hegemonic structures. It is in the revealing of these alternative spaces that I seek a technology of resistance; by connecting people in these counter spaces we create dynamic modes for understanding the influence of normativity and the experience of otherness. The physical representation of these theories reveal the hegemonic protocol structures of interconnection which we internalize as social norms.

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Chapter 1

Introduction

On one level or another we are all Others to some group.- Sander L. Gilman [17]

Sander L. Gilman wrote the preceding words as a commentary on Jewish self identity, however, as he observes, the model can be extended to sexuality, gender, class and age - any categorization of identity that can imply a hierarchical relationship between the other and what is perceived by dominant culture to be the norm. Simone de Beauvoir too spoke of the other, positing it rather as an extension of gender , "it is not the Other who, in defining himself as the Other, establishes the One. The Other is posed as such by the One in defining himself as the One." Both Gilman and de Beauvoir speak about what can be described as protocol. Whether technical or social, protocols are the rules that determine standards of interaction. Protocol situates the body of the other using a discrete set of rules based on perceived difference and, in the case of race and gender (and often in other cases), justified through biology.

One way to begin to understand how protocol acts on the body is by employing the concept of "network" to describe its relationship to bodies. In the case of my work on PASS, or Protocols for Alternative Sexuality and Sensibility, I hope to address the presence of other as understood through the embodiment of sexuality. Since the construction of the other exists in conjunction with established social norms, elements such as the gender of whom one takes as a lover can have a profound affect on the construction of identity and how connections or differences surface within communities.

I propose that the network provides a dominant trope through which the modeling of protocol can make sense in a contemporary context. The ubiquity of the network ensures a form that is familiar and understandable to a greater public imagination and provides a frame through which the intricacies of how protocol forms social relationships can be expressed. By creating a wireless platform that maps these formulations of identity, I hope to technically engender a dialog that challenges the terms by which embodiment of identity tends to be taken for granted.

This thesis works on the premise that subcultural communities can provide contexts where otherness is not simply an expression of alienation, but provides connection and validation. PASS leverages the idea of embodiment and subcultural connection through dynamic, anonymous, topological representation.

The Turing test provides an example of the juxtaposition of embodiment with technology. Based on the "imitation game." Turing conceived of this test as a way to tell the difference between human and machine, rather than the game's example goal of telling the difference between a man and a woman. Thus, the Turing test speaks to both the cultural implications of embodied gender and to the question of cybernetic development. N. Katherine Hayles makes the following observations of the Turing test:

> Think of the Turing test as a magic trick. Like all good magic tricks, the test relies on getting you to accept at an early stage assumptions that will determine how you interpret what you see later. The important intervention comes not when you try to determine which is the man, the woman, or the machine. Rather, the important intervention comes much earlier, when the test puts you into a cybernetic circuit that splices your will, desire, and perception into a distributed cognitive system in which represented bodies are joined with enacted bodies through mutating and flexible machine interfaces.[21](p.xiv)

This observation reveals a critical point when addressing bodies in relation to technology. The complexity of human experience cannot be replicated by technology, but it can be informed and perhaps changed by it. As Hayles observes, "What embodiment secures is not the distinction between male and female or between humans which can think and machines which cannot. Rather,

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embodiment makes clear that thought is a much broader cognitive function depending for its specificities on the embodied form enacting it."(p.xiv) In the case of gender as well as sexuality, a complex set of social expectations and behaviors contribute to the process of embodiment. These rules, or protocols, reflect what Alexander Galloway observes as, "any type of correct or proper behavior within a specific system of conventions."[15](p.7)

PASS attempts to locate technology as a tool through which the project of embodiment can be examined. Through the process of externalized representation of sexuality, PASS is designed to challenge the assumptions of protocol and embodied identity.

The title PASS has multiple meanings, beyond its function as an acronym. To pass, is to masquerade; to be accepted for something you are not. Passing happens in many communities, whether speaking of Jewish people passing as Christians, people of various races passing as white, or homosexual people passing as straight. The urge to pass is an assimilative impulse experienced as a result of otherness. This process of assimilation resonates in the form of a cultural feedback loop, described by Gilman as "...the more one attempts to identify with those who have labeled one as different, the more one accepts the values, social structures, and attitudes of this determining group, the farther away from true acceptability one seems to be."[17](p.3) The idea of passing is not new to homosexuals and is illustrated by those who look for partners who are "straight acting" and "straight sounding"; as can be found quite frequently in personal ads particularly for gay men. Wendy Chun describes passing as "space in which one's representation and actuality need not coincide"[6]. There are a myriad of instances where race, gender, class or sexual orientation are perceived as vulnerabilities, and thus characteristically underplayed in an effort to conform. Although this is an issue that arises frequently in discussions of cyberspace and virtual identities, it has continually been part of the repertoire of racial and sexual minorities.

Pass has more playful meanings as well. A pass can be a permission slip; permitting an exploration into one's own sexuality. One can pass a note. Similarly, PASS enables the passing of information from one device to another enabling a form of non-verbal communication. Such non-verbal signaling has traditionally been of importance to marginalized communities, as we will see later in Chapter 3. An example of non-verbal signaling in the queer community can fall under the auspices of the mythological sixth sense of "Gaydar" which is purported to alert homosexuals when in the

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presence of each other. To pass can mean to move along side, and PASS as platform emphasizes the importance of what passes between rather than who passes by. Finally, pass also can refer to the passing up of the protocols of normalization: refusing to play by the rules.

As a quick semantic note, I would like to explain the use of terms for this document. First, when I refer to homosexual or gay, I am referring to people for whom sexual object choice is people of their own gender (this includes both gay males and lesbians). When referring to heterosexual or straight, I am talking about people for whom sexual object choice is of the opposite gender. When referring specifically to queer, this indicates a group which may fall under either of these categories; queers may be of dimorphic genders that may or may not correspond with their biological genitalia, or they may identify with a gender that may not fall under the binary category of male or female. The category of queer is generally inclusive, beyond culturally predefined labels, of alternative sexual orientations and genders.[1]

1.1   Creating a Platform

As a researcher at the MIT Media Lab, I had an opportunity to imagine a unique technology; I decided to draw on personal experience. My own perception of otherness, coupled with my interest in physical embodiment, lead me to create a platform with the intention of encouraging intervention rather than assimilation. Through this process of self-reflection I came to the question: How does one excavate networks of subcultural connection that are masked by the demands of normative protocols?

My interest wasn't in finding a date or making new friends; there are forms of technology - digital as well as traditional - that could help me make those connections. Rather, the question surfaced more as an inquiry into the structures that support a sense of connection in a normative environment. I decided then, to create a device that that describes subcultural connection instead of creating a "friend finding" technology.

Another influential factor in the development of PASS was the concept of embodiment. In order to

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[1]An example could be a biological male who identifies and dresses as a female, thus considers himself a lesbian.

utilize my background in movement and previous work that centers on the sensorium and body, I wanted to address the particular tendency of technology that supports a disembodied representation of identity. The terms of engagement in the virtual space of the Internet represent very different stakes than those present in physical space. With this in mind, I wanted to make a platform that would address contemporary demands of protocol and embodiment. For this reason, I chose to build a wireless technology that could visualize the topologies of alternate protocols and locate them to a device that could be worn on the body.

In a broader context, PASS suggests that the "subtle networks of power" detailed by Foucault in "A History of Sexuality: An Introduction"[13] are part of the regulatory systems that we all are subject to, regardless of our sexual choices. By giving form to these networks, I hope to create a position from which we can reexamine the network and ourselves.

1.1.1 Project Description

PASS is composed of three primary components, all of which rely on the 802.15.4 wireless protocol. The first component is an interface and wireless programming module. Through this interface alternative representations of sexuality can be programmed into individual devices that are worn on the body. These devices or modules represent the second component, and transmit and receive data based on the user-entered data. The final component is a wireless packet sniffer that receives packets transmitted by the devices and creates a dynamic topological rendering based on the the packets and their corresponding data. The packets are represented by nodes and edges are drawn when data in the different packets is the same.

PASS incorporates conceptual models and technical implementation of networking by showing connections based on the embodiment of protocols associated with sexual identity in public space. The devices are designed to display the counterspacial relationships represented by subcultural connections based on representations of sexual identity. Sexual identity is represented by several alternative paradigms in addition to the culturally predicated homosexual/heterosexual binary. Connections are made visible via independent graphical displays that indicate the various paradigms and connections at play. The inclusions of multiple paradigms opens of the possibility for a polysexual identity of the node.

Unlike friend finding technologies the PASS device is not intended to provide the wearer with "matches"; rather it is formulated to bring forth an image of the paradigms at play outside of dominant cultural cues like assessment of sexual orientation based on appearance, etc. The PASS device displays patterns on the body as a result of connections between devices and as a contribution to a topological rendering of a space. These patterns correspond to topologies visualized with the data transmitted to devices, but are not designed to locate "matches" to the individual or node. Rather these patterns relate to a relational counterspace made possible by the transmission of data. In fact, little can be inferred about the node or individual; the algorithms are developed to protect the identity of individual nodes and data does not persist through power cycles. The PASS device is designed to explore the subcultural patterns that we may or may not be aware of. The display represents the interstitial space between nodes, a mapping, a topology. PASS is not designed with considerations of desire in mind, but rather consideration of identity as a formulation of social protocols and demands of normativity.

1.2   Chapters

Few people in the United States are without either a connection to the Internet at home, a telephone, or cellphone. Technology has brought the network into popular consciousness, and the network has become a powerful tool for describing and understanding structures, whether conceptual or material. The invocation of the network has been useful for many theorists, technologists, biologists, urbanists, sociologists, and many others to describe both ontological and scientific inquiry.

In the first chapter, Networks, I will give an overview of the conceptual framework of the network. This chapter addresses the network as both a physical construction and a dominant trope and examines the roles the network fills in contemporary society and theory. I will look at the work of Michel Foucault, among others, in describing the regulatory inscription of power on the body. As a foundation for the theory behind PASS, I will show how Foucault locates sexuality as a social construct. Through this description, we can begin to locate sexuality as a regulating protocol of embodiment. From here, using the work of Deleuze and Guattari as a point of reference, we can begin to extend Foucault's model and identify strategies of resistance; by noticing moments of

deterritorialization as described by Deleuze and Guattari, we can identify strategic places of rupture in hegemonic power structures. Drawing on the work of Donna Haraway and Bruno Latour, I will also briefly describe the manner in which science is engaged in the terms of its own production. From here, I will look at the network as a mathematical construct, showing the role of the network as a generalizable model, and also give an example of how that model is instantiated as the technology of the Internet. I will look at three examples of social networking, then, finally, I will present examples of subcultural networks conducted through mail art and zine cultures.

In the second chapter, Queering Networkspace, I will examine how queer theory treats the regulatory systems of power and normativity. In this chapter, I will take a closer look at protocol and embodiment. By presenting the idea of counterspaces I will look at the constitution and biases of public space and how subcultural affiliations can be formed. Drawing on the work of Michael Warner and others, I will discuss how spaces devoted to subcultural or countercultural interaction (such as gay bars) emerge as locations that rupture the confines of normativity. In this chapter I will also look at some historical forms of resistance, such as the civil rights movement and Stonewall.

The third chapter, Design, presents an overview of the ongoing design process for PASS. In this chapter I try to identify how technologies may be adapted for subcultural uses. I will discuss the ways signaling has been used both overtly and covertly to establish community. I will also look at the effect the construction of normativity has on consumer design using gender as an example. I will conclude in a discussion of how the constitution of normativity constantly redefines itself through the development of products.

Technology, the fourth chapter, is a detailed technical description of the PASS platform. In this chapter I will describe the development and function of the platform, including open-sourced hardware and software. I will also give a detailed description of the implementation of the 802.15.4 based wireless protocol.

In the final chapter, I will give an evaluation of the performance of the devices along with a description of a deployment, and critical feedback I have received. I will also propose three alternative scenarios for artistic resolution.
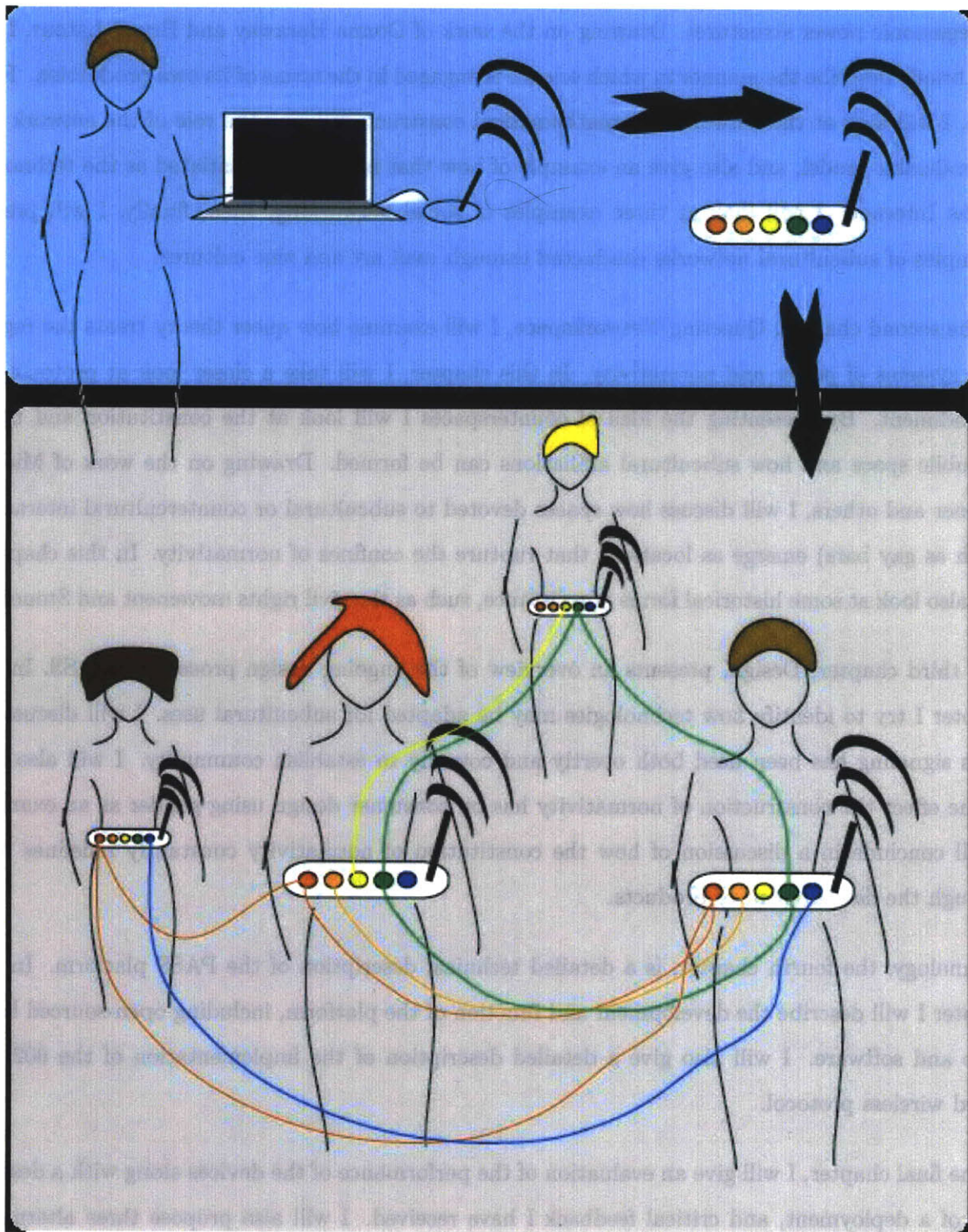
Figure 1-1: PASS Flow

Chapter 2

Networks

The map is open and connectable in all of its dimensions; it is detachable, reversible, susceptible to constant modification. It can be torn, reversed, adapted to any kind of mounting, reworked by an individual, group, or social formation. It can be drawn on a wall, conceived of as a work of art, constructed as a political action or as a meditation.

- Deleuze and Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*

Technologies have frequently been a source of creative metaphors for natural and social sciences. Examples such as the clock, the railroad, the telephone and the network each provide insight into the historical moment and a public fascination with new technology. Networks themselves are certainly not new. The Oxford English Dictionary traces the English etymology back to 1530 when *networke* was first used to describe the interlacing of metal threads or wires. References to reticulate structures in nature date back to 1658. Subsequent references to networks included man made technologies such as the railroad, telephone and broadcasting systems[1].

Network started to be used as a verb in the late 1800's, was used to describe social networks in the 1930's, then fell into widespread usage in the context of social networking until the business conscious 1980's. The transition illuminates a trend to conceive of one's self as part of a network by taking on the role of "node" (as in a point on a graph, a node here representing an object in

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[1]The OED reports the first reference to wireless broadcasting was recorded in 1914.

a network, that object being a person). We may have found ourselves in these weblike structures but this does not indicate a trap or passivity; the potential and principles of the network rather indicate strong possibilities for social and professional connection.

The human body also is seen to host its own network-like structures. The nervous system and circulatory system contain distributed pathways through which the body is regulated. Neurons form a plexus of cells that are delicately connected by synapses. The circulatory system in mammals is closed and centralized, allowing the transfer of oxygenated blood throughout the body. The network applied to these systems provides a complex modeling of the function of the human body.

The frame of networkspace then can be found inhabiting many dimensions: technical, biological, material, epistemological, ontological; each instance revealing different potential for interconnectivity thus extending the context and usage of the word network. The goal of this project is to highlight the manner in which queer spaces exist simultaneously with and below the surface of what society dictates as normative interaction. In laying out the framework for how this occurs I would like to begin with a discussion of some of the different ways the network emerges in critical discourse. I will look at the the manner in which the network offers a trope as a conceptual frame, and examine ways the network is instantiated through language in both professional and popular culture.

2.1   Networkspace

In order to provide a foundational description of how networkspace can be conceptualized, I'd like to use, as a point of reference, the work of those postmodern theorists whose work relates to the network as a mapping of power and exchange. The discourse concerning networkspace also contains potential for illuminating protocols and hegemonic or regulatory systems woven into the social fabric. These discursive creations or epistemes lay the foundation for many conceptual possibilities in locating the modes through which power asserts itself on the body. The representative potential for both inclusion and subversive action situates the network as a conceptual framework.

Networks seem to surface in many forms across an abundance of disciplines. The network clearly appears to be one of the "hybrids" described by Bruno Latour, working simultaneously across

multiple theoretical frames. It is at once a cultural construct, an ontological entity, a technological, biological, natural structure. Bruno Latour explains the divide between nature and culture by writing: "we are always attempting to retie the Gordian knot by crisscrossing, as often as we have to, the divide that separates exact knowledge and the exercise of power" [25](p.3) in a manner he describes as "To shuttle back and forth, we rely on the notion of translation, or network" (p.3). If applied to the network, this description captures a paradox, the network exists as both material and ethereal. Network provides the method of translation while also constituting the substrate. Latour concisely describes the epistemology of the network while sustaining the crucial aspect of multidimensionality.

For me, and as supporting text for the development of PASS, the most compelling descriptions of the network in social criticism come from Michel Foucault. In his writings on sexuality [13], Foucault details what he called the transition from a discipline society to a society of control. The hierarchical displays of power of monarchies present in discipline societies differentiated them from the reliance on a self governance, or embodiment of protocol from its citizens experienced in societies of control. Foucault rejects sexuality as a product of nature, rather suggesting that it is installed and formed by discourse. Sexuality then is situated as a protocol that regulates the distribution of power through the social body. He traces the origins of discourse from the rise of Judeo-Christian values and emphasis on confession, through the labeling, pathologizing, and medicalizing that happened early in the 20th century. Foucault rejects the repressive theory of sexuality popularized by Freud, rather locating sexuality as an organization of power that operates through the individual. This power network instills a regulated sense of what normative sexuality should look like and act like by creating a norm and an other. Through the embodiment of protocol, individual sexuality can be represented by a node in a network of power. He describes distribution of power thus:

It seems to me that power must be understood in the first instance as the multiplicity of force relations immanent in the sphere in which they operate and which constitute their own organization; as the process which, through ceaseless struggles and confrontations, transforms, strengthens, or reverses them; as the support which these force relations find in one another, thus forming a chain or a system, or on the contrary,

the disjunctions and contradictions which isolate them from one another; and lastly, as the strategies in which they take effect, whose general design or institutional crystallization is embodied in the state apparatus, in the formulation of the law, in the various social hegemonies. (p.72)

He continues: "..it is the moving substrate of force relations which by virtue of their inequality, constantly engender states of power..." (p.93), adding an important point that spans far beyond associations of sexuality to implicate any embodied protocol be it assessment of class, race, age or gender. Foucault was able to articulate the inherent structure of power, although ephemeral, through a "subtle network of power" that, rather than supporting the Freudian repressive hypothesis, reveals itself as "a proliferation of discourses, carefully tailored to the requirements of power."

Foucault's writing on sexuality served as a crucial element in the development of his concept of bio-power, which serves as a pivotal concept in critical theory. Bio-power refers to the embodied regulation and distribution of power and describes a mechanism for control over populations: a technology of power. Bio-power speaks also to the mechanism of discourse or *dispotif* by which sexuality is constructed and embodied by a public. The dynamic vectors which construct the network of bio-power supply a foundational element in describing structures of control and protocol.

The Oxford English Dictionary defines a rhizome as:"A prostrate or subterranean root-like stem emitting roots and usually producing leaves at its apex; a rootstock." This definition elicits the image of a broad horizontal network and provides an alternative to hierarchical frameworks. The use of the rhizome in critical theory emerged in the writing of Gilles Deleuze and Félix Guattari in their book *"A Thousand Plateaus: Capitalism and Schizophrenia"*[9]. Deleuze and Guattari reject the hierarchy of trees, interested instead in decentralized non-hierarchical systems, that reference the biological description of reticulate structures. Feeding on their organic metaphor, Deleuze and Guattari describe a rhizome which is governed by specific principles. First are the "principles of connection and heterogeneity"; this indicates that connectivity can occur at any point, and all connectivity is non-hierarchical. Next, the principle of multiplicity, for which they use a puppeteering metaphor likening the strings to connective fibers and highlighting the idea that the puppeteer is acted upon as well as the puppet. The "principle of asignifying rupture" describes the

ability to fragment and regenerate from any node; in other words if any edge is broken the rhizome can rebuild from that point. And the final two categories are the "principles of cartography and decalcomania". The principles of cartography stress that a rhizome is "a map and not a tracing." This map is characterized by multiple entry ways and relies on a constructivist method of describing relationality: "The orchid does not reproduce the tracing of the wasp; it forms a map with the wasp, in a rhizome."(p.12) The principal of decalcomania supports the claim that the rhizome is "not amenable to any structural or generative model".

The rhizome offers itself as a counterspace, a heterogeneous, decentralized, non-heirarchical site of resistance. Deleuze and Guattari discuss principles of connection and heterogeneity : "A rhizome ceaselessly establishes connections between semiotic chains, organizations of power, and circumstances relative to the arts, sciences, and social struggles."(p.7) For Deleuze and Guattari the potential for resistance centers around the act of deterritorialization and reterritorialization, a principle explored in depth under the topic of nomadology. Consider the following, "an "ideological," scientific or artistic movement can be a potential war machine, to the precise extent to which it traces , in relation to a *phyllum*, a plane of consistency, a creative line of flight, a smooth place of displacement."[10](p.121) The nomad war machine is effective because it exists outside the "State apparatus" it is through the rejection of State protocols that the war machine maintains power. In their description of the rhizome and nomadology, they offer a sense of agency in the face of the constriction depicted in Foucault's bio-power model. Deleuze and Guattari depict an alternative space from which the "node" once again has agency within the network structure in procuring and situating its own site of resistance to the hegemonic representation of the State. As Alexander Galloway observes, "Deleuze had the foresight to situate resistive action *within the protological field.*"[15](p.17) The nomad experience can be paralleled to that of queerness; the call to live outside the boundaries of the structural apparatus of power or normativity. The "war machine" described by Deleuze and Guattari offers a rhizomatic structure from which we can puncture through normative social casing by maneuvering into spaces of deterritorializtion.

These theories try to negotiate the contested boundaries between socially generated conceptual frames, scientific inquiry and the natural world. Each deliberates on the distribution of power and knowledge, understanding discrete relations as locations and signifiers of patterns of control. This control manifests through the internalization of cultural constructs as bio-power or protocol. In

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illuminating these frames, sites of resistance also emerge.

All of these theorists, in particular, Latour's writing in the field of science studies and Foucault's on the mechanism of discourse, compel us to not only examine the content but also the usage and application of technical apparatus, in this case the network and accompanying protocols. Cultural predisposition to regard science theory as fact while disregarding cultural and historical agendas limits the possibilities for critical engagement and creates a structure to which we remain passive subjects. This is not to say that science should not be regarded as fact, it is rather to suggest that fact may be more fluid than we expect containing in it all the implications of history and culture that determine scientific pursuit.

2.1.1   Tyranny of Fact: The Rules of the Node

In talking about cultural integration of scientific or technological concepts, it is important to consider the relationship of the public to the scientific community. Public acceptance of conclusions presented by the worlds of scientific and medical research provides key insights into the use of "truth" as a tool of power. Scientific "truths" represent a cycle of cultural production that maintain and set the boundaries of our cultural belief structures. Simultaneously, without acceptance from both the scientific community and public these claims are difficult to maneuver around or disprove, particularly if they find conclusions that are against cultural currents. The enmeshed cycles of scientific and cultural production are in constant dialog with one another, accommodating economic and hegemonic agendas.

Let's take, for example, the search for biological determinism in relation to sexual object choice in the case of homosexual sex. There have been a number of studies that search for evidence that would place homosexual behavior in the nature rather than culture category (in spite of the relatively recent construction of medicalized homosexuality[2]). Same sex desire has been present through out history, however, *homosexuality* is a contemporary construct which holds within it the historical and cultural conditions of its production (I will speak in more detail about this later in

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[2]The word *homosexual* was coined in 1869 by the German journalist Karl-Maria Kertbeny in a pamphlet contesting German antisodomy law. He is also credited with the first use of *heterosexual* which appeared in later writings.

my discussion of Normativity and Otherness). There have been a number of scientific studies that have tried to locate a biological reason for same sex desire. The study of androgen exposure in fetuses and the proportionality of the index to ring finger attempted to locate a gender dimorphic (male homosexuals have opposite proportional relationship to female homosexuals) indicator for homosexual desire. Another well known example is the work of Simon LeVay. LeVay is a neuroscientist and a gay man who in 1991 published a paper in the journal *Science*[26] claiming variations in the brain structure between homosexual and heterosexual men. Criticism of his initial study has centered on his methodology primarily because of the small sample size and the large percentage of the cadavers used in the study that had died of AIDS related illness. In spite of the nonconclusive evidence, there is still an overwhelming push to find a reason for homosexual desire.

Work of scientists like LeVay and the compulsion to essentialize homosexual behavior is generally unpopular among queer theory academics. Queer theorists fear the search for biological roots for homosexual behavior supports attempts to validate the pathologization of non-normative sexual behavior. The process of medicalization in turn reiterates the process of marginalization of the homosexual population - labeling it as defective. By treating sexuality as a kind of internalized disease, not only is the heterosexual public protected from same sex desire, but homosexual desire maintains the stigma of "defect" that exists outside the boundaries of designated normal physical impulses. Once again I turn to Foucault: "Homosexuality appeared as one of the forms of sexuality when it was transformed from the practice of sodomy to a kind of interior androgyny, a hermaphrodism of the soul. The sodomite had been a temporary aberration; the homosexual was now a species."(p.43) Importantly, this process of pathologizing creates an environment in which people have to justify their experience of same sex desire; this is what Foucault referred to as "reverse discourse". Individuals feel compelled to engage in discourse and rituals such as coming out whereas no such equivalent exists for heterosexual people or perceived normative behavior. Agency and variation yield to depictions of sickness and scientific determinism. Finally, in solely taking into consideration the cultural constructions of the present, we sacrifice the lessons of history. The political and cultural reasons that this research may or may not be useful cannot be overlooked by the scientists who conduct it. As I will describe further in the next chapter, the construction and definition of homosexuality itself is dependent on the context of the historical moment.

Considering the work of LeVay and others, it may be understandable that an individual would

want to comprehend the nature of their desire. For homosexual scientists the pursuit of empirical evidence must seem like a logical means to validate their experience. But, from the historical point of view, these attempts can seem naive and dangerous. When a scientist to attempts to dislocate the *fact* of homosexuality from its cultural construction, they give undue power to the conditions under which it was produced. LeVay chooses to engage within a system that by its nature invalidates him and this appears to many like tilting at a windmill.

Other scientists, such as the Stanford biologist Joan Roughgarden, have suggested that homosexuality is an expression of biodiversity rather than a genetic trait. Roughgarden, a transgender woman, seeks a biological basis for the "naturalness" of homosexuality [31] citing many references to same sex activity across diverse animal species. Roughgarden assesses the dilemma faced by gay scientists thus: "From a scientific perspective, sexual orientation is a fundamental feature of mating behavior, and the task of basic research is to understand how this trait forms..." continuing, "From a policy perspective, the issue is different: it is focused on whether gayness is a matter of choice, whether gayness is learned and thus can be unlearned."(p. 254) This is the heart of the conundrum, researchers are asked to choose camps of either determinism, risking the fall down the slippery slope to disease and defect, or choice, from which point homosexuals are asked to correct themselves. Roughgarden tries to establish a different strategy for examining same sex contact and gender in animals and tries to be cautious of, if not circumvent, the hegemonic human definition of sexuality. Roughgarden uses examples of sexual diversity in nature to try to dislodge the homosexual/heterosexual binary from its moorings as a biological rather than a cultural trait.

To illustrate the framework in which social factors influence the work of science I turn to the writing of Donna Haraway. In her studies of primatology, Haraway looks at the way in which the construction of gender informs the structure and methodology of scientific processes. She questions the manner in which the construct of science and the construct of femaleness conflict with one another asking, "How may the people simultaneously known as women and as scientists - an oxymoronic social subject only beginning to break down - intervene in the construction of the potent natural-technical objects of knowledge called females?"[20](p.281) In her analysis of scientific modes of production, Haraway's observations provide an inlet to how the cultural/scientific construction of gender asserts itself through scientific process, "Gender is part of the apparatus of scientific production, and in turn is replicated or destabilized through it."(p.324) Haraway reveals

the substructure that creates a feedback system within the scientific frame, "Addressed to each other, western feminists and scientific discourses warp each other's story fields and redraw possible positions for claiming to know something about the world, including gendered social space and sexed bodies."(p.324) For Haraway, it is not only the embodiment of protocol that is important, but how that situates the subject in relation to the rest of the world.

The organization and privileging of scientific fact reflects the cultural conditions of its production. We internalize this production; scientific "facts" become represented in the public sphere as "truth" which we in turn embody. Again this circles back to the Foucauldian idea that the quest and emphasis on truth in discourse directs our identity as social beings. Through our embodiment of protocols we become both subjects and representatives of bio-power. In the context of sexuality and gender, by embodying these truths our bodies reflect the dimorphic genders with proper or pathological mating practices that society both produces and requires. By naturalizing the embodiment of protocols we actively (if unwittingly) forfeit a degree of agency as human actors.

2.2 Technologies and Topologies

This section moves from the theoretical and conceptual framework established in the last section, to a discussion of the physical properties of the network itself. If the previous section spoke of nodes and the construction of subjects, this section will address the topologies that model the environments that the nodes inhabit.

2.2.1 Graph Theory

In part, the ability of the network to serve so many disciplines is due to the scalability of its mathematical models. Early work on graph theory provided strong tools for generalized solutions to problems. The first articulation for the mathematical basis of the network emerged in 1735 with Euler's famous analysis of the Königsberg bridge problem. The problem was to find a path in which all bridges were crossed only once, which Euler proved to be impossible. By replacing points on land with vertices and possible routes with arcs, Euler developed a topological method of

modeling. He proved the theorem that a network with more than two odd vertices does not have a path that would allow each arc only to be traversed once. Thus, Euler provided the proof which inducted graph theory and topology into mathematical discipline. The analysis of the problem lead to a generalizable theory applicable to all networks.
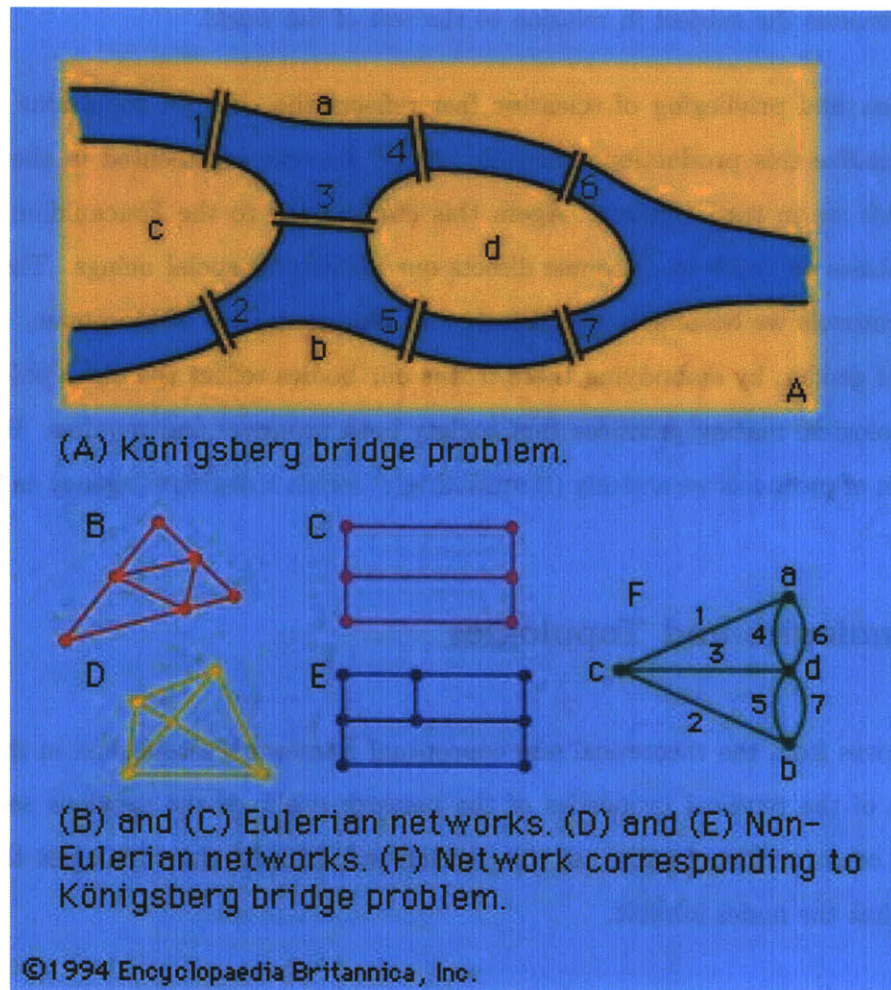
Figure 2-1: Königsberg bridge problem from Encyclopedia Britannica, 1994.

Another famous example (at least in Computer Science circles) is the traveling salesman problem. This problem is posed by the proposition: given a finite number of cities find the shortest and most cost effective route for the salesman to traverse [16]. The traveling salesman problem is an example of a deeper level of computational complexity to graph theory. The problem is NP-complete (Non-deterministic Polynomial-time), meaning that there is no efficient algorithmic solution to the problem and the time it takes to solve it grows exponentially as the number of vertices increases.

However, this also indicates that the combinatorial optimization problem is at least as hard or harder than any NP problem. This also means is that the problem is generalizable: if you find a solution, the algorithm can be applied to any other NP-complete problem. This class of problem signifies the mathematical utility of network modeling and shows a clear example of why networks can be so valuable as a modeling tool. Indeed, the ability to generalize mathematical solutions may in fact be one of the reasons graph and network theory finds such popularity within so many disciplines.

2.2.2 Technological Networks: a Brief Example

According to the sociologist Manuel Castells, "It was only under the conditions of a mature industrial society that autonomous projects of organizational networking could emerge. When they did, they could use the potential of micro-electronics based communication technologies." [4] Indeed it is difficult to even conceive of contemporary human culture without acknowledging the entangled relationship with digital, technological, networks. The first large scale digital networking project surfaced in 1969 when the United States Department of Defense completed the first computational packet switching network. ARPANET or the Advanced Research Projects Agency Network was the precursor to the Internet. [22] Development of ARPANET started during the cold war. Initially ARPANET connected four universities as nodes, UCLA, UCSB, Stanford and the University of Utah. Although this was an example of a closed network the underlying architecture was open; it grew regularly at the rate of about one node per year. Meanwhile other networks began to emerge, such as USENET, BITNET and CSNET. In 1974, a Transmission Control Protocol (TCP) layer was designed in combination with Internet Protocol (IP). This protocol would allow for the interconnection of networks through gateways and created a protocol layer that was the foundation of the Internet. In 1990, ARPANET shut down. By this time much of the previous activity had been moved to the Defense Data Network (DDN, initially created as MILNET in 1983). This network diverted military activity off of the open network of ARPANET to a large-scale, closed, private network. With the introduction of IP routers, the DDN also shut down and was replaced by four subnetworks running different protocols for security NIPRNet (Non-secure Internet Protocol Router Network) for exchange of internal information and gateway access to the Internet, SIPRNet (Secret Internet Protocol Router Network) which runs a secure network which is not accessible

on the Internet, and JWICS (Joint Worldwide Intelligence Communications System) for multimedia communications. The Internet itself has been built as a multidimensional structure, linking networks together through standardized protocols; growing almost rhizomatically to become the ubiquitous structure we use today.
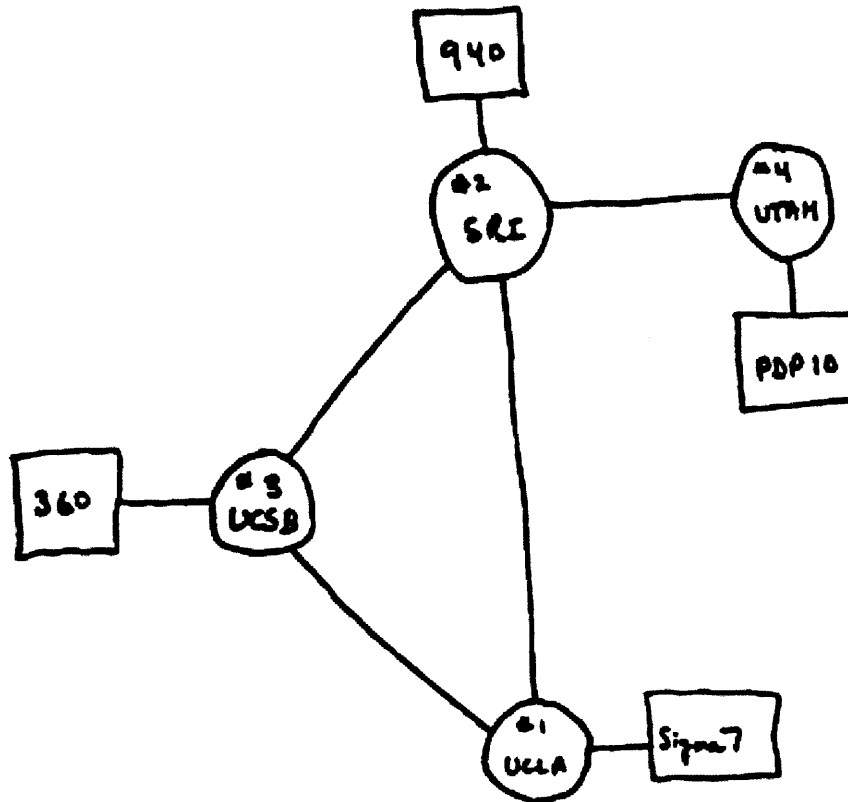
Figure 2-2: Image of the 4 node ARPANET
http://www.computerhistory.org/exhibits/Internet_history/#1969

The initial architecture of the Internet was built using peer to peer protocols (this was maintained through out the development as TCP/IP allows communication directly between nodes). Applications such as the web browser changed the terms of engagement, favoring instead one sided client/server based exchanges. Although peer to peer provided the basis for the structure that we use now it also has provided an infrastructure for alternative networks that subvert what has evolved as the prescribed economic model of the Internet. The HTTP (Hypertext Transfer Protocol) uses TCP to create a client/server connection. The client/server model, offers a new normativity based

on economic might. As Wendy Chun observes, when the Internet became accessible to the public, the infrastructure for the Internet fell into the hands of private companies, "The Internet, then, became a shopping mall - a privately owned, publicly accessible space-"[6](p.38)

As an example of a resistive subnetwork, or subversive network, the application Napster allowed shared distribution of music over a peer to peer network. Napster followed a non-normative exchange model based on a user's willingness to contribute (Napster would search a user's drive for available mp3 files) in order for the user to access other files on the network. By effectively creating an economy based on non-monetary exchange, Napster offered a subverted instance of the network over the Internet. The popularity of Napster brought into play issues of property which were not dissimilar to the Deleuzian rhizomatic principle of deterritorialization. The demands of capitalism had created a new normativity for the network of the Internet. Napster created a rupture through which the public could envision different protocols and a different network. As Alexander Gallaway states, "It is important to remember that the technical is always political, that *network architecture is politics.*"[15] It is important too to remember that in the context of the Internet structural protocols were intentionally designed to be neutral to content; they make up the connective tissue of a what was designed to be a flexible network.

2.3   Social Networks

The study of human behavior has, in many cases, elicited an impulse to quantify and explain human relationships and interactions. Networks have provided sociology and social theory with tools, modeling people (nodes) through a set of relations (edges). In the mid 1930's the psychotherapist Jacob L. Moreno developed the field of sociometry and began using the structure he called the sociogram. Moreno's sociograms were early examples of the application of of graph theory (nodes and curves) applied in an attempt to quantify human relationships. Using a combination of qualitative and quantitative data, sociometry provided tools for a practitioner to model relationships using the quantitative tools of mathematical charts and graphs.

Another watershed moment in the social scientific definition of network was the small world study (Milgram). This 1967 study attempted to quantify a discrete number of edges between nodes

which represent acquaintances. The study was extremely popular, giving rise to what became famously known as "six degrees of separation". Milgram, a social scientist, claimed that there were at maximum six nodes separating all pairs of people. The small world phenomenon is exhibited mathematically through small world networks, or networks with high clustering coefficients. This means that each node can be reached by another by only a small number of steps. These networks display high clustering coefficients which made the added value of the generalizable mathematical model seem apparent. But the ability to generalize social networks may in fact be a little trickier than it appeared.

Milgram's methods were rather unconventional and, it has been suggested, not entirely empirical. During his study, he sent packets to participants in Kansas or Nebraska while the intended recipient lived in Cambridge or Boston, Massachusetts. They were asked to send the letter to whomever they knew who would be most likely to know the intended recipient. Apparently, although the report Milgram submitted claimed that approximately six recipients were between the origin and the destination, however the completion rate for the experiment was dismal (roughly 5% of the packets reached their destination), and subsequent studies by Milgram revealed a discrepancy in percentages of packets received based on the race of the origin being different than the race of the recipient. The theory was extremely popular, though, and "six degrees of separation" is a concept that gained even more momentum in popular culture with John Guare's play and subsequent the subsequent movie of the same name.

A more current popular foray into network theory is "Linked"[1] by the physicist Albert-László Barabási. In this account Barabási champions a general theory of complexity; situating social, biological, and digital networks on the same field. Barabási makes reasonable claims about the generalizability of mathematical modeling, but seems to miss some of the subtlety of human motivation. Using the example of the disciple Paul, he states the following: "he used his first hand knowledge of the social network of the first century's civilized world from Rome to Jerusalem to reach and convert as many people as he could". He continues "he reached out to the biggest communities of his era". This description appears confused on two counts. First, he is applying a contemporary concept out of context with the historical setting. Barabási's a priori knowledge of the network and its functions shadows his comprehension of historical event. Secondly, Barabási does not locate the technology of the day. Perhaps Paul was not making use of his knowledge

of social networking, he may have just been walking down the roads available to him. Accusing contemporary scientific research of "reductionism," Barabási makes generalizations by draping the term network around as he says "everything" in an act that in itself appears reductionist. Barabási categorizes graph and network theory as "eternal truths" and, as seductive as this is, it seems dangerous to cede our agency so easily. As constructors of these "eternal truth" we are also the guardians against their abuse. Science is not static, and research often reflects historical agendas, we must examine "fact" with critical eyes. Barabási's work reiterates the danger present in blindly accepting models as "truths" and distilling or shielding the other forces at work by invoking a dominant structure such as the network.

2.4 Subcultural Networks

Before the Internet, subcultures had to implement creative strategies in order to communicate and form communities. An interesting example is that of the zine. Zines are part of Do it Yourself (DIY) culture, these are self-produced publications representing literature, editorial and musical production overlooked by consumer culture. Zines are normally distributed at concerts and independent book or music shops for little or no money. Although there are many zines still in production, they have begun to be upstaged by the blog - which has become a digital extension of the zine. The blog maintains many of zine-like characteristics such as low production cost, easy distribution, and multiple media formats. But often for zine writers and contributors the scene is as important as the message. As described by Amy Spencer in her book, *DIY:the rise of lo-fi culture*, "For many writers it is this community-building that is the most important part of producing their zine. Networks are forged which serve to support not only the zine community but also artistic and activist communities."[33](p.27) Much of the section that follows is based on Spencer's history, which locates queer publishing as part of a larger, subcultural movement.

Spencer traces a connection between self-publishing as both a medium and mode of distribution, "Artists began to realize that they did not need to operate within the mainstream art world but could co-exist just outside, developing global networks through which to distribute their cryptic art." Around the turn of the 20th century Dadaists began self-publishing magazines such as

"Cabaret Voltaire" and *"Dada"*. In these publications they incorporated collage, detournement, and appropriated images. The Situationist International movement also worked with self-publishing. One publication called *Potlach* extended the rather small immediate network of the Situationists by picking out names at random from the phone book.

Mail art or 'Eternal Network', as dubbed by fluxus artist Robert Fililiou, is a system of exchanging and developing artwork through the post. Mail art preserved and created community for artists living in different locations. Besides the publication of the journal *An Anthology*, the fluxus movement spawned a number of mail art networks. The fluxus artists used the postal system's infrastructure as a method of distribution of art but also as a way of conceiving art-making practice; often collaborating with artists they may not have met in person. In 1968, artist Ray Johnson started what he called the New York Correspondance School[3], creating a kind of virtual gallery through which artists used the mail as a method of sharing and distributing work. Mail art generated a quirky economy based on the creative exchange of artworks. In 1973, Johnson published an obituary for the New York Correspondence School - treating it as though it were an organism and resurrecting it as the Buddha University[34]. The movement had some protocols, participation was required of those who received art works and all exchanges had to be made by post. Johnson had his own protocols as well; he was made famous for his signature bunny heads or buxus heads which would appear in his mail art and which other artists would emulate.

One of the largest contemporary mail art networks is Ryosuke Cohen's *Brain Cell* project. This project has been in progress since 1986 and is purported to have thousands of members. Cohen receives postcard art and incorporate it into his current designs. He describes his project as, " a whole body, it appears as a brain constructed with numbers of compiled and complex nerve cells, which are created in a non-linear order. So I have named this style of art Brain Cell ." [4]

Mail art and zine publication can be seen as close cousins. Spencer notes, "With the advent of these art magazines and mail art projects, those interested in such cultural forms increasingly began to realize that they were part of a wider network." Thus highlighting the role of community in

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[3]The misspelling of Correspondance was intentional, Johnson wanted to give action to the word by incorporating the verb *dance*

[4]Instructions for participation can still be found on his website `http://www.h5.dion.ne.jp/~cohen/info/ryosukec.htm`.

enabling artistic, political and cultural exchanges provides integral meaning to zine culture.

Queer communities also found a voice through self-publishing. Frustration with both the punk scene and the mainstream gay scene inspired zines such as *JDs* authored by G.B. Jones and Bruce LaBruce, heralding the beginning of the homocore or queercore movement. LaBruce explains his objection to mainstream gay culture, "even in the 80's the gay community was heading in an assimilationist direction... Eventually, when a cerain amount of social acceptance was gained, the more extreme signifiers were dropped in favor of a less offensive uniform."[33](p.277) Also frustrated with the punk community, Spencer describes their desire to create a "queer space within the punk community." The queercore movement was marked by an unapologetic attitude toward their sexuality and was highly critical of the sexism and gender segregation that often occurs inside of gay culture. G.B. Jones in an interview with Amy Spencer says,

> Mainstream gay culture is essentially a mirror of repressed straight society, of which I include large segments of the so-called 'alternative' scene. Foucault's notions of sexuality and gender interested me far more than the adherence to 'labels' that inhibit both straight and gay cultures.[33](p.42)

Subcultural connection provided by the music and literature of the queercore movement, stimulated a unique kind of cultural glue. It also set the stage for the feminist riotgrrl movement of the 1990's, offering an alternative to the male dominated music scene. Queercore put into practice many of the theories put forth by queer theorists. The paths forged by this alternative subculture gave permission to a range of expression that was not available through cultural assimilation. The network in this context represents an opportunity to subvert hegemonic cultural forces.

2.5   Weaving Webs

Although we may be ruled by protocol and ensnared by networks, we are, at the same time connected, and this implies agency and opportunity. In seeking the potentiality of the structure we can participate in the network and in turn exploit its strengths: to understand the human condition,

modes of self - and external- regulation, rules of engagement. This affords us an opportunity to conduct social transactions with other people in new and creative ways.

Chapter 3

Queering Networkspace

Sexuality must not be thought of as a kind of natural given which power tries to hold in check or as an obscure domain which knowledge tries gradually to uncover. It is the name that can be given to a historical construct: not a furtive reality that is difficult to grasp, but a great surface network in which the stimulation of bodies, the intensification of pleasures, the incitement to discourse, the formation of special knowledges, the strengthening and controls of resistances, are linked to one another, in accordance with a few major strategies of knowledge and power.- Michel Foucault, *The History of Sexuality: An Introduction*

Heterosexual and homosexual people do not live in different worlds, but the places, products, and trajectories that mark their lives can be very different. Most of our culture is produced under the auspices of normativity; things are made for normal people, the median, the majority. The places we inhabit and products we consume reflect culturally-produced biases and protocols. The assumption of normativity production contains within it a "chicken and egg" - question; do the norms produce culture or does culture produce the norm? For any given generation, culture entrains individuals with norms. Most cultural production, then, whether art, business, or family, will tend to be framed within those norms. This then entrains subsequent generations.

Cultural perception of public space leans toward a precarious desire to estabish a neutral territory. The positivist quest for a peaceful, heterogeneous public is one of the cultural myths of the "melting

pot". In reality, there is a difference between normative and neutral atmosphere. Factors such as race, gender, sexual orientation, age, height, and weight can all contribute to an individual sense of dislocation or belonging. Of course, one premise of a neutral public space is that there are more private spaces that are specialized for certain groups; there are gay bars, community centers, lesbian dance clubs, dungeons, –specialized places for many different subcultural interests. These spaces exist as dedicated venues providing an opportunity for a certain kind of connection to thrive. Although we think of many spaces as not having a preconditioned state, most spaces are biased - public space is largely constructed to meet the requirements of heterosexuality. For example, a public park may be a space that is identified as a place for gay cruising, although in the same park public displays of homosexuality might still be taboo or dangerous. Most homosexual spaces feel uncomfortable to most straight people, and in our culture particularly men. Spaces are separate. In describing a train ride back from a weekend at a gay resort community, the Yale law professor Kenjo Yoshino writes, "I look up and realize the moment has passed - the moment when straight culture has reasserted itself." [37](p.85) Yoshino describes the experience of many when re-emerging from a subcultural space to a normative space. However, this does not mean that homosexual or queer connections do not still exist in normative spaces. Homosexual expressions become for the most part submerged in dominant culture. When same-sex contact manifests in public, normative, space it ruptures the continuity of space, often becoming a spectacle. These ruptures can at best produce mild discomfort and at worst physical danger.

Of course, even within homosexual communities there are divisions based on assimilation and acceptance of normativity. Mainstream gay culture and queer culture tend to embrace very different cultural identities. While queer culture generally rejects issues such as gay marriage as heteronormative, mainstream gay culture is constantly embroiled in a fight for acceptability. Queer and mainstream gay culture often end up at odds in their social agendas. The result is that a group (gay) portrayed in dominant culture as homogenous, is actually a multi-layered expression of subcultural networks. As described by Gilman, "The sense that there are "good" qualities as well as "bad" ones in the projections that are concretized into the Other means that these qualities will also be found within the newly formed self-definition of the other." [17](p.5) Here he points out the cyclical and paradoxical nature of a normative process that instates an internalized version of the broader requirements of heteronormativity.

The coalescence and health of a subculture is then dependent on factors that illuminate connection. The Internet has provided one method of maintaining sexual subcultures, but is virtual. The type of contact established though the Internet contains with it all the paradoxes posed by non-physical contact. This can span from "passing" i.e. masquerading as something other than what you "really are" to passive voyerism. The conflicting social issues raised by the Internet are quite complex and not a subject that I intend to explore in depth here, but the perceived anonymity of the web introduces interesting issues relating to the construction of desire. In the context of the body-free space of the internet, anything goes and yet no *thing* goes; the non-physical space created by the Internet changes the stakes involved in engagement. As a digital medium that operates in physical rather than virtual space, PASS has been designed to reveal a different kind of connection; one that describes the space of subcultural contact in spite of the cultural regulations of place and product.

3.1   Counterspaces

The dialectic of public and private space spans another loosely defined territory. Certainly there is no one definition of public and by extension no binary reciprocal definition for private. Although the concept of public is not easily described, one quality is that it is space where the regulation of bodies is paramount. It is in public that our internal protocols make themselves most apparent. Public spaces hold intrinsic boundaries that delineate what are considered acceptable forms of being and behaving in regards to social interaction.

Author and professor of English at Rutgers University, Michael Warner, speaks about functional operation of publics and norms for subcultural or "counterpublic" communities: "Dominant publics are by definition those that can take their discourse pragmatics and their lifeworlds for granted, misrecognizing the indefinite scope of their expansive address as universality or normalcy. Counterpublics are spaces of circulation in which it is hoped that the poesis of scene making will be transformative, not replicative merely." [35](p.122) Warner describes the ways in which we internalize the demands of public space and the entitlement it confers on those who embody the norm. He illuminates the depth to which indoctrinated cultural structures remain invisible, particularly to those engaged in normative patterns of embodiment. At the same time, he acknowledges the fact

that the status quo does not work for everyone, that in counterpublics there is a desire to affect change.

Counterspaces can and often do represent multiple topologies simultaneously. The science fiction writer Samuel Delany used sexual networks to transcend the restrictive protocols of class networks. An author and professor of English, he describes sexual encounters with men of varied backgrounds, heterosexual, homosexual, hustlers and homeless men at the various pornographic movie theaters in Times Square in New York. Delany draws an interesting parallel between the initiation of sexual encounters and cross-class contact. He describes a situation in which a topology relating to sexuality was directly enmeshed in a topology of class and how, by breaking through the protocols associated with public or anonymous sexual contact, he was also able to break free of protocols associated with class contact. He exposes a rupture in the different protocols at play in different networked paradigms of engagement. These ruptures were enabled by the specificities of the space they occurred in. When Times Square began redevelopment of this area, the potential for this strategic rupture also shifted. Delany observes, "Precisely at the level where the public could avail itself of the neighborhood, some of those subsystems were surprisingly beneficent - beneficent in ways that will be lost permanently unless people report on their own contact and experience with those subsystems."[8](p.xx) From Delany's description we can see how the gentrification and redevelopment of public space in Times Square not only regulated certain kinds of sexual behavior but also eliminated a space where cross class contact enjoyed different terms of engagement than it would in normal public interaction.

Delany's account illustrates the strategic potential of deterritorialization; by changing terms of engagement we can reimagine multiple protocols revealing paradigmatic potential in regards to class, race and gender. In her precise analysis of Delany's book, Judith Halberstam observes how the following "relations between sexuality and time and space provide immense insight into the flows of power and subversion within postmodernism"[18](p.13). Delany describes an opportunity for subversion; a chance to relate to people who in any other situation would be inaccessible. The process of redefining regulation of the body gives agency to the individual in situating themselves in relation to both their own self awareness and their awareness of others. This sort of rupture in a protocologic structure introduces the potential to reimagine the way in which one may identify otherness and provides new inlets and multiple mappings for relationships.

3.2 Protocols - Normativity and Otherness

As I have been pointing out throughout this thesis, the experiences of normativity and otherness are part of a protocol system that situates individuals in relation to one another. It is this paradigm through which sexuality operates as a category of identity (I am gay) rather than an action (I have sex with wo/men).

In order to contextualize the contemporary understanding of same-sex desire vis a vis homosexuality, queer theorists have investigated historical forms of same-sex contact. David Halperin's essay, "Is There a History of Sexuality?"[19] supports the assertion that sexuality itself exists as a modern construct. In his account of ancient Greek sexuality he states:

> Because, as we have seen in the case of classical Athens, erotic desires and sexual object-choices in antiquity were generally not determined by a typology of anatomical sexes (male versus female), but rather by the social articulation of power (superordinate versus subordinate), the currently fashionable distinctions between homosexuality and heterosexuality (and similarly between "homosexuals" and "heterosexuals" as individual types) had no meaning for the classical Athenians: there were not, so far as they knew, two different kinds of "sexuality", two differently structured psychosexual states or modes of affective orientation, but a single form of sexual experience which all free adult males shared- making due allowance for variations in individual tastes, as one might for individual palates.[19](p.420)

The sexual practices in classical Athens were highly regulated but were constructed as class-based, rather than gender-based, sexual associations. In researching different ways that sexuality has been instantiated, Halperin introduces the question of how sexuality can be imagined. This provides a tangible basis for constructivist models of sexuality. Halperin calls sexuality a "cultural effect" and treats it as a historical rendering rather than a physical attribute. Halperin extends Foucault's descriptions of sexuality to show that sex, in relation to the body, has had different properties at different historical moments: "In classical Athens, for example, sex did not express inward dispositions or inclinations so much as it served to position social actors in the places assigned to them, by virtue of their political standing, in the hierarchical structure of the Athenian

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polity." (p.418) Same-sex desire has persisted, over time, in many forms - but the highly binarized homosexual/heterosexual paradigm that we understand as sexuality in contemporary culture has evolved from a number of our own set of specific social dynamic influences and discourses. Certain practices, such as some described by Foucault, like the medicalization of sexuality, the confession, and modern discourses on sex, have produced what we have qualified in cultural terms abnormal sexuality.

By situating a body as different or abnormal, the body becomes entangled in a system of bio-power that is constantly reiterating its disenfranchisement. Again, Foucault brings this into focus. In talking about the institutions and technologies of power he states, "They also act as factors of segregation and social hierarchization, exerting their influence on the respective forces of both these movements, guaranteeing relations of domination and effects of hegemony." [13](p141) For Foucault, the economic mode of production is dependent on the bio-power model: "The adjustment of the accumulation of men to that of capital, the joining and growth of human groups to the expansion of productive forces and the differential allocation of profit, were made possible in part by the exercise of bio-power in its many forms and modes of application." (p.141)

As Michael Warner describes, "A whole field of social relations becomes intelligible as heterosexuality, and this privatized sexual culture bestows on its sexual practices a tacit sense of rightness and normalcy. This sense of rightness - embedded in things and not just in sex - is what we call heteronormativity." [35](p.194) It is in this juxtaposition that we also can feel a sense of wrongness, of Otherness. Or as Sander Gilman describes it, "Outsiders view themselves as marginal and are thus dependent on such real or imagined categories to define the borders of acceptability, which must be crossed into the world of privilege ascribed to the reference group." [17](p.4) The establishment of these boundaries of normativity are constantly being defined, may differ according to geographical region, and change over time.

Otherness becomes evident through cultural definitions of norms whether describing sexuality, race, or gender. However, as Judith Butler points out, we find ourselves dependent on constructed frames of reference: "if we consider that human bodies are not experienced without recourse to some ideality, some frame for experience itself, and that this is true for the experience of one's own body as it is for experiencing another, and if we accept that that ideality and the frame

are socially articulated, we can see how it is that embodiment is not thinkable without a relation to a norm, or a set of norms."[3](p.28) The origins and formulations of a norm are not precise, incorporating a myriad of influences from Malthusian regulation of population, to Judeo-Christian emphasis on procreative sex, to contemporary legislative models. The establishment of norms is neither transhistorical nor transcultural, which gives insight into the potential malleability of cultural formation.

3.2.1 Reverse Discourses and Sites of Resistance

According to Foucault, one of the ways that bio-power operates is by creating systems of "reverse" discourse. This describes the means through which the subject re-articulates the regulatory system that they are subject to. Foucault states, "homosexuality began to speak on its own behalf, to demand that its legitimacy or 'naturality' be acknowledged, often in the same vocabulary, using the same categories by which it was medically disqualified."(p.101) Foucault offered the realization that in spite of the desire to resist, the formulation of bio-power is so tight that these actions often reiterate rather than relieve the dominating forces at work.

The act of coming out poses such a paradox. The process of coming out reifies the system that identifies homosexuality as abnormal; otherwise everyone would have to come out regardless of sexual preference. Judith Butler observes the reductive process in the act of self-labeling; "being 'out' must produce the closet again and again in order to maintain itself as 'out'."[2](p.302)

However, considering the social conditions that we live under, it seems important for most people to come out not only as a personal but also as a political point of reference. In an interview with Bernard-Henry Leví, Foucault clarifies his position on reverse discourse:

> I believe the so-called "sexual liberation" movements must be understood as movements of affirmation "beginning with" sexuality. Which means two things; these are movements which take off from sexuality, from the apparatus of sexuality wihin which we're trapped, which make it function to the limit; but at the same time, these movements are displaced in relation to sexuality, disengaging themselves from it and going beyond it.[14](p.217)

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Judith Halberstam reiterates this point in an interview with Annamarie Jagose, placing reverse discourse in a contemporary context:

> Consequently, I don't see the point of simply rejecting all reverse discourses per se (coming out, organizing, producing new categories) but I do think it is limited to think of them (coming out, for example) as end points: Foucault clearly believes that resistance has to go beyond the taking of a name ("I am a lesbian") and must produce creative new forms of resistance by assuming and empowering a marginal positionality.[23]

These statements identify the resistive, but also creative, potential in reverse discourse.

Reverse discourse also relates to my earlier discussion of the production of science. The frame of scientific production, as witnessed by Haraway, is echoed in Warner's assessment of the position of the public:

> This is one of the things that happens when alternative publics are said to be social movements: they acquire agency in relation to the state. They enter the temporality of politics and adapt themselves to the performatives of rational-critical discourse.[19](p.124)

Warner speaks to the quandary faced by activists, as well as scientists, asking if change can be affected through the assimilation into a hegemonic structure, and if dissenters can, maintain a resistive stance. The Foucauldian proposition of reverse discourse does not imply a denial of the effect power has on the body, rather it suggests an acknowledgment of this power and a call to action in a way that creatively challenges it.

Reverse discourse importantly relates to how PASS operates functionally. It echos the paradoxical nature of the effort to create a platform that seeks to strategically deterritorialize in the Deleuzian sense, but still retain culturally legibility and relevance.

3.2.2 Civil Rights

How bio-power translates to individuals' rights as citizens is a contemporary concern. As Gail Rubin states, "Like gender, sexuality is political. It is organized into systems of power, which

reward and encourage certain activities, while punishing and suppressing others. Like the capitalist organization of labor and its distribution of rewards and powers, the modern sexual system has been the object of political struggle since it emerged and as it has evolved." [32](p.34) The "distribution of rewards and powers" situates the individual in a system that reiterates the disempowerment of the other.

Although activists had been working in Europe and the United States for over a century, the gay rights movement gained momentum during the civil rights movement of the 1960s. The apex of this movement centered around the Stonewall Riots of 1969. During a police raid at the Stonewall Inn, in the West Village of New York, gay, lesbian and queer patrons refused to go quietly; marking a historical moment in gay culture. Thereafter, milestones in the gay rights movement would be referred to as 'pre' or 'post' Stonewall. Taking cues from the radical movements of the sixties, politicized identity became a mainstream characteristic of homosexual identity. Dennis Altman wrote, "No longer is the claim made that gay people can fit into American society, that they are decent, as patriotic, as clean-living as anyone else. Rather, it is argued, it is American society itself that needs to change."[28](p.369)

If one marker of conflict of conflict between heterosexual and homosexual culture is to be identified with the present moment, it would probably be the movement to legalize same-sex marriage. Although marriage may be an expression of heteronormative ideals, the denial of same-sex marriage is also a denial of the rights and benefits associated with long term partnership. Thus, the denial of marriage rights marks a clear discrimination towards same-sex partners. This is an example where a failure to conform with norms has punitive effects for the terms of one's citizenship and civil rights.

From a queer point of view, marriage represents another institution of assimilation. It does not validate the queer lifestyle, but rather supports a heteronormative paradigm. The idea of equal treatment before the law has made this cause something that many gay and lesbian people feel to be important to enjoyment of full citizenship. I think that it is important too for the non-queer public to understand the degree to which such conditions can impact one's feeling of disenfranchisement. Take for example an international love affair; not a problem for a non-same-sex couple who could presumably marry and live in the same country as citizens. However for their homosexual

counterpart, even in Massachusetts, the federal government would never recognize their union. The conflicts and divisions within the homosexual community notwithstanding, equal treatment under the law is just that.

It can be argued that assimilation itself has implications on civil rights. Kenji Yoshino writes, "this gay critique of assimilation has implications for all civil rights groups, including racial minorities, women, religious minorities, and people with disabilities. In America today, all outsider groups are systematically asked to assimilate to mainstream norms in ways that burden our equality."[37](p.27) Yoshino views the problems of civil rights as issues of liberty that should addressed as social issues, asking the reader to imagine a nonconformist paradigm of inclusion. In this suggestion he confronts the mechanism that formulates the norm and other.

3.2.3   Analogy

When I was a kid, my dad had a bumper sticker that read Subvert the Dominant Paradigm. This was back in the 80's and Reagan was president. My parents were (and are) well-read lefties who had copies of The Nation stacked in the bathroom. I lived in an atmosphere where I had no idea how protected I was from the dominant paradigms of the day. During my teens we moved to the San Francisco Bay area. I had a boyfriend, then I had a girlfriend. Again, although I was aware that this was not the kind of experience that most teens had, I had no awareness that it was not normal; I just knew that it was not dominant (at least not in terms of what media and society purported to be dominant). This naïvete was all too short lived; since then I have had bottles thrown at me as someone yells dyke – I assume for holding hands with a woman on the street– I have been told by allegedly educated people that they believe my sexual partner to be indicative of a "phase", I have had people exclaim "but you're so feminine!" I've had ex-girlfriends tell me I don't look gay, and family members burst into tears extolling the observation that "you weren't born that way!" There are countless encounters, none very different from anyone else's. The sad thing is (with the exception of the violent incidents), I believe most of these people do not even realize the extent to which their comments are not only annoying but also reflect a cultural predisposition to reject anything outside the norm. Many of these comments came from educated, culturally engaged people. These comments remind me of something my father said about Jewish

identity, "if you forget you are Jewish, someone will remind you." It is easy not to want to attract such attention from one's family and society. Although the common trope states that we should all be proud of who we are, the rewards for being Jewish or for dating women are personal and not generally extrinsic. Rather, society and family are, almost always, elaborate social structures that reinforce a system of binaries comprised of norm and other, often with punitive consequences for otherness.

We all have aspects of otherness; we just have different ways of dealing with normalization and conformity. This is a strong drive in capitalism and other forms of social control. In a capitalist society we consume to make up for a lack, whether it be robotic appliances or the next new gadget for wireless information exchange. The objects we surround ourselves with play a role in ensconcing us in our identity as individuals and social actors. Of course, otherness extends to many other aspects of cultural life and product development. Race is confronted with skin lighteners, hair straighteners, eyelid surgery, and colored contacts. The consumer ideal remains (at least partially) within reach with a trip to the drug store to pick up hair dye and contact lenses. We find ourselves quietly colluding with a structure that at times makes each and every one of us feel marginal.

A fascinating aspect of capitalism is its dependency on the population's experience of otherness to function. Marketing strategies that highlight our perceived deficiencies motivate us to buy products as compensation. (The marketing success of the drug Viagra^{TM} is a good example of a compensation for a physical condition without the promise or intention of creating better lovers or a higher level of intimacy - which might be a fortunate exploration for people who consider the erection to be essential to sexual expression). Capitalism depends on keeping us marginally disenfranchised. It is a delicate balance; we can't be too disenfranchised or we become subversive but we must a) want to be normal b) always feel like there is potential to become normal and c) believe that there is a norm. It is at this point that rupture can occur. We can disturb the equilibrium sought by the prescriptions of mainstream culture; the heterosexual, monogamous, procreative, married, age-appropriate, ideals that we are told are normal and static.

Chapter 4

Design

Part of remaking ourselves as socialist-feminist human beings is remaking the sciences which construct the category of 'nature' and empower its definitions in technology.
- Donna Haraway, *Simians, Cyborgs and Women: The Reinvention of Nature*

4.1 Foundations

Sex in design is an integral part of our commodity based culture. As Sarah Dougher points out, "Sexuality has an object - even if that object is the self - and, consequently, its relationship to consumer objects is of primary importance, particularly when we are looking at advertising design. People are represented as not just desiring each other, but desiring each other in the presence of product and, consequently, desiring product- or implying this relationship to the viewer."[30](p.39) *MS. Magazine*'s No Comment section was a forerunner in offering critical insight into offensive ads, usually relating to the objectification of women. Continuing with this tradition, the book *XXX: The Power of Sex in Contemporary Design* by the Plazm design team dissects the application of sexuality and gender in the sphere of graphic design. Along the way they point out the way that "normative gender categories and the visual lexicon of the sex act remain strikingly static despite the increasing prevalence of nonnormative sex and sexuality in public discourse." [30](p.10)

Sexuality and gender in graphic design reflect the complexities of capitalism. Feeding off consumer

desire and the allure of the taboo, design often strives to appear edgy without really challenging normative constructs: "we are comfortable seeing a representation of a man dressed as a woman, as long as we are aware of the ruse. Otherwise, transgressive representations of gender become much too complicated and are generally not part of mainstream design."[30](p.15)

Again, the subculture of zines created a space in which transgressive representations of both sexuality and gender could be explored and mirrored. By creating a venue in which the terms of engagement were altered, zines could depict female sexuality in a way that was not just answering the male gaze. Indeed contemporary depictions of lesbianism are still often fashioned through a fetishized lens.
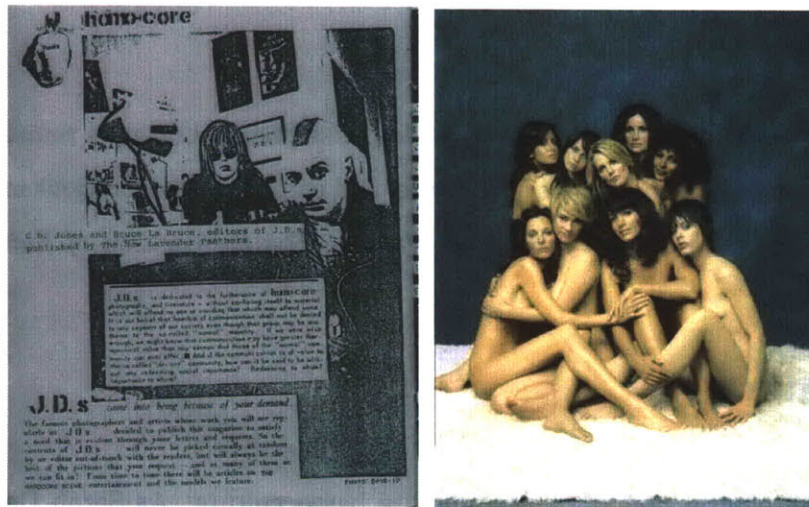

Figure 4-1: A page from JDs, 1989 and a promo image from Showtime's L Word from 2005

4.1.1 Conceptual

Throughout the process of designing PASS, I've tried to find a way that a digital medium can illuminate a process of subcultural connection. PASS is an artistic exploration into the dimensions inhabited by non-normative associations and identities: connections which are not usually encouraged as part of expression in public space. PASS is designed to reimagine what that a *sense* of connection can offer to the individual, as opposed to what a *specific* connection can offer. Simply put, I am interested in topologies of subcultural connectedness and community rather than pairing or "hooking up". As Yoshino observed, place can completely change the rules of engagement.

PASS works on the premise that connections (edges) are what reveal the subversive potential that exists in our daily interaction, but which remains mostly just potential because of the stringency of our social indoctrination. The work of PASS is to illuminate the interstitial structures that form counterspaces.

In seeking a queer perspective from which to create and design a technology, I hope to address several issues that are often overlooked by the rules of normativity. PASS strategically bypasses the cultural compulsion (and lucrative industry) of matchmaking. By not enabling individual connection, PASS denies the heteronormative principle of coupledom. By layering the parameters associated with sexuality, PASS is designed to question the homosexual/heterosexual binary and create a structure where other, consensual, adult, forms of non-normative sexual expression are validated. Finally, by creating a method through which non-normative counterspaces can be visualized, I hope to illuminate that subculture coexists with what we perceive as dominant and is not delimited solely by subcultural spaces.

PASS is designed to situate alternative paradigms of protocol in relation to embodiment, connectivity, and individual expression as an extension of sexuality. As Judith Halberstam points out, "we have become adept within postmodernism at talking about 'normativity', but far less adept at describing in rich detail the practices and structures that both oppose and sustain conventional forms of association, belonging, and identification" [18](p.4) With PASS, I hope to give a voice to some of those practices. Although perhaps not with "rich detail", the project is far from inclusive, I do try to engage in a discourse that is usually overlooked in the design of technology. For me, by designing a technology that takes into account non-normative ways of constructing one's self I am attempting to reimagine the normative imperatives that drive traditional technological design. As Michael Warner said, dominant publics are able to "take their lifeworlds for granted."[35](p.122) PASS is designed for a segment of the population whose "lifeworlds" are usually excluded from the considerations of design.

4.1.2 Form

Although overshadowed by technical considerations, the physical characteristics of the design indicate my attempt to leverage issues of embodiment with the concerns and implications of embedded

technologies. The process of design necessitates attention to both the body of the wearer and the social, relational aspect of the object. In this chapter I will discuss some of the considerations that have contributed to a continuing process of the design of PASS. From the offset I knew I wanted to make something that could be worn; to confront directly the issues of embodiment and sexuality in a way that could not be addressed in the virtual realm of the Internet.

4.2 Queer Technologies

At times, queer expression seems anything but conformist or repressive, particularly when it occurs in queer spaces. Contemporary forms of signaling tend to be much more fluid than the hanky codes or pink triangles that gained popularity in the 1970's and 80's, particularly in urban contexts. Gender play and fluidity offer modes of expression enjoyed by many gender queers. There are many communities that give a venue to subcultural connection. Neighborhoods like the Castro in San Francisco or parts of Lower Manhattan provide ruptures in normalized space. These ruptures only happen safely when topologies are tightly clustered and garner support from many points of interconnection.

Historically, gay communities have used various signaling technologies to establish points of contact. Some of these techniques were developed in response to legislation that prohibited same sex contact, others developed as mechanisms for making political statements. Reference during conversation to gay subculture can also provide alliances [1]

4.2.1 Dress

Protocols of dress function as a indicator of gender identity. Dress and adornment outwardly reveal the inward requirements of gender for a given culture. As the design of technology becomes more integrated with the body, there is potential for a new variety and scope of information in what our

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[1]An example of this happened to me on a flight to Venice. I made eye contact with another woman after I noticed her notice the title of the book I was reading. We were traveling with a group, and although we were not "out" to each other this unspoken exchange had great significance in forming an alliance on the trip.

Figure 4-2: Queer Culture, NYC 2005: photo Kevin Muth

clothing and accessories can convey. [2]

As opposed to mainstream gay culture where assimilation is encouraged, queer dress tends to be more fluid in treatment of gender. Gender play represents a rejection of social expectations but transgender expression may or may not be an indicator of sexual preference. Halberstam describes transgenderism as, "for the most part a vernacular term developed within gender communities to account for the cross-identification experiences of people who may not accept all of the protocols and strictures of transexuality."[18](p.53) So too, boundaries of sexual categories are surpassed allowing for bois who like bois, queens who like women, and various other configurations that defy gender and sexual stereotyping.

In their essay, *Definition and Classification of Dress*, Joanne B. Eicher and Mary Ellen Roach-Higgins point out that, "to give a detailed verbal report of all the information an individual's dress communicates (including gender) would be both time consuming and socially clumsy."[12](p.17)

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[2]Cell phones are worn, and indeed treated as extensions of memory. For example, I still remember my grandmother's telephone number which she has had since before I had a cell phone, but could not give my parent's number of 3 years ago from memory.

Dress in our culture can reveal insight into the internal identification of gender and sometimes into the internal identification of sexuality.

4.2.2 Signaling

After Stonewall, gay visibility became part of an important political movement. Coming out became a politicized action reflecting one of the popular feminist tenants, "the personal is political." Prior to Stonewall, visibility was more often seen as a vulnerability. Certain locations, often bars and parks, became known as locations for cruising or meeting other gay people.

Gaze can provide insight into the intuitive process of finding connection. Visual attention and eye contact can indicate formation of connection or attention. The gaze can function as a social probe, but is limited by the processing of social cues. Visual contact can invite or indicate contact, but it can also fall astray of its goal. Misinterpretation of social cues is fairly commonplace, as more than one of my friends has commented, "my gaydar is broken."

"Gaydar"

There are a number of ways that gay people inform each other of their presence. Methods range from subtle to overt. "Gaydar" is mythologized as a homosexual "sixth sense", and relies on intuitive interpretation of behavior, appearance, dress, and other subtle social cues. The idea that sexuality can be read from the body is problematic, and inferences from dress or behavioral cues can be as embarrassing and inaccurate as any other kind of stereotyping. Cliches such as the question "is he/she gay or just European?" gives insight that such stereotypes may be socially and culturally biased.

As tends to be the case with humans, there are many variations in sensitivity to human behavior. Eye contact, physical contact, facial expressions, can all give insight into a person's interests but can also be misread. Most of the people I know give more credibility to explicit verbal cues (references to "my ex/girlfriend") than nuanced behavior. While talking about "Gaydar" with one friend, he gave the analogy of a colleague whose sexuality everyone at the workplace speculated about. When

my friend finally ran into him at a gay bar, a short time after they had stopped working together, my friend told him of the workplace mystery. The man responded, "Well, you could have just asked."

The reasons that we do or don't ask can be complex. Sometimes it is simply fun to guess, at least when nothing is at stake. But the way in which sexuality relates to both our private and public identity situates it uniquely; what constitutes the act of sex is something intensely private, whereas the construct of sexuality situates our very identity within a social and political context.

Pink Triangles, Rainbow Flags

Nazis labeled men who were considered sexually deviant, including homosexuals, with a pink triangle, a cloth patch sewn to the outerwear. The symbol was used to identify and order homosexuals in the hierarchy of the prison system and concentration camps. After the end of the war, homosexual prisoners were not released like other prisoners but remained incarcerated under paragraph 175 of German Law, which remained actively enforced until reforms in 1969. A version of the law remained part of German legislation until 1994. In the 1970s the inverted pink triangle returned as a symbol of gay liberation and resistance. The pink triangle was made popular by the group ACT-UP (AIDS Coalition To Unleash Power) in the 1980's, during the early emergence of the AIDS epidemic. In this context it represented both a symbol of political solidarity for the gay community and a unifying symbol in the struggle against AIDS.

The act of reappropriating signifiers of oppression is an action taken in the context of gender, race and sexuality. The word queer, as well as the symbol of the pink triangle, reformulate derogatory significance as a kind of cultural glue. Acts of cultural reappropriation can gradually infiltrate the parameters of normalization; widespread adoption of terms can destabilize the perception of normal as strictly heteronormative. It is through such forms of reverse discourse that the rules of engagement are challenged, taking terms and symbols that once implied negativity and turning them into expressions of community.

The rainbow flag, an icon of inclusive gay pride, was first created by the artist Gilbert Baker for the 1978 San Francisco Gay and Lesbian Pride Parade. Baker assigned specific meaning to each of

the colors as follows:

* hot pink - sexuality * red - life * orange - healing * yellow - sunlight * green - nature * turquoise - magic * blue - serenity * violet - spirit

The modern instantiation of the flag has six colors (the magic is gone). There are variations on the rainbow flag to indicate other alliances and subcultural affiliations such as, Leather Pride, Victory over Aids, and Bear Pride.
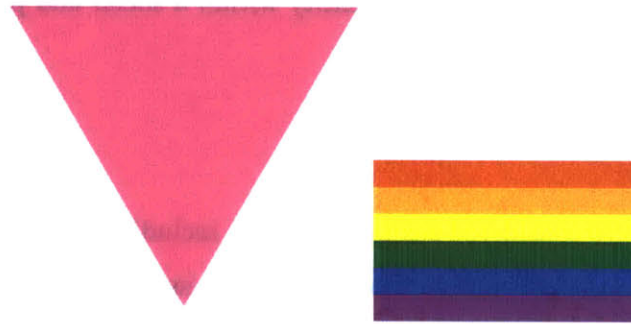

Figure 4-3: Symbols

Flags and triangles initially represent highly politicized expressions of sexual orientation. The overt nature of wearing a symbol binds the wearer to the terms of cultural engagement through which it was produced; creating an entrenched form of reverse discourse. At the same time, these symbols can work to subvert what is perceived as normal. Flags mark territory, no less so for gay communities. Territorial claims such as in the Castro district in San Francisco engage in the process of normalization creating subcultural environments where the community can surpass the standard goal of "tolerance" to find a place in which it can thrive.

In a larger cultural context, if these symbols are taken out of the context of a supportive subcultural environment they may put individuals in direct confrontation with normative culture and in some cases at risk. Mostly, signifiers like rainbow flags and pink triangles are found in communities like the ones in San Francisco and New York where subcultural network clustering ratios are high and the implied safety of a community is present. Visibility outside of these deterritorialized spaces can produce vulnerability both to discrimination and physical harm.

The increasing commercialization of gay culture raises an interesting conflict. For example, since its emergence the rainbow flag has spawned a huge amount of gay related consumer products,

Figure 4-4: Market Street, San Francisco, 2006

Figure 4-5: Products

sometimes called "pride merchandising". Rainbow rings, decals, underpants, are all available as products to purchase. Such objects illustrate the dynamic process by which norms are defined. These objects simultaneously represent norm and otherness, signifiers of political and cultural resistance reappropriated by the the normative capitalist structure that they at one point critiqued. It is in this cycle that the process of establishing cultural norms is constantly reinstantiating itself. This iterative process deposits layers of normativity through production and marketing. Mainstream advertising is beginning to target gay audiences. Dougher points out that, "An increasing (self) identified market of gay customers has caused designers, advertisers, marketers, and their clients to pay attention to this previously ignored category."[30](p.39) This attention, though, is limited and often twists

Mainstream audiences also have begun to accept limited portrayals of gay culture. However, as much as gay culture can be marketed to a straight audience, there are limits to the parameters of its portrayal. As Yoshino points out, "The selective uptake of gay culture - gay fashion, yes; gay affection, no - shows that acceptance is driven by the desires of the straight cultural consumer rather than the dignity of the gay person."[37](p.85) Even when gay affection is portrayed such as in the recent movie, *Brokeback Mountain*, not only does it generate controversy, but the actors are congratulated for playing gay characters in a way that they would never be if the characters were straight. The assumption that contact with someone of the same gender constitutes an acting challenge, whereas contact with someone of the same gender, regardless of attraction, does not, reiterates the position of the homosexual as other.

Hanky Codes

The hanky code refers to the use of different color handkerchiefs to signal sexual preferences and proclivities. Both the color and placement of the handkerchief relays very specific sexual information. The peak popularity of hanky codes was in the 1970's and found usage primarily with gay men as a way to find sexual partners. Hanky codes are popular among many sexual subcultures, including the bondage and s&m community.

Symbols offer adaptive strategies for dealing with marginalization. They offer a way in which connections can be made and communities formed. As much as space can offer a subcultural

LESBIAN HANKY CODES

Worn on Left	Color	Worn on Right
Fister	Red	Fistee
Oral Sex, Top	Light Blue	Oral Sex, Bottom
Anal Sex, Top	Dark Blue	Anal Sex, Bottom
Light SM, Top	Robins Egg Blue	Light SM, Bottom
Food Fetish, Top	Mustard	Food Fetish, Bottom
Anything Goes, Top	Orange	Anything, Bottom
Give Golden Showers	Yellow	Wants Golden Showers
Hustler, Selling	Green	Hustler, Buying
Uniforms Top	Olive Drab	Uniforms Bottom
Likes Novices/	White	Novice (or Virgin)
Chickenhawk		
Victorian Scenes, Top	White Lace	Victorian Scenes, Bottom
Does Bondage	Gray	Wants Bondage
Scat Top	Brown	Scat Bottom
Heavy SM	Black	Heavy SM
Piercer	Purple	Piercee
Likes Menstruating	Maroon	Menstruating Women
Group Sex, Top	Lavendar	Group Sex, Bottom
Breast Fondler	Pink	Breast Fondlee

GAY MALE HANKY CODES

Worn on Left	Color	Worn on Right
Wants Oral Sex	Light Blue	Expert at Oral Sex
Sixty-niner	Robins Egg Blue	Sixty-niner
Cop	Medium Blue	Cop S*cker
Genital Torturer	Teal Blue	Genital Torturee
Anal Sex, Top	Dark Blue	Anal Sex, Bottom
Fister	Red	Fistee
Dildo User, Top	Light Pink	Dildo User, Bottom
Breast Torturer	Dark Pink	Breast Torturee
2-Handed Fister	Dark Red	2-Handed Fistee
Likes Navel Worship	Mauve	Navel Worshipper
Likes Armpit	Magenta	Armpit Fetish Worshippers
Piercer	Purple	Piercee
Likes Drag	Lavender	In drag
Golder Shower Top	Yellow	Golder Shower Bottom
Spitter	Pale Yellow	Drool Crazy
Has 8" or more	Mustard	Size Queen
2 Looking for 1	Gold	1 Looking for 2
Anything Goes	Orange	Not Now, Thanks
Two Tons O'Fun	Apricot	Chubby Chaser
Foot Fetish Top	Coral	Shrimper
A Cowboy	Rust	His Horse
Spanker	Fuschia	Spankee
Hustler	Kelly Green	John
Uniform Top	Olive Drab	Uniform Bottom
Daddy	Hunter Green	Daddy Hunter

Figure 4-6: Hankey Codes, source http://library.gaycafe.com/nifty/information/hanky-codes

venue, the alliances made in normative space can be even more powerful, relieving the isolation of otherness.

4.2.3 Outing Strategies

The act of "coming out" served an important political role particularly after the Stonewall incidents in 1969 and progress made by the gay civil rights movement. Prior to this, however, strategies for identifying homosexuals were practiced by industries and the State. During the McCarthy era in the United States homosexual people were targeted along with those whom the state considered communists. Conflating homosexuality with political sabotage, homosexuals in the government were outed and fired, justified by the claim that "One homosexual can pollute a Government office."[28] In the early 1950s, a Senate subcommittee identified the counterspaces that had been created to engage community against itself, marking them as security risks:

> Most perverts tend to congregate at the same restaurants, night clubs, and bars, which places can be identified with comparative ease in any community, making it possible for a recruiting agent to develop clandestine relationships which can be used for espionage purposes.[28](p.261)

Until 1973, homosexuality was classified as a disease in the DSM (Diagnostic and Statistical Manual of Mental Disorders)[3]. Particularly prior to Stonewall, although not exclusively, homosexual people have been targeted as scapegoats, been fired, institutionalized or even arrested. The attitudes represented by historical discrimination still reveal themselves in contemporary politics. In the June, 2003 *Lawrence vs. Texas* decision the Supreme Court ruled that anti-sodomy legislation was unconstitutional. Echoing two very different yet contemporary perspectives, Justices Kennedy and Scalia commented to the Associated Press after the ruling, Kennedy issued the following statement: "When homosexual conduct is made criminal by the law of the state, that declaration in and of itself is an invitation to subject homosexual persons to discrimination both in the public and in the private spheres." Justice Scalia offered this quote in dissent, "Many Americans do not want

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[3]The DSM is published by the American Psychiatric Association and sets the standard for psychological diagnosis in the United States.

persons who openly engage in homosexual conduct as partners in their business, as scoutmasters for their children, as teachers in their childrens schools, or as boarders in their home. They view this as protecting themselves and their families from a lifestyle that they believe to be immoral and destructive." Contemporary views on homosexuality reflect a conflicted public. Although homosexual culture has become a more visible part of the mainstream entertainment industry, the "homosexual agenda" is still perceived as a threat to a "way of life".

The United States is certainly not the only country to target homosexuals as deviant, in fact it may be among the most liberal. In the 1950's and 60's the Canadian government conducted a security campaign that targeted homosexuals in particular. It was during this campaign that the strange creation the "Fruit Machine" made its first appearance. The purpose of the "Fruit Machine" was to identify Canadian civil servants, members of the military, and of the Royal Canadian Mounted Police who were homosexual, so that they could be fired. The contraption looked something like a dentist chair. It used a camera to measure responses in the pupils and eyes of the subject as they were shown pornography. Presumably dilation of the pupils, perspiration, and heart rate would indicate arousal. The "Fruit Machine" was part of a much larger campaign, which like the Congressional Subcommittee in the United States, used stereotyped and bigoted opinions about homosexuals to claim them as a security risk. The Orwellian nature of the "Fruit Machine" is at once comic and extremely disturbing; it illuminates the extent to which social control has been imposed on the body in the most literal sense, even in the last century.

Name _____

1. T F I am very slow in making up my mind.

2. T F I think I would like the work of a building contractor.

3. T F I think I would like the work of a dress designer.

4. T F I become quite irritated when I see someone spit on the sidewalk.

5. T F I must admit that I enjoy playing practical jokes on people.

6. T F I get very tense and anxious when I think other people are disapproving of me.

7. T F A windstorm terrifies me.

8. T F I think I would like the work of a clerk in a large department store.

9. T F I get excited very easily.

10. T F I like to boast about my achievements every now and then.

11. T F I think I would like the work of a garage mechanic.

12. T F I like adventure stories better than romantic stories.

13. T F I prefer a shower to a bathtub.

14. T F The average person is not able to appreciate art and music very well.

15. T F The thought of being in an automobile accident is very frightening to me.

16. T F At times I feel like picking a fist fight with someone.

17. T F Sometimes I have the same dream over and over.

18. T F I think I would like to drive a racing car.

19. T F I like to be with a crowd who play jokes on one another.

20. T F I am somewhat afraid of the dark.

21. T F I think I could do better than most of the present politicians if I were in office.

22. T F I always tried to make the best school grades that I could

23. T F I am inclined to take things hard.

-1-

24. T F I would like to be a soldier.

25. T F I like to go to parties and other affairs where there is lots of loud fun.

26. T F I very much like hunting.

27. T F In school I was sometimes sent to the principal for cutting up.

28. T F I think I would like the work of a librarian

29. T F Sometimes I feel that I am about to go to pieces.

30. T F I would like to be a nurse.

31. T F If I were a reporter I would like very much to report news of the theater.

32. T F I like mechanics magazines.

33. T F I want to be an important person in the community.

34. T F I must admit I feel sort of scared when I move to a strange place.

35. T F If I get too much change in a store, I always give it back.

36. T F It is hard for me to start a conversation with strangers.

37. T F I think I am stricter about right and wrong than most people.

38. T F I am pretty sure I know how we can settle the international problems we face today.

Figure 4-7: Canadian Questionaire Used to Identify Homosexuals, source: http://www.yorku.ca

4.3 Mobile Social Technological Devices

Where networking technology has intentionally intersected with sex or identity, it has usually been in the service of "friend finding". PASS is not a friend finder. The following examples do, however, show ways that social networking has been deployed through wireless devices.

Social networking technologies that function as friend finders have been around for a while (a while at least in the relatively nascent history of digital technology). The LoveGety was a wireless matchmaking device developed in Japan in 1998. The device came in pink for women and blue for men and could be set for "karaoke", "chat", or "friends" depending on your intentions. As far as I can tell, it didn't stay in distribution long enough to expand, as reported in a Wired magazine article[24], to "movie," "drinks," and "dinner." The premise it operated under was pretty clear, to create a fun way of meeting people or finding a date. If another user was in a 15 foot range and matched your interests the device would beep and/or vibrate. The LoveGety inspired the creation of GayDar, sometimes referred to as the GayGety which also was supposed to beep or vibrate when users were in proximity to one another.
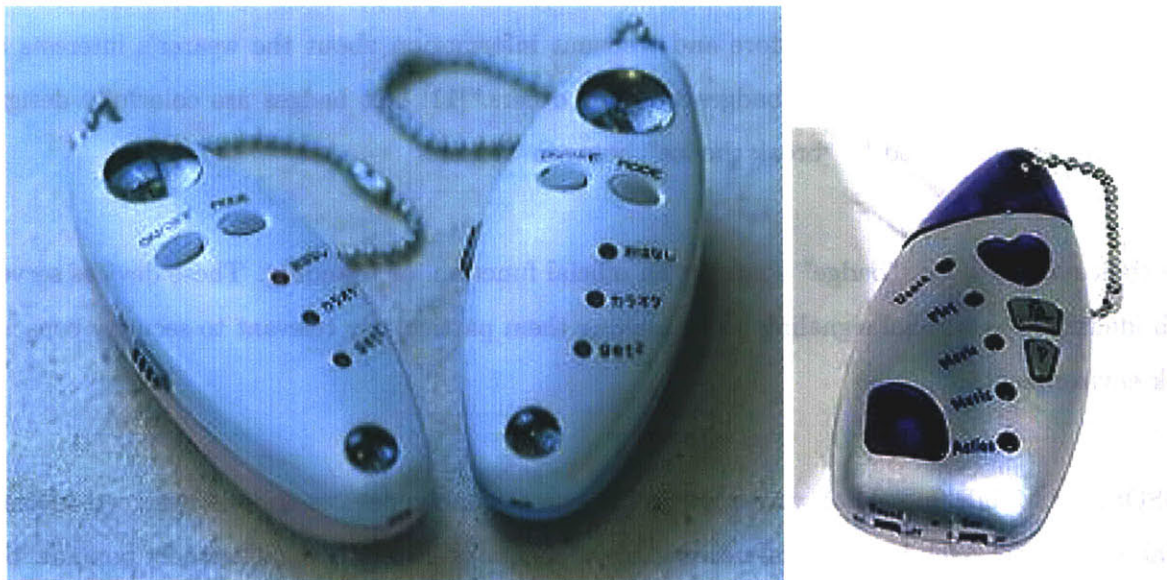

Figure 4-8: LoveGety and GayGety devices

In 2000, GayDar was, "billed as the first portable interactive electronic icebreaker/matchmaker for gay men and lesbians" [36]. The distribution for this product, like Lovegety, didn't seem to last (it

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is unclear to this author if it was ever commercially distributed). Although GayDar was a different product than LoveGety, aside from the color and the ability to specify gender, the construction was the same. The scenario of finding a match was based on binary heteronormative conditions reconstituted in a way that did not challenge the status quo. Products like GayDar seem more like an attempt to define same sex contact as something that is commercially viable.

Other technologies such as the UbER-badge from MIT and the Hot Badge from Philips do similar social networking matching. The UbER-badge (Ubiquitous Experimental Research Badge) was developed by Mat Laibowitz and Joe Paradiso of the Responsive Environments group at the MIT Media Lab. The badge was used in a number of applications including as a social interaction tool at Media Lab events. The UbER-badge is a general computing platform and offers a platform for distributed networking services. Offering a much more complex platform than PASS, the UbER-badge can store data, provide messaging capabilities, and create visualizations. The UbER-badge represents a more flexible platform and a design that exceeds the specialized needs of the PASS platform.

The Hot Badges from Philips, "store and transmit information about the wearer's interests and receive similar information from badges worn by others."[11] Hot badges are colorfully designed badges and are purported to "break the ice" between wearers.

The choice of the word, "badge" connotes an official function, or branding. These devices serve as both identifiers and social signaling tools, making them particularly relevant to security conscious work environments.

MOSOSO or Mobile Social Software applications run on mobile devices and are designed to enable social interaction. Web based social networking applications have become extremely popular, both for dating and for other forms of social networking. Sites such as Friendster and Myspace have been joined by similar applications for mobile phones like Dodgeball and Playtxt. These applications are designed to help users make new connections and maintain established contacts, for "people on the go", and are designed to integrate social interaction into "busy lifestyles".
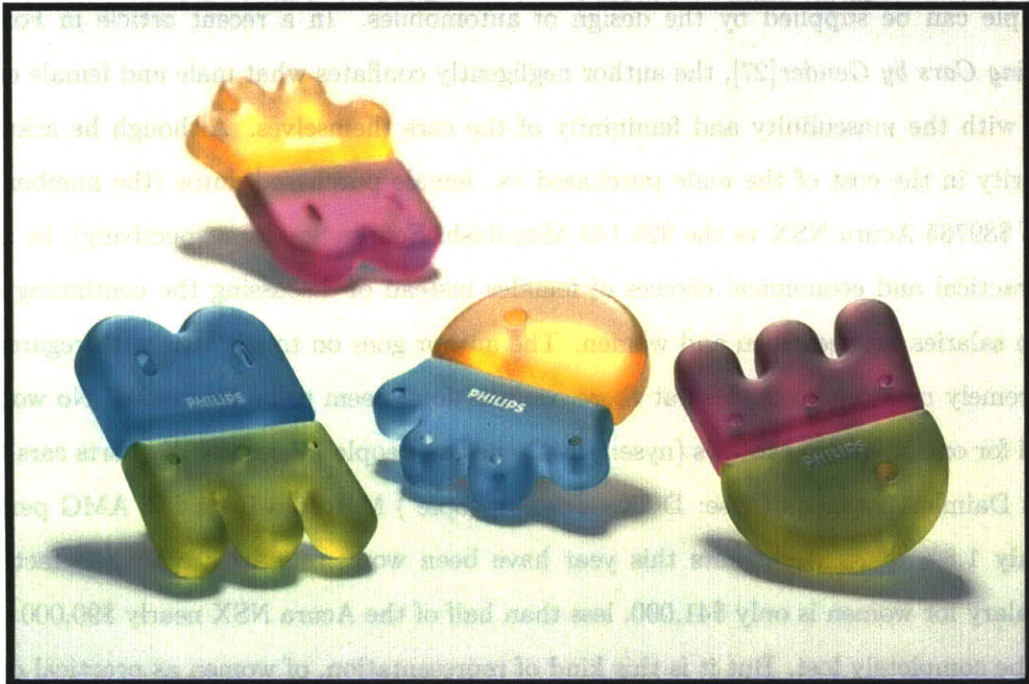
Figure 4-9: Philips Hot Badges

4.3.1 Gendered Design

From our earliest experiences we encounter gendered objects, whether in the form of clothes or toys. One of the first questions that people ask of a child is "is it a boy or a girl?" The cultural indoctrination into the embodiment of gender is inescapable. Through daily encounters with objects we learn how to perform properly as boys or girls.

Product design, like space, does not usually operate neutrally. Gendered constructions such as color, size, and shape can all affect how product is perceived and marketed. These stereotyped expressions are the tools of embodiment and train our sensibilities to what is considered appropriate. Product design engages in the normative cycle of installing binary identities regarding gender. For instance the pink Razr phone by Motorola would unlikely be purchased by a man who was not trying to challenge concepts of masculinity. As obvious as color coding is in contemporary culture, it is also arbitrary. In fact the use of pink and blue were actually reversed at the turn of the last century. According to Jo Paoletti, the current, gendered meaning of the colors was not considered a standard until the 1950s[29].

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An example can be supplied by the design of automobiles. In a recent article in Forbes, *The Best Selling Cars by Gender*[27], the author negligently conflates what male and female car buyers purchase with the masculinity and femininity of the cars themselves. Although he acknowledges the disparity in the cost of the male purchased vs. female purchased autos (the number one cars being the $89765 Acura NSX vs the $25,149 Mitsubishi Eclipse Spyder respectively), he attributes this to practical and economical choices of females instead of discussing the continuing disparity in median salaries between men and women. The author goes on to say that with regards to "the most extremely masculine vehicles out there, women don't seem to be interested. No women have registered for one of Honda Motor's (nyse: HMC - news - people) Acura NSX sports cars this year. And with DaimlerChrysler's (nyse: DCX - news - people) Mercedes-Benz S55 AMG performance sedan, only 1.8% of its registrants this year have been women." Apparently the fact that the median salary for women is only $41,000, less than half of the Acura NSX nearly $90,000 price tag, seems to be completely lost. But it is this kind of representation, of women as practical consumers rather than a consumer underclass, supports a repressive status quo in which women are paid less than men.

The tactical design of technology is often based on the designer's perceived audience. One of the metrics used in design, and always used in marketing, is gender. As the Forbes article points out, "We knew something wasn't right with the 2003 movie 2 Fast 2 Furious. Specifically, we could not believe the angry, muscular ex-convict played by Tyrese Gibson would not only tolerate–but want to drive–a purple Mitsubishi Eclipse Spyder. This was way too cute and girly of a car..." Gender is another normative construct constantly reestablished through the mechanism of consumer product.

4.4 PASS Module Design

PASS is designed to relay information about space and connection through the context of embodiment. Relating as an installed rather than integrated object, the package is not designed to be invisible. The modules are constructed to be worn, and are attached to a strap that can be configured in a number of ways including around the waist or shoulder. The straps and modules are black, and are designed to be perceived to be as neutral as possible in terms of gendered design.
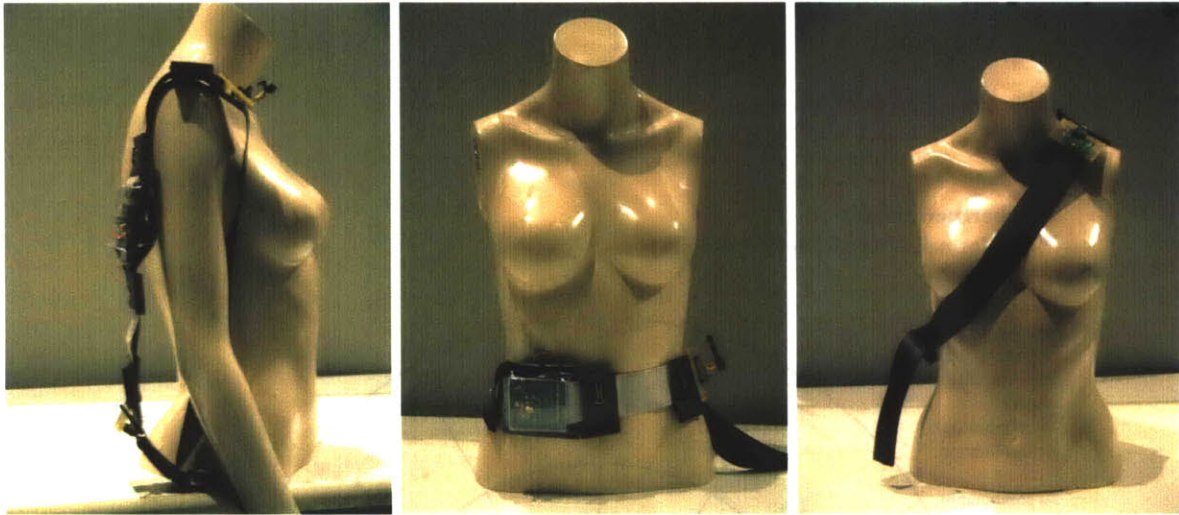
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Figure 4-10: PASS Module

4.4.1 PASS Interface

Creating parameters for this project I continually ran into the dilemma that the act of constructing even an abstracted representation of sexuality was reductive. Because of my frustration with this, I decided to draw on an existing taxonomy from feminist theory to create categories. The data fields used in PASS are based on an illustration of "The Sex Hierarchy: the charmed circle vs. the outer limits" as described by Gayle Rubin in her essay *Thinking Sex*[32]. Rubin proposes alternate sexual paradigms expanding beyond the homosexual heterosexual binary. She lists behaviors that fall under the categories of "Good, normal, blessed sexuality" and opposing them to "Bad, abnormal, damned sexuality". Using this framework, I attempt to reimagine a multilayered description of sexuality. Programming the device demands the consideration of alternative definitions of sexuality, that deviate from a strictly homosexual/heterosexual paradigm.

The interface is programmed in Processing and runs as a standalone applet. Data is compared as a series of parallel parameters in order to produce a deeper mapping of connection. A more thorough description of the technology will be presented in the next chapter.

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The charmed circle:
Good, Normal, Natural, Blessed Sexuality

Heterosexual
Married
Monogamous
Procreative
Non-commercial
In pairs
In a relationship
Same generation
In private
No pornography
Bodies only
Vanilla
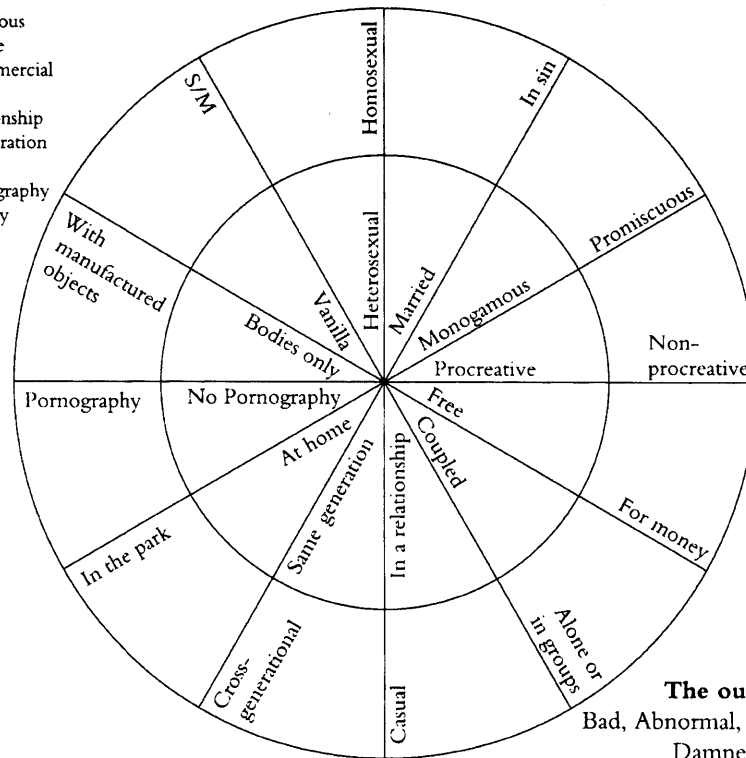
The outer limits:
Bad, Abnormal, Unnatural,
Damned Sexuality

Homosexual
Unmarried
Promiscuous
Non-procreative
Commercial
Alone or in groups
Casual
Cross-generational
In public
Pornography
With manufactured objects
Sadomasochistic

Figure 4-11: Gayle Rubin's Sex Heirarchy: the Charmed Circle vs. the Outer Limits

Figure 4-12: Interface to the PASS device programmer

4.4.2 PASS Visualization

By monitoring the network a real time display of an interconnected topology is drawn. The topology redraws itself each time the coordinating device receives a packet and connections fade over time; in this way the mapping is both spacial and temporal, constantly in a mode of decay and regeneration. The relationship between nodes is not locative; screen location of nodes is based on randomly generated coordinates that are instantiated on receipt of a data packet.

4.4.3 Privacy and Safety

PASS was designed for deployment in the context of an artistic experiment. The devices are designed for controlled spaces where the safety and anonymity of the wearers is preserved. The PASS devices are designed to generate a random identifier for each device in the interest of data integrity. Although data is collected by the sniffer for purposes of visualization, the data is not preserved during power down cycles. The application data is dynamic and transient.
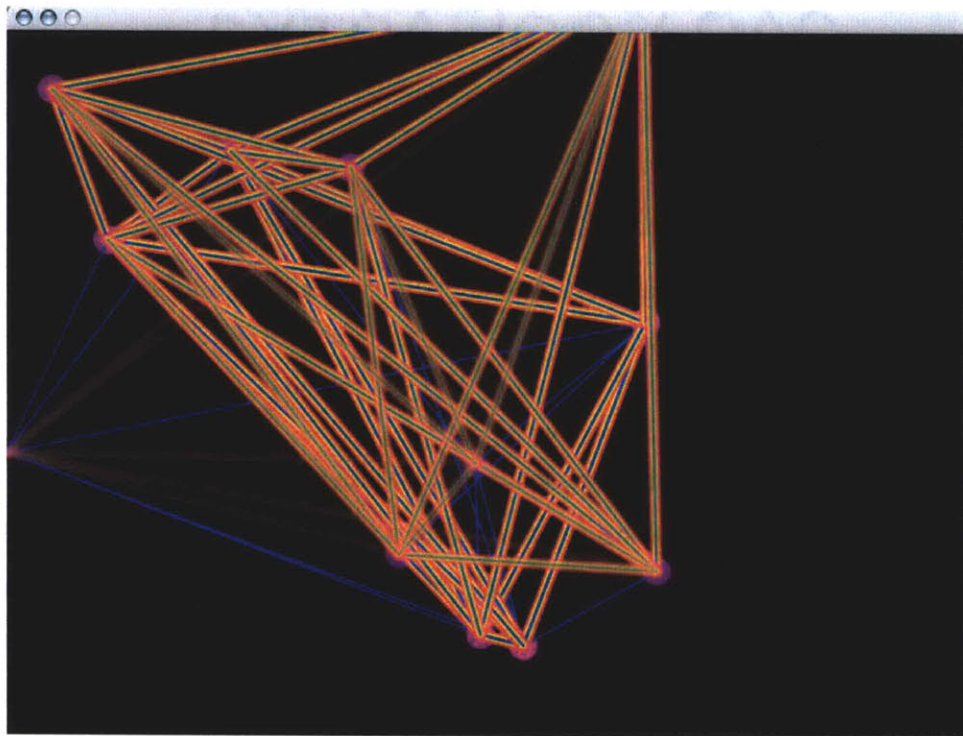
Figure 4-13: Visualization from the PASS device

Chapter 5

Technology

The PASS devices are designed to be mobile networking modules that make use of the 802.15.4 protocol. The technical design of PASS allows each device to transmit and receive data from any other PASS device within range, effectively creating an ad hoc mesh network topology. In order to facilitate the creation of an autonomous wireless network, the design necessitated a hardware and software platform that could provide reliable medium range communication in a mobile package. After looking into available technology, I decided to try the protocol 802.15.4 primarily because of the range and availability of radio transceiver chips. I also wanted to make use of available resources in the Computing Culture Group. The #6 microcontroller was developed by my colleagues in Computing Culture and is an nice example of a simple, low-cost microcontroller platform that makes use of opensource hardware and software.

A single device functions as a programmer and packet sniffer and remains an exception to the behavior of the other devices. This device operates in two modes, program and sniff. When in program mode it sends initial, user specified data to uninitialized devices allowing them to begin their transmit and receive cycle. While in sniff mode, the device records received packets, and creates a weighted count based on the number of same data connections in a space. Primary concerns in writing the code for the devices were: reliable data delivery, addressable data packets, rejection of invalid data, and internal logging of received data.
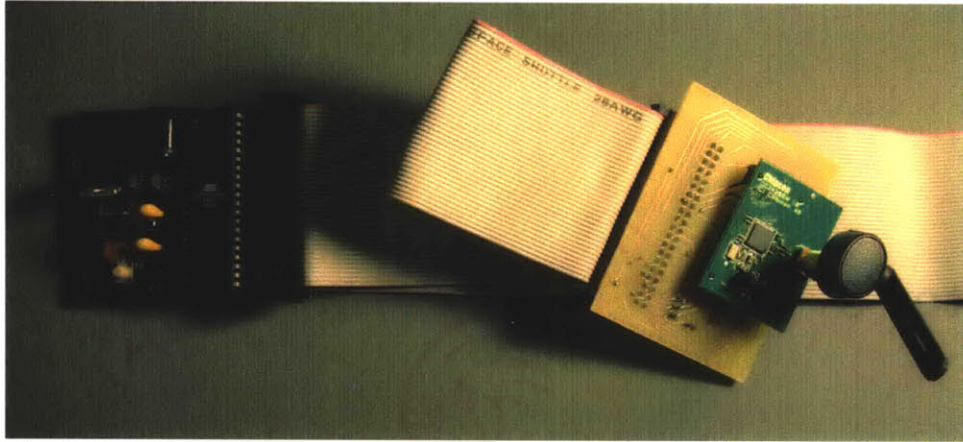
Figure 5-1: PASS Device

5.1 Hardware

The PASS device consists of three hardware elements, a microcontroller board, a daughterboard interfacing to the Chipcon2420 Evaluation Module, and an LED output display. The radio transceiver used is the Chipcon2420, and is interfaced to an ATMEGA 32 microcontroller using Serial Peripheral Interface (SPI).

5.1.1 Choosing a transceiver Chip

I chose to use 802.15.4 technology rather that 802.11 or Bluetooth because I wanted a relatively cheap solution that could be contained in a modular, largely opensource system. The size and cost of 802.11 and Bluetooth were limiting factors. Bluetooth transceivers are extremely expensive and uses a proprietary development stack. Range limitations of Bluetooth also made it a less desirable choice, necessitating closer proximity between users for reliable data exchange. 802.15.4 on the other hand uses low cost chips, and uses non-proprietary software and protocols. Data transfer rate for the CC2420 is 250kbps. The 802.15.4 has lower bandwidth than the aforementioned solutions, but since this application transfers little data between devices, this was of little concern. Also the transciever uses the 2.4GHz band which is an ISM (industrial, scientific and medical) band and unregulated for non-commercial use as specified by the FCC.

The choice to use the Chipcon2420 was based on feedback from both users at the Media Lab and

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articles [7] comparing the qualities of the different chips that are commercially available. The CC2420 was a single chip solution in contrast to the Atmel AT86RF210 which relies on a companion microcontroller, making design less versatile and compact. Other chips such as the Freescale MC13192 had significant deficits in functionality (in this example the chip has no transmit receive switch with would necessitate the use of a separate switch or dual antennae). The Ember EM2420 was codeveloped with Chipcon and the architecture for the chips is identical. However, the development kit for the EM2420 costs approximately $14,000 in comparison to the $500 cost of the CC2420 development kit. After looking into available options, my advisor recommended the Chipcon2420.

Chipcon provides some development code including a minimal MAC (Media Access Control) level implementation for the Atmel ATMEGA 128. Since I was planning to use an ATMEGA 32 based platform I felt it would be useful to have these source libraries as reference. In the end I did not end up using these libraries for development, opting instead to write versions of SPI, the hardware abstraction libraries and MAC level code that made use of AVRlib.

5.1.2 Platform

An important (although, imposed by myself and my advisor) constraint of the hardware design was to implement the project using primarily opensource circuit boards and preferably low cost components. Of the available radios the Chipcon2420 evaluation module board (CC2420EM) was the most reasonable choice, the hardware schematics are available in 2 and 4 layer designs which are available open source from Chipcon. And libraries for interface to the ATMEGA 128 were available for reference. The CC2420 transceiver chip costs around $5 and is easily obtainable. (The CC2420EM boards are also available for purchase in pairs from Mouser Electronics and run around $140 usd.)

Basic Development Configuration

The basic environment for development on the ATMEGA 32 consisted of a bootloading environment, a programming environment and a basic #6 microcontroller. For programming the bootloader on the ATMEGA 32 I used the ATMEL STK500. This was connected to a PC running
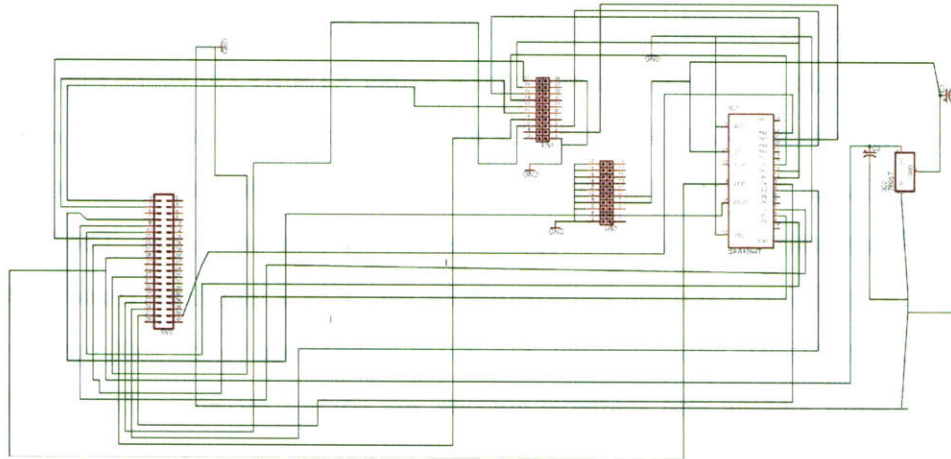
Figure 5-2: PASS Daughter board schematic

AVR Studio on Windows XP. Once the bootloader was put on the chip with the proper bootflags, development code could be transferred to the chip using a USB/serial connector between my MAC G4 laptop and the #6 which can run in execute or bootload mode depending on application of a push button switch.

My laptop was running Zterm, which allows access to USB ports. C code development was done using a combination of Vi and Eclipse and compilation was done using makefiles accessed though the Terminal program.

#6

The PASS platform uses the #6 microcontroller board (http://edgy.media.mit.edu:8080/6/) as the microcontroller for the radio transceivers. The #6 is interfaced through a custom made daughter board to the CC2420EM. The primary components of the daughter board are a LM1086 3.3 volt voltage regulator and a Phillips 74LVC4245 (octal dual supply translating transceiver) tristate buffer for converting signals from 5 volts on the ATMEGA 32 to 3.3 volts for the CC2420. The daughter board was constructed in manner intended to utilize a single 9 volt power supply, available from the #6 microcontroller board and would use components that could be easily obtained and hand soldered.

The ATMEGA 32 is a low cost chip easily available and programmable in GCC C using open source

AVRLib libraries. The 74LVC4245 is interfaced to the ATMEGA 32 via two input pins and takes power directly from the ATMEGA 32 for both 5 volt and 3.3 volt inputs. The 3.3 volt input is first routed through an LM1086 voltage regulator to drop it from 5 volts to 3.3. The inputs to the 74LVC4245 consist of an output enable and a direction pin and must be enabled for communication from the ATMEGA 32 to the CC2320. Inputs to the ATMEGA 32 from the CC2420 do not need to go through the tristate buffer because input TTL levels can trigger at 3.3 volts.

Chipcon2420

The CC2420 is an RF transceiver which uses the 2.4 GHz frequency band and baseband modem with a gain of 9dB and data rate of 250 kbps [5]. The 2.4 GHz is an unlicensed band but is subject to varying regulations depending on country. The CC2420 is compliant with IEEE standards for the 802.15.4 protocol. It also supports MAC layer protocol and the Zigbee^{TM} stack. For the purposes of this project I created a partial implementation of MAC protocol.

The CC2420EM is designed as an evaluation module for 802.15.4 applications on the CC2420. Because the design of this module is open source I felt the expansion of the design to interface with #6 could provide a suite of tools for wireless communication. The CC2420EM comes in 2 or 4 layer designs which take into account the specificities required for effective RF transmission and reception. It has a well defined ground plane and a 16 MHz crystal. Ground planes on different layers are connected through closely spaced vias.

The CC2420 has 128 byte data buffers for both TX and RX. The chip also provides features in hardware that support the 802.15.4 MAC protocol. Access to the MAC protocol provides features including: clear channel assessment or CCA to avoid frame collisions, a frame check sequence or FCS to guarantee packet integrity, address recognition, automatic acknowledgement transmission, encryption and decryption support. For the purposes of this project I implemented a minimal MAC layer and made use of the frame check sequences and address recognition only.

5.1.3 Power

PASS devices are powered by a single 9 volt battery. The power is stepped down to 5 volts via a LM7805 to the #6 and to 3.3 volts for the CC2420EM using a LM1086 regulator. Battery life has been determined to be around 4 hours with devices failing at about 7.25 volts. The platform may be easily ported to a smaller, longer lasting battery source such as lithium-polymer, offering orders of magnitude greater lifespan.

5.1.4 Testing and Debugging Environment

Chipcon2420 DK

The first iterations of the code and hardware were tested using the Chipcon2420 DK (Development Kit) and a combination of the *Packet Sniffer*™ and *SmartRF Studio*™ software (both are available free from the Chipcon website http://chipcon.com). These applications, in conjunction with the ChipconDK, allow the detection and transmission of packets between RF devices. Using this configuration, proper packet formation, addressing standards, RF channel information, and other protocols could all be tested using the 802.15.4 standard. *Packet Sniffer* also provided a GUI interpretation of packet data. Using the *Packet Sniffer*, I could detect transient packets in the environment and develop a strategy for reliable packet formation.

Initial tests were conducted by setting up serial transmit (TX) and receive (RX) modes on the CC2420EM and CC2420DK and establishing a connection between two devices. Serial transmit mode is asserted in the upper two bits of the last byte of the register MDMCTRL1 (register 12) and serial receive mode set in the lower two bits. After reliable connections were established the next step was to begin the transmission of packets utilizing the frame structure as specified by 802.15.4. Initial tests were conducted on the daughterboard constructed for the CC2420EM and monitored and verified through the CC2420DBK using either the *Packet Sniffer* or *SmartRF Studio* . Subsequent monitoring could be done through the sniffer programmer module connected to a laptop via USB/serial connection.

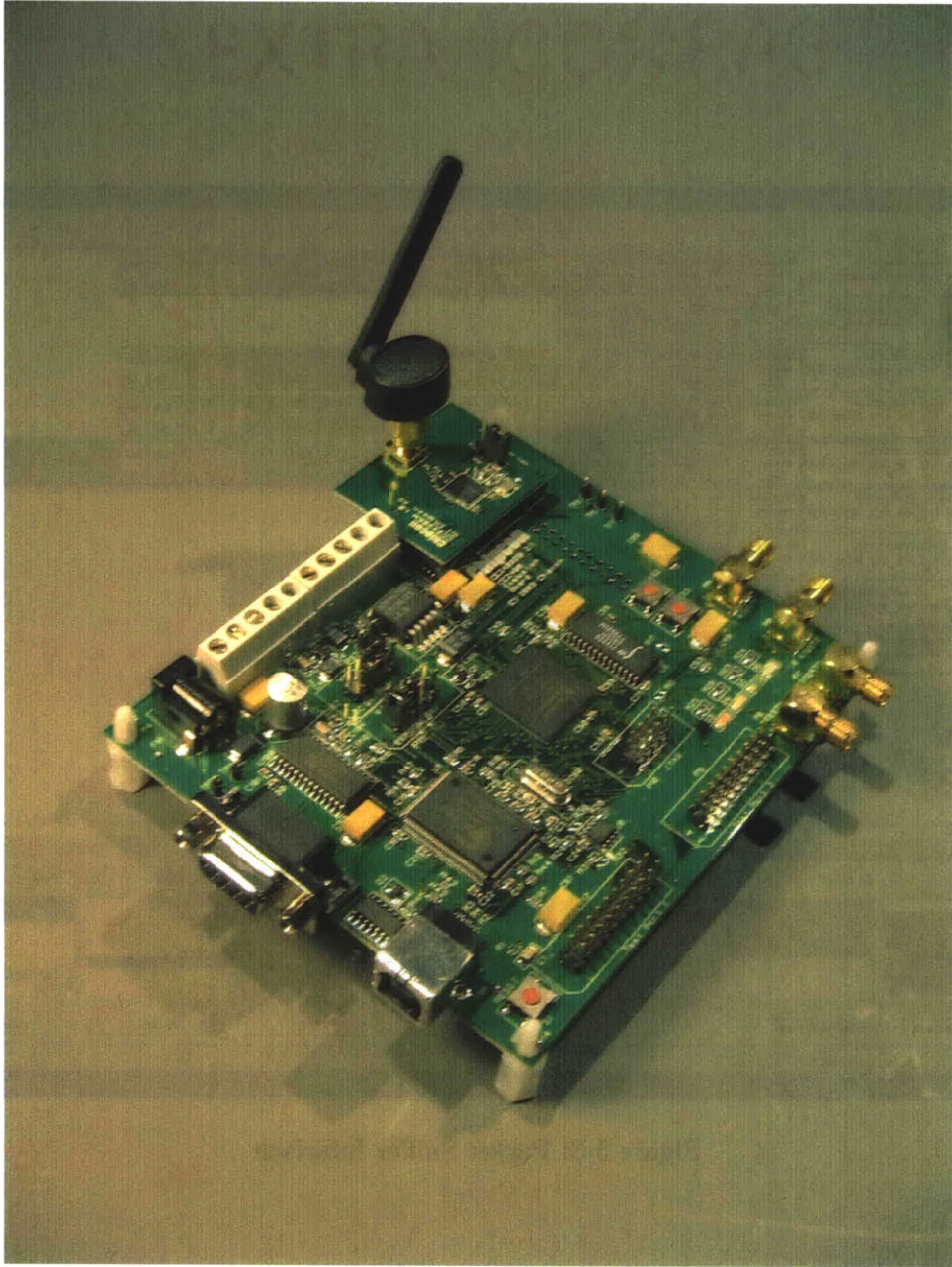Figure 5-3: Packet Sniffer Interface

Figure 5-4: CC2420 Development Kit

5.2 Code

5.2.1 Radio Configuration

Each radio requires initialization on startup. The files ccinit.c and ccinit.h contain initialization routines that perform an initial reset of the CC2420 and turn on the pin that corresponds to the internal voltage regulator. During the initialization phase input and output pins are also set for SPI communication by calling functions in the file ccspi.c. Next, an initialization function configures registers in order to use MAC layer functionality including, address decoding, assigning a PAN coordinator, disabling security features, turning on the 16MHz oscillator and enabling and calibrating the 2.4 GHz synthesizer. Flags are set in the main program to indicate that user data needs to be programmed after which the PASS device goes into transmit and discovery mode, allowing connections to be made with other devices.

5.2.2 Microcontroller to Radio

There are eight pins that serve as the primary connection between the ATMEGA 32 and the CC2420. Four are used for SPI communication and are MISO (Master In Slave Out), MOSI (Master Out Slave In), chip select (CSn) and SPI clock input signals (SCLK). Slave input occurs on the positive edge of SCLK and output on the negative edge. Chip select is active low. The additional four pins correspond to the SFD or start of frame delimeter to notify of reception, the FIFO which goes high if data is detected in the RX FIFO buffer and the FIFOP which indicates a full frame has been received and validated. The CCA is a clear channel assessment and is in a high state when the channel is clear for transmission of data.

During SPI communication, sequences are delineated by toggling the CSn pin, part of the reason that I implemented SPI independently rather than using libraries. By creating specialized functions the chip select can be toggled when appropriate and additional issues of addressing registers, running command strobes or accessing RAM.

The CC2420 has 15 strobe command registers. Strobe commands can be initiated by addressing the register. These commands are used to initiate the crystal oscillator, enable receive or transmit
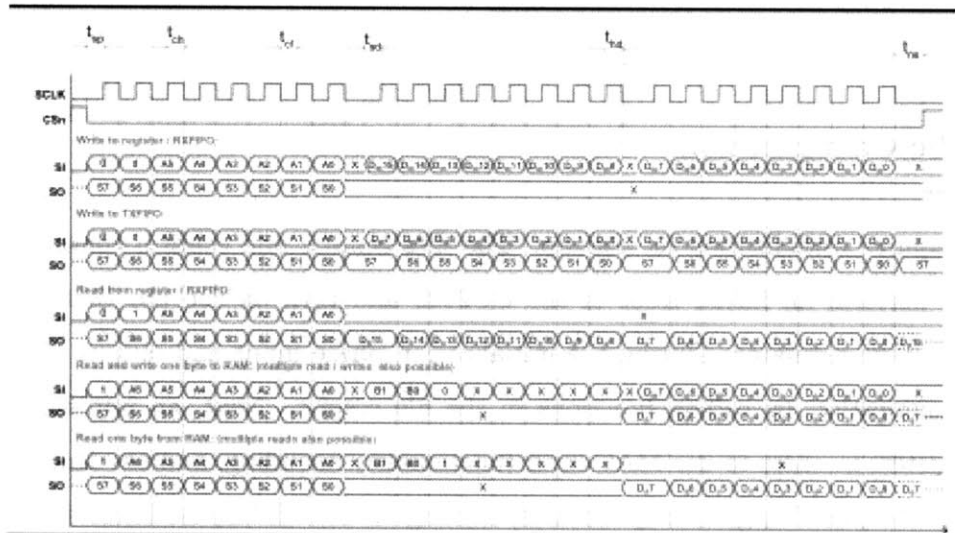
Figure 5-5: CC2420 SPI Timing Diagram

mode, flush the TX or RX buffers, The TXFIFO and RXFIFO can also be accessed through 8 bit registers and TXFIFO can be read using RAM access.

5.2.3 Radio to Radio

In order to make use of address recognition the transceivers are required to send and receive frames based on the IEEE 802.15.4 standard. Data packets consist of a header sequence, start of frame delimiter, payload and FCS which are generated by the CC2420 in and inserted during packet formation. Data packets also contain a frame control field (FCF), data sequence number and address information which are set in the code initialization code for the device (REF ccinit.c, ccinit.h, ccradio.c). Following the address information, the data payload sent. The FCS checksum is generated and appended to the packet allowing for assertion of data correctness and completeness when a packet is sent.

Receive mode is interrupt driven. Once an interrupt is received, the incoming packet is parsed for validity. If the packet is valid, data comparison is performed and the output lights are lit corresponding to same data. Data packets are also stored in order to keep track of network topology. The data is not persistent through a power down cycle.

The packets for this application are data type, security disabled, no frames pending (single se-
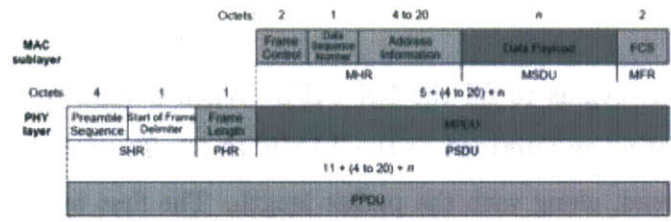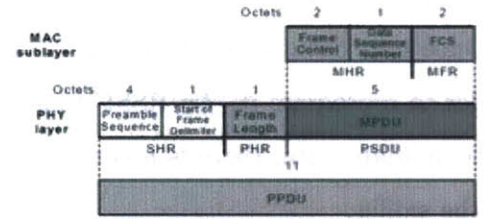
Figure 16: IEEE 802.15.4 data frame

Figure 17: IEEE 802.15.4 acknowledge frame

Figure 5-6: IEEE Packet Description

quence), no acknowledgement, intra-pan and use 2 byte addressing for source and destination. The PAN identifier for all the devices is 0x1111 and each device is given a common address for easy detection and transmission. PASS devices share common addresses, allowing each device to send a receive to every other device, the exception to this is the sniffer programmer which uses a unique address from which it sends the programming type packets.

5.2.4 Sending Packets

To send packets the application code first flushes the TX FIFO to get rid of any bad data due to overflows and disables interrupts. Subsequently, it begins a write sequence to the TX buffer beginning with the packet length which includes a count of both payload and overhead bytes. These bytes include frame control field, PAN address, device destination and source addresses, packet type header, data payload. After a packet is sent, interrupts are once again enabled to allow reception of incoming packets. In between send cycles there is a random delay which is incorporated in order to prevent two devices from becoming locked in a feedback cycle.

5.2.5 Receiving Packets

When a packet is detected it begins to fill the RX FIFO. When a valid packet is complete the FIFOP pin goes high, generating an interrupt on the ATMEGA 32. To process an incoming packet the RX buffer needs to be read, along with the packet length. The first byte of the packet frame indicates the packet type (data or programming) then the data payload is read into a data buffer. Once this is obtained the data is processed as either incoming data or user defined data based on the data type of the received packet. Once user data is programmed the device is considered initialized and must be power cycled in order to reprogram it. An RSSI value is also appended to the packet and although this can be used to validate data, there is no error check in place at this time other than visual inspection through the sniffer.

5.2.6 Processing Data Packets

The CC2420 does some validation in hardware when MAC protocol is set up. In this case address decoding, checking the PAN identifier are done prior to the FIFOP going high and an interrupt being generated.

Unique identifiers are assigned to the first payload byte of the data packets. These bytes are used to store incoming data in a two dimensional array which ignores duplicate data. When a new packet is received the data is parsed and compared to the receiving devices array of user data. For each incoming byte a comparison is done with existing user data and same data results in high signals on the output pins turning on the LEDs on the display board. Data is not persistent through power down cycles but it can be used for visualization of topology.

5.3 Creating a Network

The PASS device is networked using an ad hoc mesh topology. In this configuration all devices function as full function devices or FFDs; this allows for a fully distributed network with no vertical heirarchy. The network utilizes a common PAN identifier and common addressing with unique

network identifiers which are hardcoded in order to facilitate more robust communication between devices. As stated before the only exception is the sniffer/programmer which behaves much like any other device in sniffer mode with the exception of its lack of transmission.

Devices are programmed to alternately send data packets and poll the interrupt pin at random intervals. When an interrupt is detected sending is halted and the incoming packet is processed. Data packets which do not conform to MAC protocol, and do not have the proper address information or PAN identifier are ignored and no interrupt is generated. After the packet is fully received another random delay is generated in order to prevent two devices from entering into a feedback send and receive cycle. Both TX and RX buffers are flushed after each send and receive cycle to minimize data corruption due to overflow.

5.4   User Interface

The user interface and visualization software are written in Processing, an open source programming language and environment developed by Ben Fry and Casey Reas at the MIT Media Lab. Processing has a collection of libraries, including a serial port interface library. As stated above, the sniffer/programmer operates in two modes: program and sniff. The interface and visualization interact with the device respectively.

The PASS programming interface is a graphical application that assigns field values according to the buttons selected by the users. After all five fields are selected the user may choose to send the data to a device or clear the data. When data is sent to a device it first is send via serial to USB connector to the sniffer programmer unit which then sends it wirelessly to an uninitialized device. A series of packets is sent along with a randomly generated prepended identifier.

When the sniffer/programmer is in visualization mode it receives incoming packets and keeps a running tabulation of the number of edges or connected devices. A graphical representation of the number of edges is drawn on the screen. For each received interrupt a new graph is drawn on top of the old image as the older topology begins to dissolve from the screen.
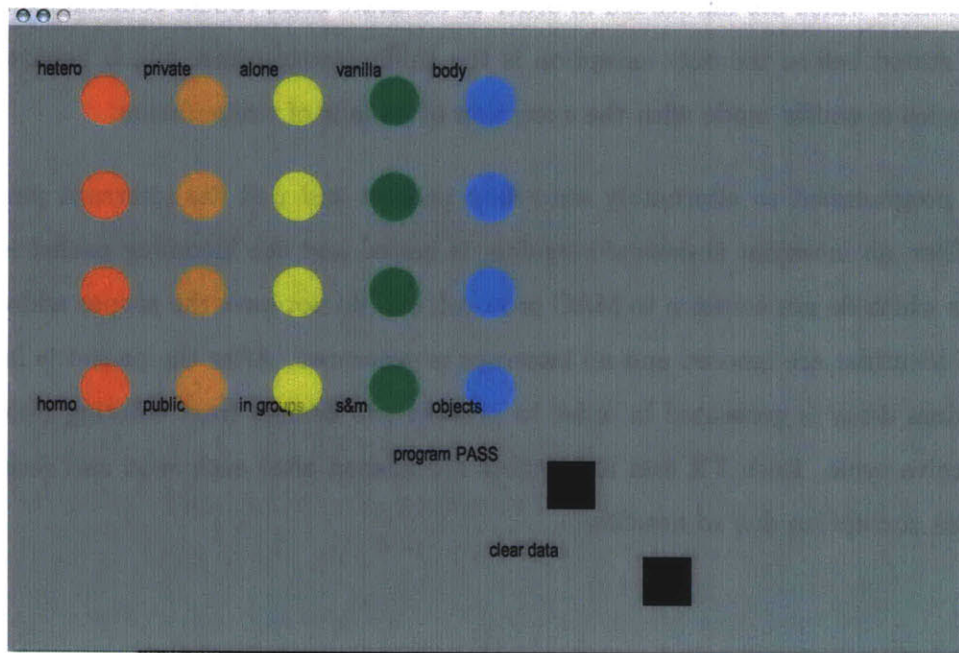
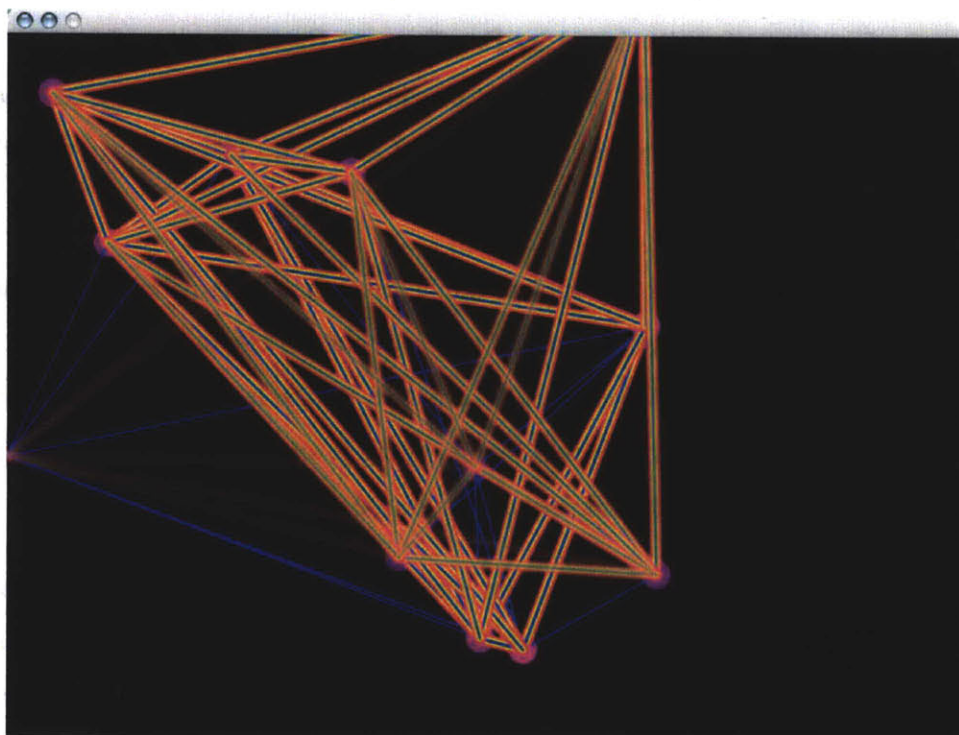Figure 5-7: Interface to the PASS device programmer

Figure 5-8: Visualization from PASS sniffer

Chapter 6

Artistic Process and Evaluation

The conceptual frame work of PASS is, to say the least, pretty extensive. Although I was not able to succeed on all fronts, I do believe the project is able to address three important issues. First, it provides a unique technology that is designed specifically for the queer community. Second, it is a reliable, extendable platform that is deployable in public space. And finally, it preserves the anonymity of the wearers.

It was difficult to conceive of a framework that would not in some form be reductive. I have however, wanted to find a way to engage in a novel form of reverse discourse. Also, in allowing a visualization of the internalized protocols of sexuality, I hope to illuminate the variety that contributes to our on going definition of the norm.

After participating the the MIT Graduate Arts Forum in the beginning of may, I realized I wanted to engage in more critical discourse about my work with the project in a more developed phase. I decided to coordinate a salon gathering and bring together a diverse group of experts with the purpose of critiquing the project. The goal of the salon was to facilitate a small scale deployment and presentation of the project, followed by a conversation about the project among the attendees. By using this scenario I could get feedback on the interaction aspect of the interface as well as investigate the conceptual legibility of the project.

6.1 The Salon

As part of the evaluation, I not only wanted to create an environment in which PASS could be presented and deployed, but also create a mechanism for artistic critique. I invited a small but diverse group of Media Lab students, designers, artists, and curators to discuss the project in an informal salon gathering. There were eight attendees: two visual artists, two curators, and four Media Lab students with a variety of backgrounds including industrial design, graphic design, and art.

Approaching the salon, I already had several questions about the legibility of the piece. On the pragmatic level, I was curious about both the form and content of the different parts of the piece: the interface, the devices, and the visualization. I composed a list of questions designed to inspire dialog about the project. I asked the participants to read the questions and project abstract prior to a brief presentation. Although the questions reflected my concerns coming in, they were designed more as an aid for discussion, rather than quantitative analysis. In the end, however, most of the questions were addressed by the audience, along with a number of astute observations and critiques.

6.1.1 Explaining the Piece

During the first part of the critique, I spent some time discussing the piece and the function of the interface, the devices themselves, and the visualization. The piece still requires more explanation than I would prefer, although over the course of the critique there were a number of suggestions that could increase its legibility. During this time, attendees could experiment with the graphic interface as well as the devices themselves.

I spent some time talking about my motivations for the piece, then we began a dialog that included an in depth critique of the piece. The questions were provided to stimulate conversation. Although the list was informal, most of the questions were addressed during the course of the evening.

> Interface
>
> Do the parameters make sense in the context of sexuality as a construct? What parameters would you suggest to the device setup seem more inclusive?

Do you find the lights on the devices informative, ornamental, or distracting?

Does entering data for the PASS device make you feel vulnerable?

Do you find the topological representation informative, ornamental, or distracting?

Conceptual Legibility

Does the physical presence of the device convey something about embodiment and technology?

Do you feel anonymous, exposed or neutral when the devices are running?

Does the visualization of the topology influence your perception of subcultural connection?

6.1.2 Impressions of the Interface

The construction of the Processing based interface, appeared to be both approachable and understandable to people. However, the lack of mobility of the programming station, did elicit some comments. During the course of the evening alternate modes of programming were suggested. One comment proposed an on circuit programming mechanism, which would allow users to program the devices manually and on the fly. Another suggestion was using alternate mobile technology, such as a cell phone as an interface. This would eliminate the need for a stationary, central location from which devices are programmed.

There was a conversation that centered on the dilemma of parameters reconstituting norms. The impressions seemed to lead to a consensus that there needed to be more variation and scalability of the parameters. One attendee suggested pushing the parameters further, to reveal a more creative constitution of sexuality. The suggestion was to use parameters that were wilder, although not necessarily more raunchy, for instance "liquid" or "solid". Although I have been relying on Gayle Rubin's descriptive chart, I think this was an excellent suggestion and intend to spend some time developing more creative parameters. One strategy that was mentioned was that I develop a taxonomy of parameters that could be based on the "Charmed Circle", but would reflect more creative possibility, rather than the dichotomies presented by Rubin.

Another attendee pointed out that the act of parameterizing these variables is in itself reductive; that technology will continually fail in translating such an intricate part of identity. In spite of this she felt that the fact that it was not fully replicative provided a gratifying levity about the parameters, that was in itself, freeing.

The way in which the data related to the devices seemed a bit more confusing. The lights seemed to be less of a concern to the attendees than they were to me. Most appreciated the external representation of the internalized concept of sexuality. This may, in part, be attributed to the fact that some form of feedback may be required for people to feel like the devices are actually doing something. However, there did seem to be some confusion about what the lights represented both on the devices and in the color coded edges in the topological visualization. Because the lights are on the body, it was difficult to switch people's focus to the fact that they represented information about the edges and another node, as much as they represented the embodied node. The lights seemed to connote a transmission, rather than a reception, which is actually what triggers the lights to activate.

6.1.3   Impressions of the Form

The devices themselves seemed both alien and unapproachable to the assembled group. Because of the state of the design (exposed circuit boards, clunky construction) the devices were generally not inviting to the attendees. Although there were issues with the design, the discussion of embodiment did reveal that the general form was conducive to the idea of constructed and embodied information. The strap that can encircle the body, did translate the intended message of externalization of embodied protocol. So the overall while the overall intentions of the form were legible, there is still work to do in providing a less bulky and intimidating form.

Although my intention has always been to create an independent platform, I was intrigued by one proposal that I create mutated docking devices for mobile phones. By using cell phones or more ubiquitous platforms the project could theoretically be deployed to a larger population. However, in this sort of instance issues of privacy and safety are sure to arise.

6.1.4 Visualization and Topology

The current instantiation of the topology too, seemed confusing to the attendees. Because the topology is time based, packets from the same node are redrawn, creating a layered affect that was more confusing than I had hoped. The general consensus among attendee was that they wanted a more faithful, less abstract rendering of the topology. This would mean a single representation of nodes with only edges that change over time.

One suggestion was that periodic frames be recorded to capture the dynamic of space over time. This seems to be an important way to address the fact that all of the data is currently transient giving no way to document the process of interconnection. By taking time shots, a kind of archival restoration of the dynamic of space could be undertaken, while still maintaining the anonymity of the participants.

6.1.5 Conceptual Legibility

The question arose over the course of the evening as to what the actual project of PASS is; whether it emphasizes the signal between individuals or if the goal of the signal focuses more on the overall topology. The overall topology is what is important to me, and although this may create an awareness of the node or individual it is the underlying structure of subcultural connections in space that is the primary emphasis. I believe that removing the lights may highlight this in greater detail.

At one point someone brought up hanky codes and the successful infiltration of public space it represented, through a specific legibility to a particular group. In other words, a hanky means nothing to someone who does not understand its significance. PASS does not seem to fall into that category. One of the reasons that hanky codes operate successfully, is that they are discrete and not incongruous with normal dress. PASS is indeed, incongruous. The project of addressing embodiment in this case precludes the ability to be a stealth actor in terms of signaling. The device does function as a signaling mechanism and in the embodied form works more as a beacon which awaits response. In the topological form it performs as a signal that describes a space. So the function of signaling is twofold.

Another interesting impression of the piece, was that it operated to some degree as a confessional. The deliberative act of describing and constituting one's own sexuality to perform as a signal represents an externalization of an inner construct. While the confessional was not an idea that I had deliberately addressed, it is an interesting observation and speaks directly to the Foucauldian idea of constructed sexuality being an outcome of the dialog around sexuality, which includes confession.

One attendee observed the contrast implicit in the piece; the technical requirements of data provided an interesting frame for the organic and fluid idea of sexuality. This was something I hadn't though much about before she brought it up, and she felt the piece succeeded in describing the dichotomy between the technologic and the organic. As one attendee noted, "sexuality is constituted by lived life" and this is in effect something that parameters of data can never encompass in entirety; rather they stand in contrast to the richness of individual experience.

6.1.6   Technical Issues

Technically the devices are generally reliable. They can run for extended periods of time (test time up to one hour) without dropping or corrupting any of the data packets. Problems do arise when batteries run low. Also, wireless programming of the devices can run into difficulty due to packet contention from previously programmed packets. This may necessitate the programmer to be run a number of times until the device is programmed and programming packets are received and processed.

Overall, the platform is dependable and, because it is a basic instance of the 802.15.4 protocol, highly extendable.

6.1.7   The Dilemma of Safety and the Problem of Preaching to the Converted

As part of the considerations of safety and anonymity, the project assumes deployment in deterritorialized space; spaces which already are conducive to progressive dialogs about sexuality and identity. The general consensus was that the piece ultimately has a lesser impact in these sorts

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of venues. Which, of course, I agree with. Unfortunately, however, sexuality is an issue that can provoke hostility to the point of violence, and this is not something I am willing to broach.

6.2 Three Scenarios for Artistic Resolution

Taking into account, both the feedback I've received and my own inspiration for the further development of the project, I would like to propose the following scenarios for artistic resolution. These scenarios represent both my own ideas and attempt to address the concerns of the attendees of the salon.

6.2.1 Deployment in Shopping Malls

One of my favorite suggestions that arose in discussion was to deploy the devices in shopping malls. Although there is little practicality in this proposal, safety concerns would be far too great, conceptually it represents a remarkable opportunity. It would take the devices to a venue that attracts a heterogeneous population, it would draw attention to the relationship between bodies in public space, and it would describe subcultural connections in what is ostensibly a microcosm of modern life. By introducing the devices to a controlled, public space I could ensure contact between devices more effectively than in the open public space of street life. The best deployment would be without lights, which I imagine would be distracting in this context. There would however, be a large projected display of the topology in a central location.

6.2.2 Subversive Spaces

Another idea would be translating the signals currently going into topological display to actuating devices in an environment. By using solid state relays or triac circuits, AC powered devices in a space could be controlled using receiving modules and a microcontroller. For instance lights could dim according to the number of connects between devices, fans could go on or off, or audio tracks could be initiated. In creating spaces that are reactive to subcultural connections, I could offer a

different kind of experience of space that addresses the confluence of bio-power on the body and situates it in relation to other bodies.

6.2.3   Secret Messages

Because of the extensibility of the platform, I propose an alternate method of relaying information about one's sexuality. In this version the user would be able to program a word or sentence that relays their own perception of sexuality. This variable could be transmitted between devices in the form of a secret message. The identity of the user would be preserved, and instead of finding topological connections, a linguistic cartography could be constructed. Devices could collect the data and created a poetic rendering of public encounters.

6.3   Conclusion

PASS attempts to address highly conceptual notions and in some respects does so successfully. Generally, there remains room for clarification and defining purpose in a legible way. However, technically it represents a new and extendable platform that may be used in many exciting ways. The basic functionality has been implemented and can be extended to improve this project as well as develop any number of wireless networking projects that would require an independent platform.

This platform too has allowed me to investigate, in depth, a trope of modern discourse: namely the network. It has also allowed me to create a mobile object that relates to embodiment and protocol. In this exploration I have encountered many theories and documents that support the understanding of the social construction of self in relation to others. At the same time many of these theories highlight the inherent dilemma of technology in describing the body; the richness of human experience is not reducible to the transmission of packets. Perhaps, though, we can begin to understand a bit more about how we are situated as actors in our environment by the deployment of technology in applications that challenge the norm.

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