
“I Like This Shirt”: Exploring the Translation of Social Mechanisms in the Virtual World into Physical Experiences



Figure 1. “I like this shirt” is a tangible interactive e-textile, which transforms virtual social dynamics into physical experience. (Bottom) A passerby reaches out to “like the shirt” by tapping on the wearer’s shoulder.

Ladan Najafizadeh

Makeability Lab | HCIL
Dept. of Computer Science
University of Maryland
College Park, MD, USA
ladann@cs.umd.edu

Jon Froehlich

Makeability Lab | HCIL
Dept. of Computer Science
University of Maryland
College Park, MD, USA
jonf@cs.umd.edu

Seokbin Kang

Makeability Lab | HCIL
Dept. of Computer Science
University of Maryland
College Park, MD, USA
sbkang@umd.edu

Abstract

Over the past decade, technologies that mediate and support human-to-human interactions (e.g., social networks) have become integral tools for a range of lightweight social interactions. With a single click to

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‘favorite’ or ‘like’, social media users can demonstrate their interest in a specific person, event, or piece of content. In our research, we are exploring the translation of these lightweight social interactions into the physical world as design provocations. In this paper, we introduce one example called “*I Like This Shirt*”, a tangible manifestation of the ubiquitous *Like* button embedded in an interactive t-shirt. The shirt responds to physical touches, which indicate “likes” and tracks and visualizes the “like count” in real-time on the shirt itself. We describe our design and the results of a preliminary deployment.

Author Keywords

Tangible social interaction; Social fabric; Social objects; E-textiles; Wearables

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

The emergence of social media is characterized by a breadth of new ways for people to interact with one another. For example, Facebook introduced the ability to “Like” content and communicate emotion using a

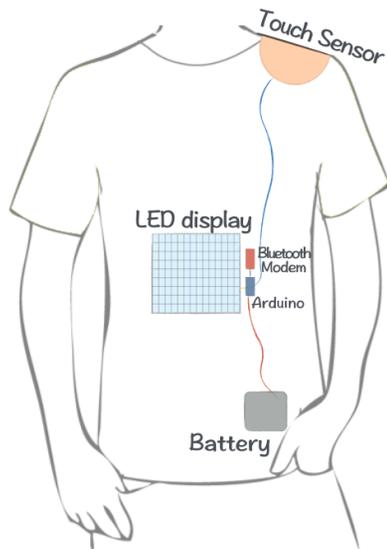


Figure 2. The system architecture of “I Like This Shirt”.

range of emoticons. Similarly, Twitter allows you to “Favorite” tweets. These features enable users to express a range of emotive content such as agreement, excitement, and support with minimal effort.

In this paper, we introduce “I Like This Shirt”, a t-shirt designed to explore the role of lightweight technology-mediated social interactions in the physical world by providing a tangible interface to “Like”. In our work, we seek to better understand the ephemerality of social interactions (e.g., complimenting someone’s t-shirt) in the physical world compared to their sustained attachment in the virtual world (Figure 1). Our exploratory research questions include: How do people respond to physical objects that utilize social metaphors from the virtual world? What sort of emotions and reactions does the “I Like This Shirt” evoke from both the wearer as well as passersby?

Related Work

Interactions in social media have largely been limited to the virtual world. However, research suggests that physical objects can represent these interactions via tangible interfaces [10]. For example, Kalanithi *et al.* explore how tangible objects can form a representation of social networks [6]. In their work, cubic objects, called Connectibles, act as gifts, and are exchanged between the giver and the receiver. The more gifts each user collects from different givers, the larger his/her social network gets. Their aim was to investigate how physical objects can be used to demonstrate social behavior in the real world.

Lingnau *et al.* designed an interactive table for a museum that is capable of retrieving twitter messages, based on the user’s interests [8]. Users place a physical

object they find interesting on the table, and the table shows tweets related to that object. Their goal was to examine how tangible interfaces can link the information from social media to physical objects. In addition, Szymaszek *et al.* investigated an alternative way of social interactions, *i.e.*, non-verbal interaction, by presenting Drum2Drum [11]. They designed two drum-form devices that can transmit rhythm to one another, and placed each in different rooms. Their aim was to encourage social interaction without requiring being present in one place.

In addition, there are research projects focused on using everyday objects as tangible interactions. Gaver *et al.* made use of a coffee table, called the Drift table, as an interactive interface that contains a round display [5]. The display can be zoomed in/out depending on the weight of the items on the table. They explored how an everyday object can be playful, which serves as further motivation for our work.

Although these studies introduced new forms of tangible interaction with social dynamics in the virtual world, their tangible objects are not worn *everyday* objects. Their lack of attachment to daily life makes it hard to utilize them as one moves about the world. Although, the Drift table is an everyday object, it lacks the social aspect of interactive design. Alternatively, “I Like This Shirt” employs an everyday physical object as an interactive social mechanism. A t-shirt exemplifies an object that can be carried easily while being noticeable by passersby and is already a social object (e.g., people wear t-shirts to show their interest in a favorite band or sports team). Our work is the first use of a wearable object (t-shirt) as a tangible, interactive social interface, and to represent the transformation of



Figure 3. A screen shot from the website “iLikeThisShirt.com”. The current number of likes accrued by each participant is shown. Visitors to the website could click on a shirt and the “like” count on the virtual and physical shirt would be simultaneously updated.

a virtual social interaction (a “Like”) into a tangible form.

Design Process and Goals

In the physical world, humans’ sense of touch is one that reminds them of their physical existence [3]. The virtual world, however, focuses more on sight and hearing senses. Tangible interfaces create means for interacting with the virtual world through physical experiences, and bridging among different senses. In this paper, we explore translating a simple button (the “like” button) in the virtual world into an everyday tangible experience. We have designed and created a set of t-shirts, called “I Like This Shirt”, each having an interactive “like” button, and a LED displaying the total number of likes accrued for the shirt. There are two ways to “like” each shirt: (i) by tapping on the “Like” button placed on the shoulder of the shirt (Figure 2), or (ii) by visiting the website, “iLikeThisShirt.com”, and clicking on the corresponding t-shirt image (one image per wearer)—see Figure 3.

Design Goals

During the design process, we defined four overarching goals:

- **Careful placement of the touch sensor.** The touch sensor should be placed appropriately on an area that is easily accessible for passersby to touch but not in a sensitive location that may cause mental discomfort.
- **Attractive and Engaging.** Design should capture passersby’s attention at first sight and encourage them to interact with it.
- **Virtual click to Physical touch.** The shirt should afford “Liking” via an easy, intuitive interaction.

- **Physical comfort.** The embedded electronics should be lightweight, portable, and invisible. It should also be mentally pleasant (*i.e.* approachable from both wearer’s and viewer’s perspective).

Implementation

To meet our design goals, we iterated across multiple prototypes, which varied in microcontroller type, LED display technology, and aesthetic design. The final prototype is comprised of five parts: LED display, Arduino Pro mini [1], Bluetooth modem, touch sensor, and a battery. These components communicate with a backend server through an application on a smartphone via Wi-Fi. The server stores the ‘like’ data in a database, and returns the current value of each device (*i.e.*, current number of total “likes” accrued to each shirt) to both the device as well as a website (Figure 3).

In general, we found that a person’s shoulders and upper back are the most comfortable locations to place the “I Like This Shirt” touch sensor [2]. Patting a person’s shoulder is also generally an acceptable form of social interaction (though admittedly not necessarily between strangers). For the “like” visualization, we custom built a flexible display using nine strips of AdaFruit NeoPixels—three strips of 13 LEDs for each digit. The LEDs are individually programmable. The touch sensor is made with conductive thread and a conductive sheet, called Velostat, in between that closes a circuit connection when pressed.

We applied the Facebook thumbs-up sign as an indexical sign [9], which creates a link between the word “like” and its physical metaphor in the mind of the perceiver. The LED display is placed in the middle of the “like” sign. A phrase, “people like this shirt”, is



(a). Front (off)



(b). Back



(c). Front (on)

Figure 4. Our designed shirt. Directions indicating where to tap to “like” the shirt are displayed on the front (an arrow) and back (a pointer hand) of the shirt (a-b). When the shirt is on the number of likes on the display (c).

written under the “like” sign in order to make it intuitively understandable and approachable. When turned on, the shirt reads “[x] people like this shirt”, where “x” displays the current number of likes. Directions indicating where to tap to “like” the shirt are displayed on the front (an arrow) and back (a pointer hand) of shirt (Figure 4a-b). This helps to eliminate confusion and encourages passersby to interact with the shirt (even strangers).

Evaluation and Results

To examine how people (both wearers and passersby) respond to our t-shirt prototype, we conducted a small field deployment study on our university campus. We investigated how people reacted to our t-shirt, the emotions/comments that they expressed, and how the wearers’ felt wearing the shirt. Note: although the ilikethisshirt.com website could also be used to like the shirts, our evaluation focused on the tangible design (*i.e.*, the website was not evaluated).

Method

6 participants (1 female) volunteered from of our research group to wear “I Like This Shirt”. Participants had a range of personalities (*e.g.*, extrovert vs. introvert). Two participants were randomly chosen to wear the shirt individually (Figure 5a); the remaining 4 were divided into groups of 2 and were deployed together (Figure 5b-c). Participants were asked to visit a public place on campus and observe/record passersby reactions, comments, and interactions toward their interactive shirts. They were also asked to report their feelings, thoughts, and attitudes on wearing our designed shirts. Our deployments took place in crowded university areas such as the student union building

during lunch and a large career fair event at our university stadium.

After each field deployment, participants were asked to complete a questionnaire regarding their field experience, and to share their personal notes with us. Because our study is exploratory, we analyzed our data based on participants’ answers and notes, followed by passersby’s quotes.

Results

From the analysis, we identified 5 emergent themes. We discuss the wearer’s perspective as well as comments and reactions from passersby who interacted with the shirts.

Overall design and functionality. Based on the responses of participants, most passersby reacted positively to the shirts. Some viewers preferred a different color shirt but with the same design: “*the design is good, but I prefer it on a shirt with darker color.*” A few did not like the design, calling it “*craving for attention*” making them feel like spectacles. As for the functionality, participants reported that the device worked, with the exception of a few times when the link between the Bluetooth modem and their smartphones disconnected. Similarly, the touch sensor did not always function correctly due to the different amounts of pressure it received by passersby.

Physical comfort. All participants agreed (by an average the score of 8 out of 10, where 10 = most comfortable) that the shirt was comfortable to wear. They reported that the battery pack was the most uncomfortable feature of the shirt. With regards to the touch button one participant stated: “*the touch sensor*



Figure 5. During the field deployment, passersby interact with shirts.

moved from its place requiring the passersby to press the area with more pressure”.

Emotional impacts. All 6 participants reported that their experience was enjoyable and fun. Those who participated in a group said that they were encouraged to get more likes and felt competitive toward their partner. They also felt empowered by being the center of attention: *“It felt good. Everyone was looking at me.”* Two participants felt nervous but only at the beginning of the experiment. One stated, *“At first, I thought I was weird, but then I saw people’s positive reactions toward the shirt and then it went away.”* The experience for the female participant was not, however, completely pleasant. She reported that some male passersby seemed to place their hands on the participant’s shoulder more than necessary. She also complained that a few male participants intended to tap on the thumbs-up sign instead of the shoulder. She also stated that in her culture, touching in social interactions is unusual—especially between strangers.

Passersby’s reactions. Based on participants’ observations, most passersby thought that the shirt was a good conversation starter. Passersby stated that they would wear the shirt in a party or a concert rather than wearing it on daily bases. One passerby reflected, *“It would become boring if someone wore it everyday”.* Another stated, *“this shirt is the future of smart clothing.”* When we asked passersby why they did not interact with the shirt, some responded that they did not like to touch strangers.

Tangible vs. Virtual. Participants agreed that tapping on a tangible “like” button was interesting and thought-

provoking but that it did not scale as easily as clicking on a website.

Discussion

As the first work exploring the translation of social dynamics in the virtual world into physical experiences mediated by a t-shirt, we were encouraged by the reaction of wearers and viewers. We reflect on our findings below, emphasizing how they relate to our design goals and their limitations.

Individual’s personality and gender need to be taken into account when touching is involved.

Based on our findings, most male passersby reported being comfortable touching and being touched by strangers. However, some female passersby reported that they were uncomfortable in the same situations. This finding is consistent with our own expectations regarding comfort in relationship to the gender of individual wearing the shirt. Another factor is individual’s personality, which includes cultural differences, and boundaries of personal space. While in some cultures touching in social interactions is common, in others it is not consider a polite gesture. This cultural difference can also affect the personal space defined by individuals. Based on our findings, male participants/passersby from different cultures were more relaxed during the interaction. However, for the female participant/passersby, the cultural differences impacted their interactions during the deployment.

Physical comfort is an important design consideration when it comes to wearable everyday objects. Comfort can be affected by physical characteristics such as its weight. We found

that all wearers agreed that the shirt's weight was sufficiently light and portable enough to be worn. Moreover, some passersby and all 6 wearers commented that the delay between tapping on the shirt and the LED display updating was sometimes delayed. In consideration of the disparity in our findings on comfort across genders, we believe responsiveness is especially important for wearable TUIs. We implemented the code in a way to prevent counting passerby's multiple taps.

Wearable social technology can increase sociability. In our findings, all 6 participants thought their social interactions were increased. Introverted participants became more sociable, and started conversations more frequently than usual. Extroverted participants reported that wearing the shirt enabled them to interact with an even greater number of individuals than usual. Both introverted and extroverted participants reported that wearing the shirt enabled novel social opportunities for them.

Limitations

Our study is exploratory and focused on a small number of participants from our research group who are familiar with wearables. Therefore, our findings are limited in both their breadth and depth. However, we believe that our findings suggest that studying a larger, more diverse group of participants may provide useful insights for designing interactions for wearable technologies.

Conclusion

Our findings suggest that wearable technologies, such as "I Like This Shirt," that incorporate social mechanisms from the virtual world can transform social interactions in the physical world. Our prototype and preliminary results help demonstrate the potential of wearables as a new medium to enrich social interaction.

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