Albert Dang

Yury Gitman

Majory Studio 2

May 15, 2007

Telx: A Platform for Remote Communication and Interaction

Questions:

Telx is a platform that allows for interaction between people across distances. The distance may span a few feet within the same room or it may cover two points that are on opposite sides of the globe. The project seeks to answer the following questions:

- Can an emotional connection and a feeling of presence be made in real-time between two or more people that are separated by distance?
- What role does location and space play in contextualizing a networked experience?
- In what ways may "traditional" interactions with networked environments (i.e., computer, cell phones, telephones) be enhanced by other physical devices?

Domains:

The domains that Telx encompasses may vary depending on the manner in which the platform is built upon. At the very heart of sending messages over a network are the ideas of communication, time, and space. In this case, the network is the Internet, implying that the messages are packets of data sent over TCP/IP. As with any language, the manner in which the messages are encoded and decoded provide meaning to the exchange. This is where the interaction with the network relates not only to Human

Computer Interaction (HCI), but also human to human interaction. In other words, the level of user awareness to the underlying technology relates directly to user expectations and user psychology. In addition, connecting users from different locations may introduce notions of space and context. The locations could provide a narrative context for the interaction or they could form the basis of conceptual exploration, such as the difference between public and private space.

Summary:

As a platform, Telx is a tool that lends itself to many types of applications, both creative and pragmatic. Artists, interactive designers, game designers, and technologists may build upon the framework to achieve different ends. Some examples include installations, networked games, networked toys, and networked products. As previously described, a meaningful experience is not personified by the platform itself, but may be shaped with the interactions that occur by the sender(s) and receiver(s) of messages across the network. However, like any medium, the tool, in the hands of the right talent, may be used to create a powerful work of expression that relates to the human condition.

Precedents:

There has been a tremendous amount of research and work done in this area of networked physical interactions. The study of HCI has ties to Human-Centered Computing (HCC) and Human-Centered Multimedia (HCM) (Jaimes et al 855). Jaimes, et. Al describes multimodal forms of communication to include “gestures, speech,

haptics, eye blinks, and many others."(859) When combined with more traditional visual and auditory feedback mechanisms, a richer sensory experience may be possible.

Much of my research has been in the field of haptics, which relates to recreating the feeling of touch via motors or piezos. Paterson states, "Haptic devices have now become routinely included with video-game consoles, and have started to be used in computer-aided design and manufacture, medical simulation, and even the cybersex industry (691). Related to this area, are the terms *teleoperation*, the ability to sense and manipulate at a remote connection, and *telepresence*, the ideal of sensing the human teleoperator in a natural way such that the "operator feels present at the remote site." (Stone 859) The history of haptics research and development spans integration with Virtual Reality (VR) environments, remote operation of robotics in nuclear and hazardous sites, remote aerospace maintenance, remote surgery, and remote landmine clearance (Stone 1-6). Such a focus on remote assistance through robotics, while certainly valuable, moves away from human connections and communications, at least in its current state.

Other projects in technology and art have made inroads in that direction. The "virtual handshake" employed haptics to simulate the physical interaction of a handshake between researches in Boston and London in 2002 (Paterson 691). *Handjive* was developed as a means to use a handheld device to communicate with other people via tactile feedback (Fogg et al). *ComTouch* (fig. 1) explored the use of vibrotactile communication both with and without voice. (Chang 312). This was an expansion upon

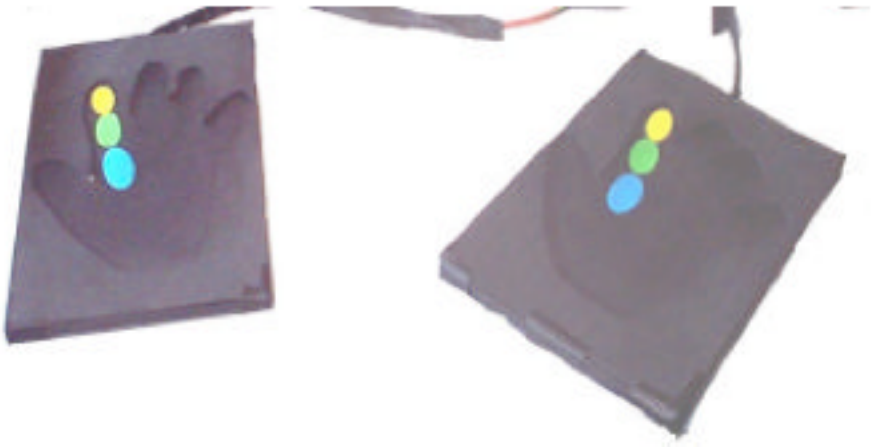

Fig. 1 – *ComTouch* used three sensors with vibrotactile feedback for the index finger between two users.

previous research with *LumiTouch* (fig. 2), which explored awareness of presence through pictures frames (Chang, "LumiTouch", 313).

Fig. 2- *LumiTouch* used light and vibrotactile feedback with picture frames to explore presence between remote users.

Khoudja takes the communication one step further with creating the first steps of a tactile language and how it may map to specific emotions (1). *STRESS* is a haptic memory

game that matches unique tactile feedback to "cards that are to be matched (Wang 271). The last example is a single-player game that maps visual language to touch, but the other projects explore various levels of communication between two remote users. It is understood that interaction between two people implies a certain level of intimacy and personalization, but it may be possible to scale those attributes to a multi-user or group interaction as well. Telx aims to show how that might be possible.

Other projects dealing with presence relate to using physical objects as representations for both human and machine activity. Kamisky used Actimates Barney (fig. 3) and Mattel Talk-With-Me-Barbie as embodied agents to transmit interaction between remote users as well as provide physical visualizations of networked activity (144-151).

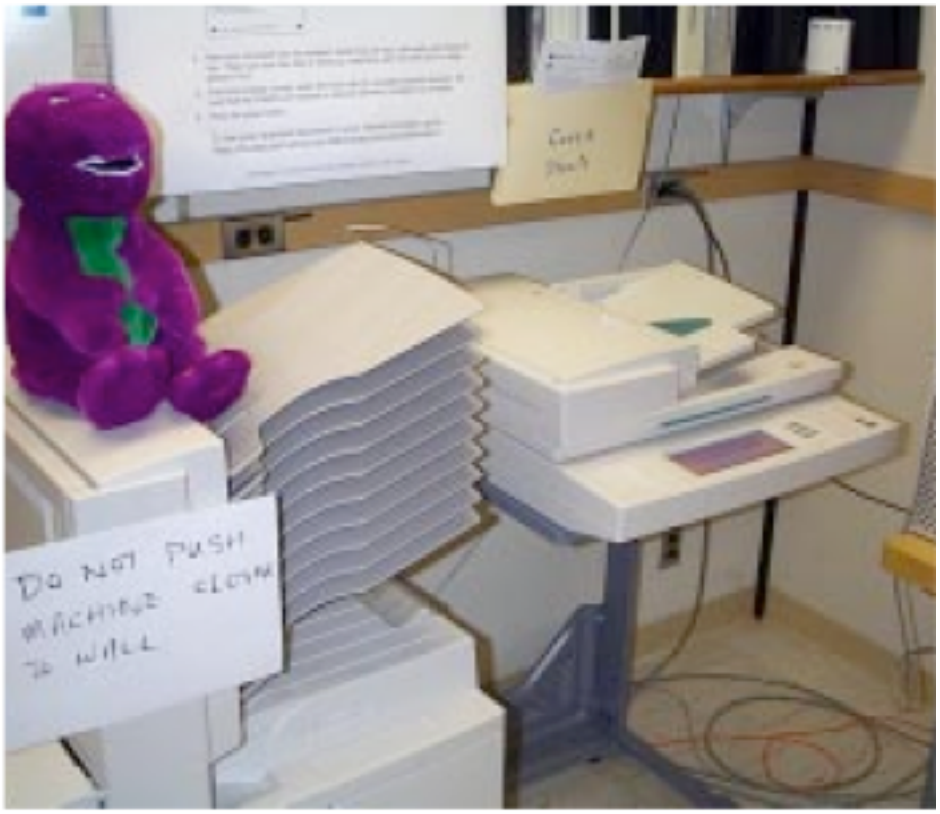

Fig. 3 – Barney as an "embodied agent" to indicate current printer activity.

Greenberg et al. designed a number of screen-based visualizations (fig. 4) and physical surrogates to deal with both awareness and privacy (1-17). These projects indicate

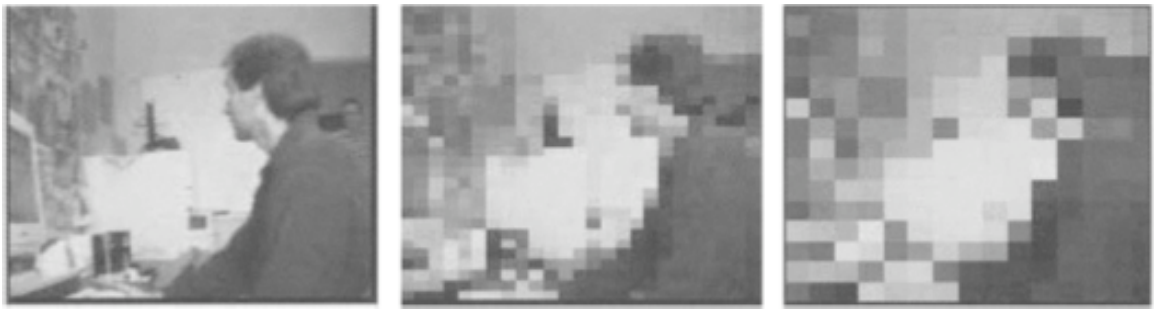

Fig. 4 – Pixelation corresponds ot the remote user's availability.

presence in a passive way so as not to distract the end-user. In some projects, passive awareness will be highly desirable. In other projects, active engagement may be the goal. Some projects may require seamless transitions between the two.

Two important observations of projects in this space are the impact of network latency as well as the relationship between haptic and visual feedbacks. Patterson notes that delatys between the initial interaction and the subsequent feedback can shatter "real-time engagment with an object" (702). Also key to the connection with an object are the close relationship between a strong correlation between visuals and haptics where "haptics…offers the verification of object in space… (Patterson 698). Although it may be possible to design around network latency, it would prove problematic to achieve any notion of real-time presence. It should also be noted that the combination of video and haptics provide a means for greater immersion if the project is aiming to employ VR environments.

Process:

I began my design process by taking inventory of not just my interest in technology and the application of technology, but also of about my personal interests in people and places. On one level, I am interested in emotion and psychological states that we have as individuals, but also how those may be contextualized by location. On another level, I see power in connecting people in a way that their contexts may be contrasted or strengthed to provide a more meaningful experience. Figures 4 describes Csikszentmihalyi's theory of "Flow" as the ideal intersection of psychology, technology and interaction.

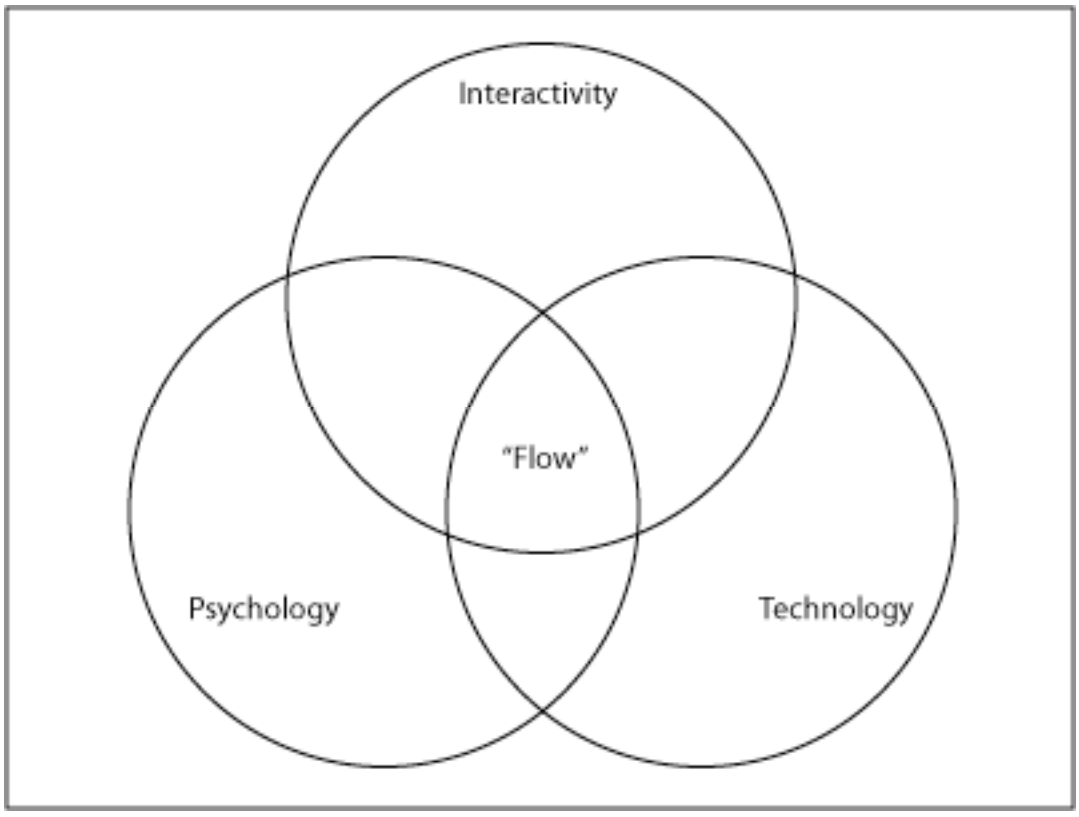

Figure 4 – One possible relationship between pyschology and technology

Figure 5 provides networks as a means to connect people and location.

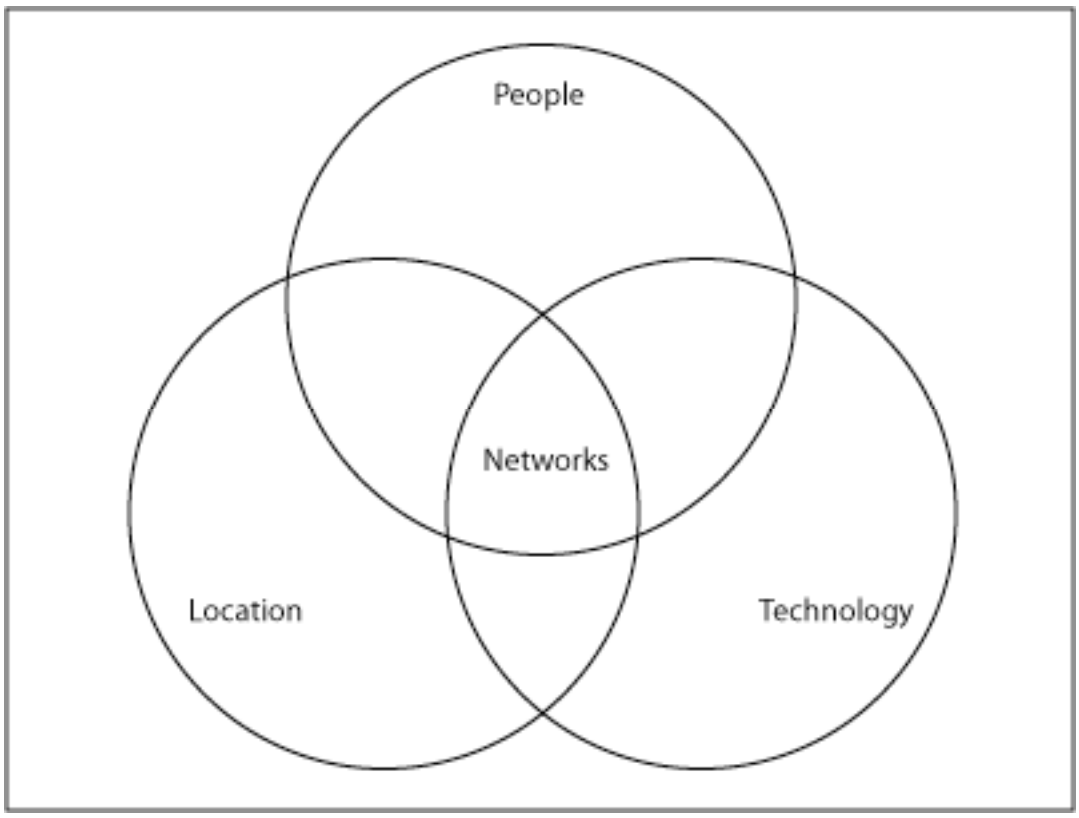

Figure 5 – Networks connect people and places

I then attempted to expand these areas into more specific criteria and map projects to different domains (fig. 6).

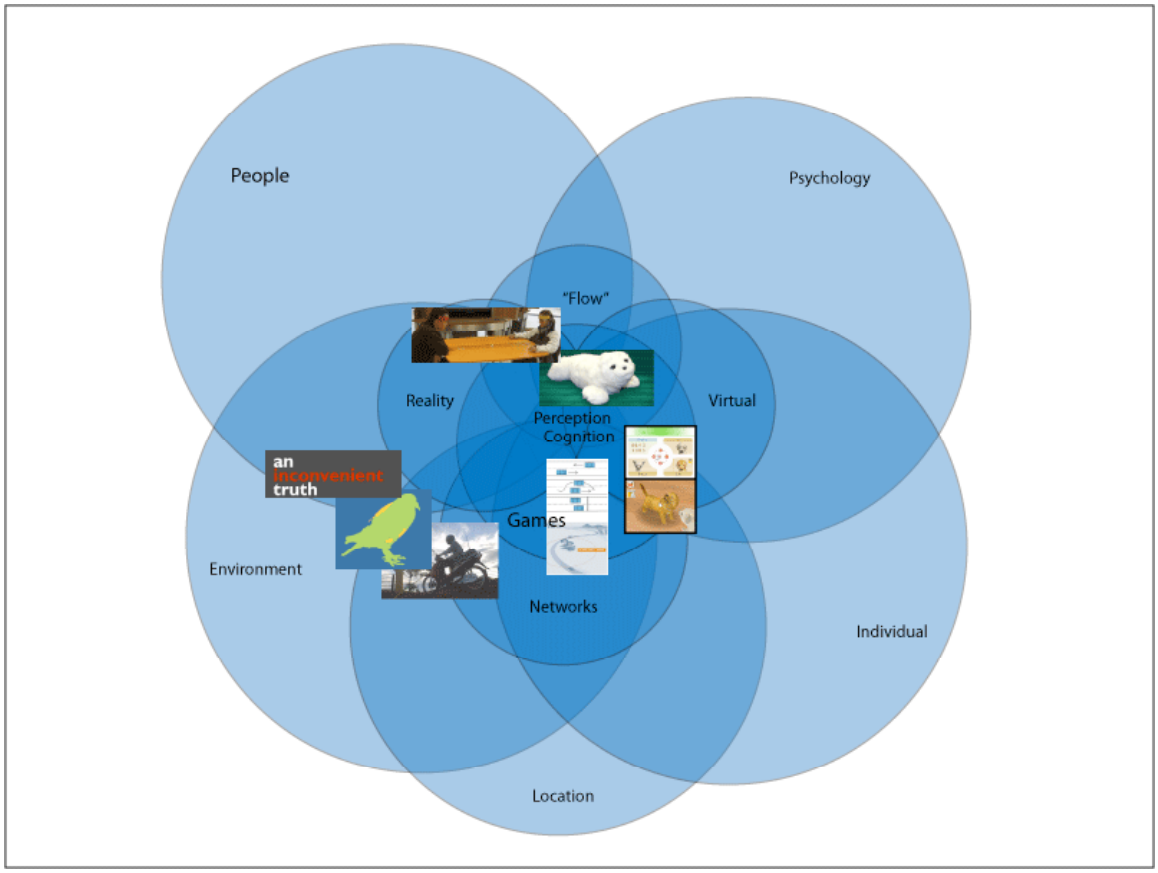

Fig 6 – Expanded domains with mapping to specific projects

Although the focus and concepts of the projects still varied considerably, I was able to see if some connections existed between the projects. In large part, the projects broke down into three main categories: environment, social interaction through networks and gaming, and emotional feedback. The next step was to think of the ways these areas might be designed into a single experience.

My initial idea was a networked experience that would convey a sense of emotion and presence between users. The use of haptics had been explored in all the studio midterm projects in my section, and I thought it would be appropriate to apply it towards achieving this design goal. On a personal level, I have used to video chatting to keep in touch with loved ones that live in other cities. Would the addition of haptic feedback

enhance this communication in any way? Figure 7 demonstrates a user scenario of the possible interaction.

Figure 7 – Video chat mockup with touch interaction between users

Similar to the "virtual handshake", would it be possible to have a "virtual finger touch" between the screens? Would "feeling" another through a screen be a meaningful experience or a novelty? The best approach would be to create a rapid prototype followed by user testing.

On the technical side, I had already worked with all the technologies that I would need for the prototype. It was more a matter of fitting the pieces together. On two machines, I would set up an Arduino board, which would would output serial data to proce55ing, which would communicate to Flash via XML sockets. Flash would then send a message to Flash Media Server 2 over Wi-Fi Internet. The flash client on each machine could receive updates from the server and then cascade messages back to proce55ing and then to Arduino. Figure 8 abstracts the interaction.

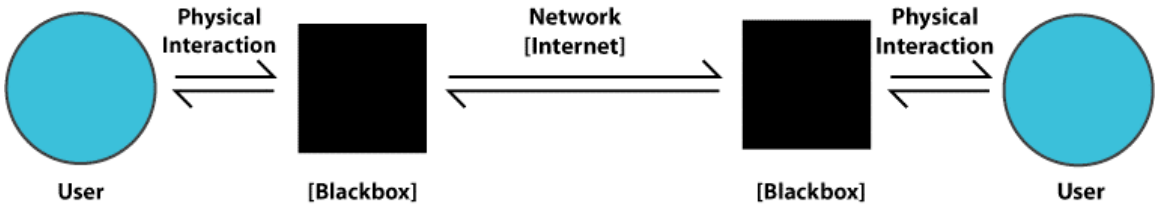

Figure 8 – Interaction flow between users over the network

Figure 9 shows the interaction in action.

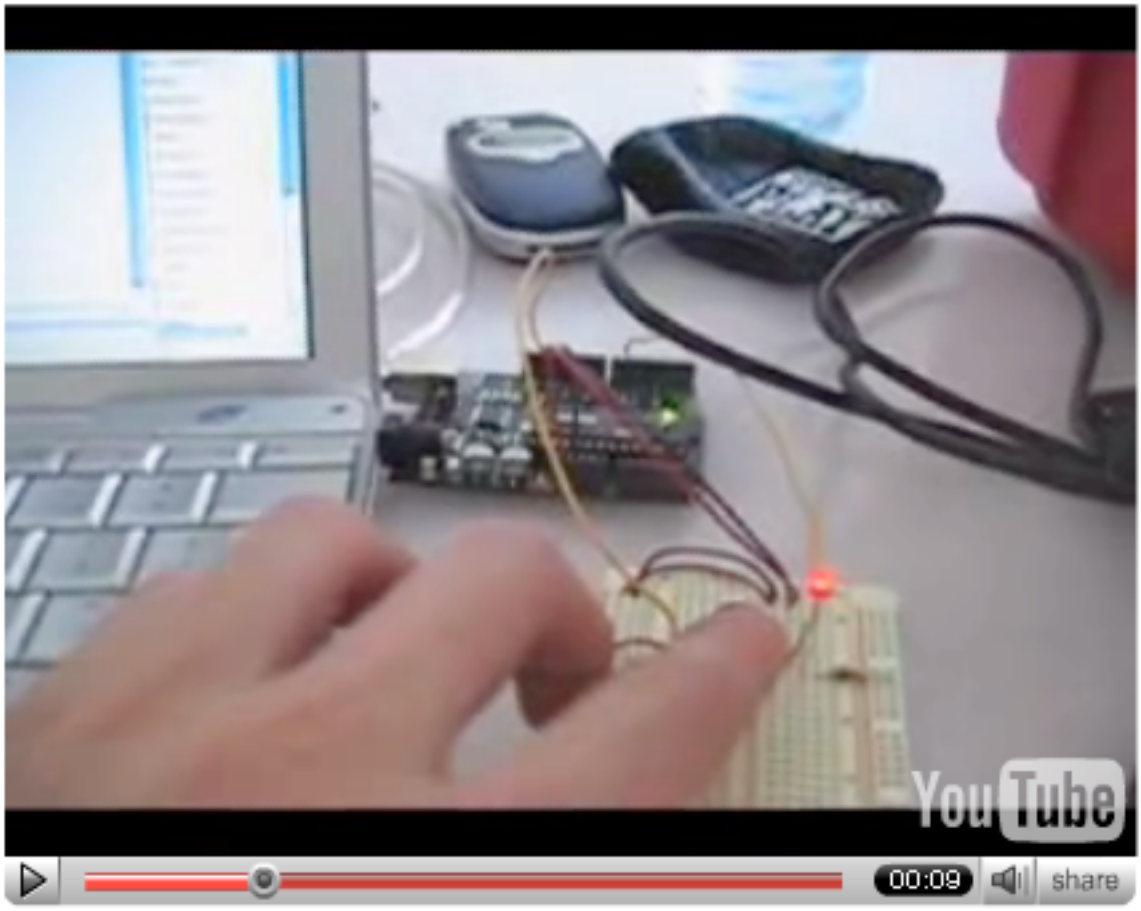

Figure 9 – An initial prototype demonstrated messaging over a network

Pressing a button switch would initiate the round trip to the server, which would result in an LED lighting up on the same breadboard.

This initial success was encouraging, but more inputs and outputs would be needed to demonstrate the capability of higer fidelity. A matrix of sensors and motors

would be need to approximate my end goal. I was able to get the mesaging system working as an array of LEDs (fig 10), and then with an array of motors over live video streaming (fig. 11).

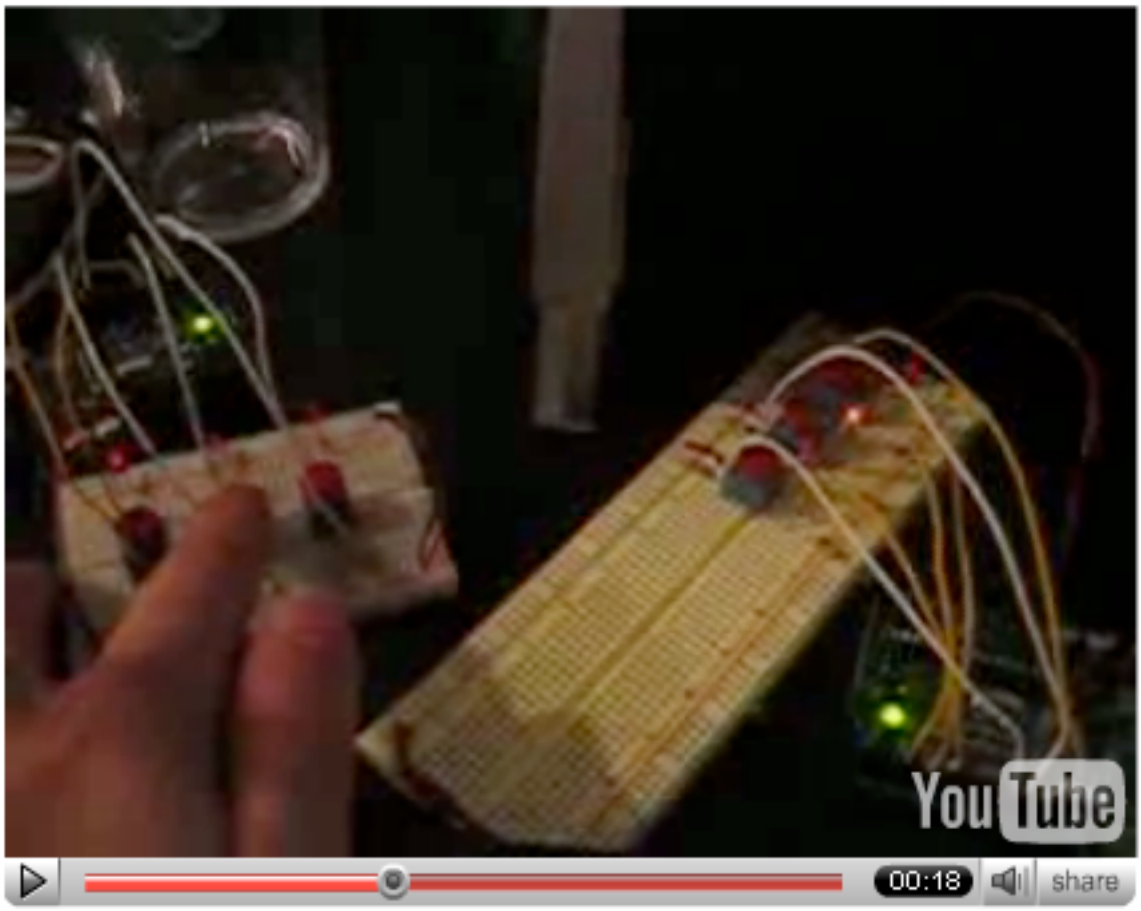

Figure 10 – Network communication with an array of three LEDs

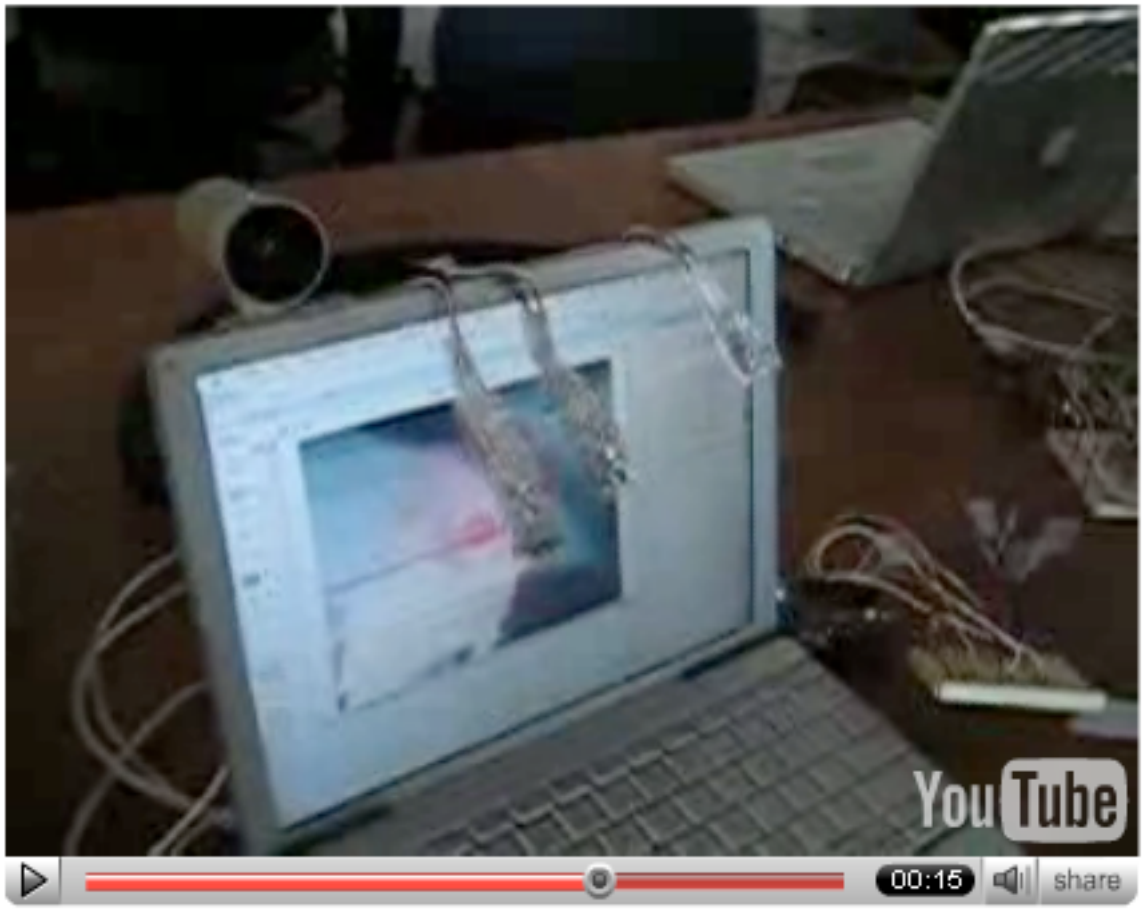

Figure 11 – Output to vibrotactile motors with a visual overlay over video

During the process of prototyping, I realized the potential of the communcation as a platform upon which many types of interaction could be built. It was at this point where my project changed direction from realizing video chat with haptic feedback to unlocking the potential ways in which the platofrm could be used. Believeing that my prototype proved that the messaging system was indeed viable, I thought about three different secnarios in which the platform could be utilized. My hope was that the scenarios could provide some context for the project as a creative tool.

Scenario one, entitled “FPS”, would take new interpretations on first-person shooters games (fig. 12) and apply them to artistic conceits related to gaming as other projects have done (fig. 13; fig. 14).

Figure 12 – The classic first-person shooter game *Doom*

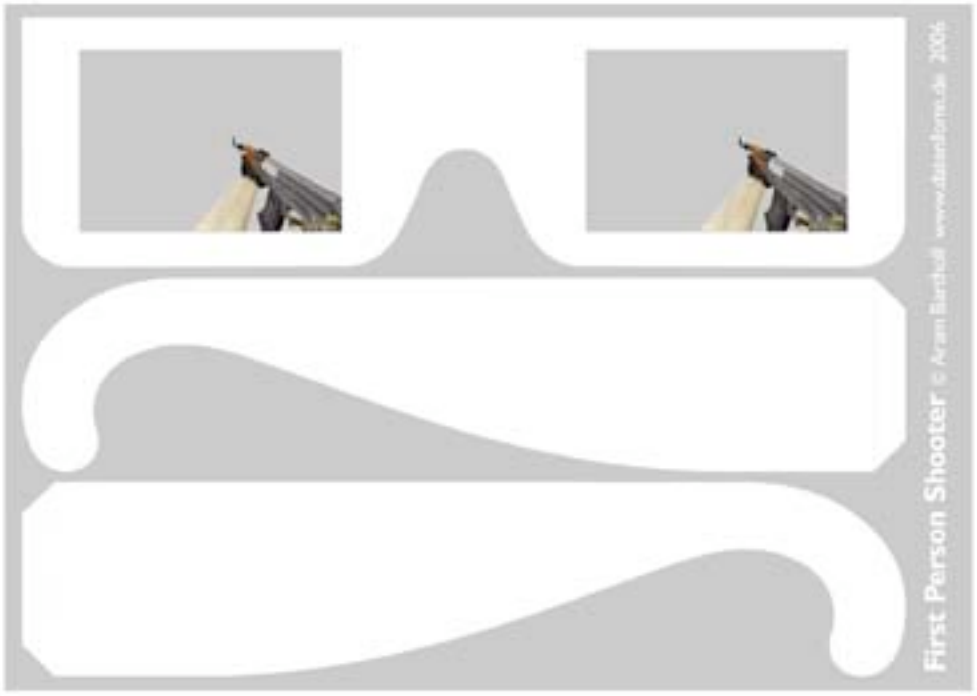

Figure 13 – The *First Person Shooter* glasses by Aram Bartholl

Figure 14 – *Super Columbine Massacre RPG* by Danny Ledonne

The installation would involve the user moving around several rooms in an enclosed building, much in the same way he might navigate the rooms of a first-person shooter game. When he enters a room, he would be faced with a screen with a live video stream of a child soldier in one of several countries that the Human Rights Watch has noted for interviewing child soldiers. They would have a duel over the network in real time with light guns (fig. 15).

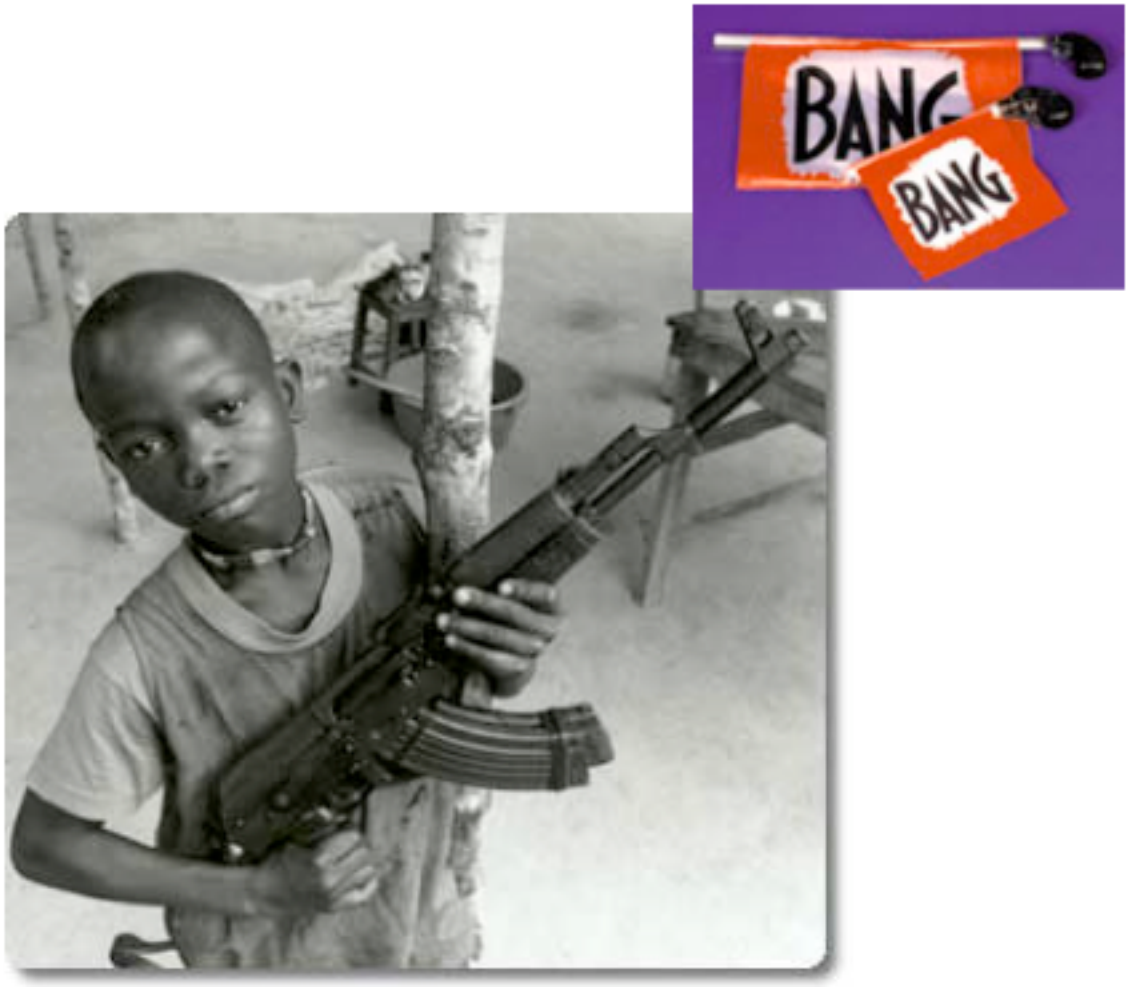

Figure 15 – A child soldier would interact over the network with a light gun

It is recognized that the reality of having children in this situated interaction may be naïve. The design goal of the piece would be to raise awareness of child soldiers in these countries as well as ask questions about violence in games, violence in warfare, and expectations of youth and play.

Scenario two, entitled "ICU", ties in notion of surveillance and location. Justin Everett Church's project *NYC Traffic* (fig. 16) reveals that web cameras that monitor traffic are spread throughout New York and accessible to the web.

Figure 16 – *NYC Traffic* by Justin Everett Church

"ICU" would use Global Positioning Software (GPS) technology in cars to pick up the location of these surveillance cameras and notify the drivers that they about to be watched (fig 17).

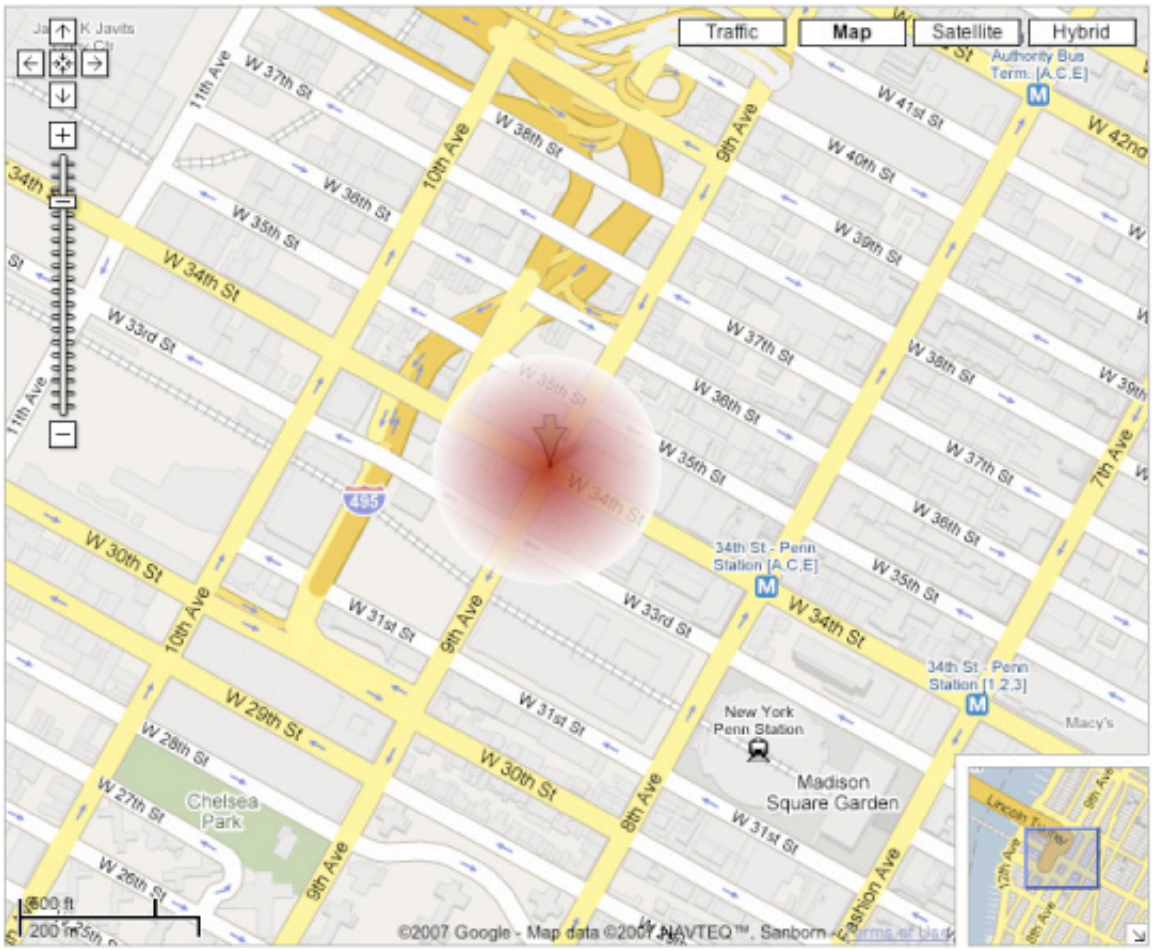

Figure 17 – A surveillance hotspot is represented on a map

As the driver approaches a surveillanced area, haptic feedback in the seat could notify him of his proximity to the camera. It could be aruged that the use of GPS, a precise positioning technology, to reveal to users that they are being watched makes little sense. One counter argument is that many users of GPS for direction finding are not aware of such privacy issues. Another approach could take advantage of an ad hoc network. If a driver saw a camera mounted on a traffic light, he could press a button on the dash to notify other drivers in the area that there is surveillance in the area. This approach would get around the use of GPS, although it would have its own set of complexities.

A third scenario, entitled "Teddy Bear Ping", builds upon the notion of communication through physical interaction with a networked device (fig. 18; fig. 19).

Figure 18 – IDEO's *Kiss Communicator* combines blowing and haptics between remote users

Figure 19 – Impulse by Gilad Lotan and Christian Croft transmits heartbeats via haptics over local network to another user

"Teddy Bear Ping" would build upon Bannana Design Lab's *ChuChi* (fig 20), and create a networked toys that would allow users to communicate to each other with a combination of lights and haptics (fig. 21).

Figure 20 – *ChuChi* features ambient light to help children relax

Figure 21 – Teddy Bear Ping communicates through lights and haptics

Children have often used flash lights in a playful manner to communicate to each other after their parents have instructed them to turn off their bedroom lights. "Teddy Bear Ping" could create a similar type of communication, but through the use of a networked toy.

Evaluation:

The major strengths of my project were my consistency of approach throughout the design process and the ability to rapid prototype to garner initial user reaction. The common thread of connecting people over networks exists from the earliest sketches through all my scenarios. Initial feedback of my prototype was positive despite the fact that it is clearly an abstraction of the touch screen that I had envisioned as a goal. Many of these users had little or no experience with haptics. Since I did not experiment with gradations of intensity with the motors, I think the was a certain novelty factor to the sensation of vibration with these users that probably would wear off quickly.

The biggest criticism for my project was that Telx, as a platform, is not a new idea. Although I was able to get my prototype working, many of my precedents, some of which date back several years, do networked communication. In order to give the project more context, I need to start building an interaction that I wish to achieve on top of the platform. My initial inclination is to start with a game. Because of a game is a closed system, the interaction could be given a clear context to manage user expectation. Also, pursuing such a project would quickly test the limitations of the hardware, software, and the network. Forging down that path would quickly indicate the feasibility of my different scenarios and whether or not the platform is viable.

References:

Bartholl, Aram. "www.datenform.de --- Net Data Space vs. Every Day Life --- Aram Bartholl." First Person Shooter. 2006. 15 May 2007 <http://www.datenform.de/fpseng.html>.

"Body Design." Ideo. 16 May 2007 <http://www.ideo.com/media/events/info.asp?x=7>.

Chang, Angela, et al. "ComTouch: design of a vibrotactile communication device." DIS '02: Proceedings of the conference on Designing interactive systems (2002): 312--320. 15 May 2007 <http://portal.acm.org/citation.cfm?id=778755&dl=ACM&coll=GUIDE#>.

Chang, Angela, et al. "LumiTouch: an emotional communication device." CHI '01: CHI '01 extended abstracts on Human factors in computing systems (2001): 313-314. 15 May 2007 <http://portal.acm.org/citation.cfm?id=634252&dl=ACM&coll=GUIDE#>.

Csikszentmihalyi, Mihaly. Creativity: Flow and the Psychology of Discovery and Invention. New York: Harper Perennial, 1996.

Everett-Church, Justin. "Adobe - Developer Center : NYC Traffic: Best Practices for Building Flash Lite Dynamic Content." Adobe - Developer Center. 15 Apr. 2005. Adobe. 15 May 2007 <http://www.adobe.com/devnet/devices/articles/dynamic_flashlite.html>.

Fogg, BJ, et al. "HandJive: a device for interpersonal haptic entertainment." CHI '98: Proceedings of the SIGCHI conference on Human factors in computing systems (1998): 57--64. 15 May 2007 <http://portal.acm.org/citation.cfm?id=274653&dl=ACM&coll=portal#>.

Gitman, Yury. "My Beating Heart: We're going to Toy Fair 2007 :))." My Beating Heart. 2007. Banana Design Lab. 16 May 2007 <http://yg.typepad.com/mybeatingheart/2007/02/were_going_to_t.html>.

Greenberg, Saul, and Hikeaki Kuzuoka. "Using Digital but Physical Surrogates to Mediate Awareness." Personal Technologies 3 (1999): 1--17. 15 May 2007 <http://citeseer.ist.psu.edu/240151.html>.

Jaimes, Alejandro, Nicu Sebe, and Daniel Gatica-Perez. "Human-centered computing: a multimedia perspective." Multimedia '06: Proceedings of the 14th annual ACM international conference on Multimedia (2006): 855--864. 15 May 2007 <http://portal.acm.org/citation.cfm?id=1180829>

Ledonne, Danny. "Super Columbine Massacre RPG!" Super Columbine Massacre RPG! 2005. 15 May 2007 <http://www.columbinegame.com/>.

Lotan, Gilad, and Christian Croft. "imPulse :: by Christian Croft & Gilad Lotan." imPulse. xn croft. 16 May 2007 <http://www.xncroft.com/projects/imPulse.html>.

Kaminsky, Michael, et al. "SWEETPEA: software tools for programmable embodied agents." CHI '99: Proceedings of the SIGCHI conference on Human factors in computing systems (1999): 144--151. 15 May 2007 <http://portal.acm.org/citation.cfm?id=302979.303021>.

Mohamed, Khoudja Benali, Amaury Sautour, and Moustaph Hafez. " Towards a new tactile language to communicate emotions." Proceedings of Virtual Concept 2005 (Nov. 2005): 1-9. 15 May 2007

<http://www-ist.cea.fr/gb/publications/realite_virtuelle/virtual_reality_publications.htm>.

Paterson M, 2006, "Feel the presence: technologies of touch and distance." Environment and Planning D: Society and Space 24.5(2006): 691 – 708.

Stone, Robert J. "Haptic Feedback: A Potted History, From Telepresence to Virtual Reality." Proceedings of the Workshop on Haptic Human-Computer Interaction (Sept. 200) 1—6. 15 May 2007 <http:// citeseer.ist.psu.edu/462374.html>

Wang, Qi, et al. "A haptic memory game using the STRESS2 tactile display." CHI '06: CHI '06 extended abstracts on Human factors in computing systems (2006): 271--274. 15 May 2007 <http://portal.acm.org/citation.cfm?id=1125510>.