
Social Textiles: Social Affordances and Icebreaking Interactions Through Wearable Social Messaging

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Abstract

Wearable commodities are able to extend beyond the temporal span of a particular community event, offering omnipresent vehicles for producing icebreaking interaction opportunities. We introduce a novel platform, which generates social affordances to facilitate community organizers in aggregating social interaction among unacquainted, collocated members beyond initial hosted gatherings. To support these efforts, we present functional work-in-progress prototypes for *Social Textiles*, wearable computing textiles which enable social messaging and peripheral social awareness on non-emissive digitally linked shirts. The shirts serve as catalysts for different social depths as they reveal common interests (mediated by community organizers), based on the physical proximity of users. We provide 3 key scenarios, which demonstrate the user experience envisioned with our system. We present a conceptual framework, which shows how different community organizers across domains such as universities, brand communities and digital self-organized communities can benefit from our technology.

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ACM Classification Keywords

H.5.3 Group and Organization Interfaces; H.5.2 User Interfaces; D.2.2 Design Tools and Techniques

Introduction

Community organizers often employ strategies for generating social interactions such as providing alcohol in social gatherings, team-building activities, solicit disclosure of member information, as well as provide symbolic commodity and merchandise. Objects such as mugs, pens, shirts, badges, notepads and bracelets are symbolic commodities provided through community organizers as they inherit attributes, which translate into social signaling opportunities.

Wearable commodities such as clothing and accessories provide unique opportunities for social advertising as their functions serve as extension to an individual's identity. One prime example of such a wearable commodity is a university's class ring or t-shirt, which identifies an individual as a part of a common representative group carrying shared values of the associated commodity. Because commodities already act as social catalysts [2], they are able to extend beyond the temporal span of a particular social event or occurrence and into extensions of everyday life, offering omnipresent icebreaking interaction opportunities amongst members. Thus, by introducing additional affordances to these commodities while leveraging their existing functionalities as social catalysts, we believe that they can act as effective tools to facilitate social interactions for community organizers. To support these efforts, we present functional work-in-progress

prototypes for *Social Textiles*, wearable computing textiles which enable social messaging and peripheral social awareness on non-emissive digitally linked shirts. The shirts serve as social catalysts for different social depths, which reveal common interests between members and exposes varying degrees of private information (figure 1). The disclosure of personal information is mediated by community organizers through defining the shirt's default state and a set of triggered states for which further information will be revealed amongst specific member groups.

Related Work

A number of prior research in computer-mediated communication (CMC) employ methods utilizing wearable commodities as social catalysts. The distinction between our research and existing works is that our development serves to generate social affordances *beyond* initial hosted gatherings, for *community organizers across various domains*.

nTags are active badges that works with personal information submitted into a database. When another wearer of an nTag with similar interests is in close proximity, the name badge shows a percentage that represents the common interests you have with the person you interact with [1]. iBand is a technology-enhanced bracelet that can store, display, and exchange information about you and your relationships. iBand leverages the familiar nature of the handshake, coupled with the qualities of jewelry to act as tangible keepsakes and reminders of relationships [4]. Urbanhermes is a wearable patch that act as a means for social signaling to meet individuals with shared interests. The wearable patch is used to transmit images to strangers with common interests [5].



Figure 1. Before and after of interaction via skin contact. Information in this instance shows the users' common university.

Prototype and Technical Design

Our system functions to aggregate social interaction among members beyond the given context of a community organizer’s hosted event. It also extends such social affordances every time the shirt is re-worn and serves as an omnipresent social catalyst. As shown in figure 2 and 3, we utilize a series of technologies which communicates with a user’s smartphone to detect proximity, deliver haptic feedback, detect human capacitance and activate the thermochromic dyes on the shirt. Here, we describe how the interaction works (see figure 4):

User feels a haptic feedback via a light “tap on the shoulder” as they sense the presence of someone wearing *Social Textiles* within a 12-foot social spatial proximity¹. We map the metaphor of haptic feedback based on relationship level: acquaintances and friends may ask for attention with a squeeze on the shoulder while unacquainted individuals enact with a soft tap. This brings about an embodied peripheral awareness upon unacquainted users. When users of the same shirt interact through a social greeting with one another via skin contact through a handshake or a high five, wearers of *Social Textiles* gain new ‘features’ or social information of the interacted parties. This incentivizes and provides social affordances for users to interact with one another, as they are able to see what they have in common, see additional artwork on the shirt design, or discover underlying social information with collocated members.

Currently we focus on exploring the feasibility of our idea and have built a functional proof-of-concept prototype. The prototype development can be described in two parts: thermochromic soft circuit and electrical hardware. For the soft circuit, we used conductive fabrics (MedTex130 and gold-thin conductive fabric) embedded below a layer thermochromic ink which becomes transparent at 89°F. Thermochromic ink is not dynamic compared to other technologies like LEDs, but is easily replaceable with current printing technology. Also the use of ink and conductive fabrics is suitable for the practicality of maintenance and laundering[6]. The hardware components consist of a microcontroller with a bluetooth low energy module (BLE), vibration motor, a 15V battery and conductive thread as a capacitive sensor sewn on the neck of the shirt. Future work will involve the miniturization and waterproofing of the hardware through a secured waterproof enclosure. The BLE module is used for wireless connection between a user’s smartphone and the *Social Textiles* in order to retrieve data among users such as common interests and social proximity which community organizers can utilize to program interaction triggers (demonstrated in the scenario & applications section). The capacitive sensor is used to detect skin contact among members to trigger the soft circuit and embedded messages and graphics on the thermochromic shirt.

Towards the development of a fully functional prototype, several technologies are under investigation based on factors such as accessibility, cost, reusability and manufacturing access. For example, E-ink [3], widely known as electronic ink technology for e-readers is under development within the research community as printable inks on fabrics, but is currently not

¹ Edward Hall’s social proxemics diagram highlights the social interaction distances in a physical environment

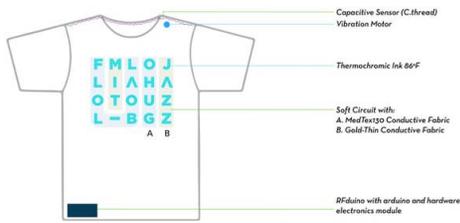


Figure 2. Diagram of shirt components

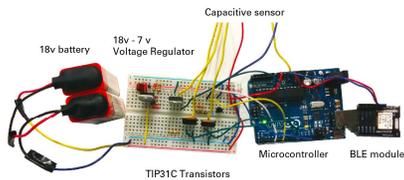


Figure 3. Electronics components with microprocessor, BLE bluetooth module, batteries and supporting electronics circuitry.

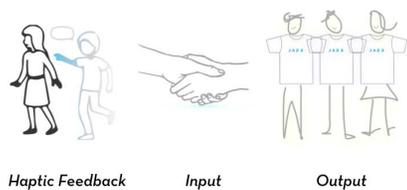


Figure 4. Interaction scheme shows
 1) Haptic feedback: user feels presence of someone wearing the same shirt; 2) Shirt serves as icebreaking interaction; 3) Wearers of the textile gain meaningful interaction as shirt reveals what they have in common other person

accessible. In contrast, LED displays are currently accessible but social and cultural acceptance of emissive displays on wearables is not yet adopted.

Scenario Applications

Here we demonstrate three scenarios where *Social Textiles* are used in different communities:

Brand communities inherit members when individuals self-identify with a particular brand and thus subscribing to the community through purchasing commodities.

John goes to “X brand” clothing store to purchase a *Social Textiles* shirt. He selects a graphic shirt with a single star on it (about the size of a dime). A sign at the store reads “uncover the real design.” The next day he wears the new shirt, curious as to when he will in fact discover the shirt’s actual design. On the way to lunch, he senses a soft vibration on his left shoulder and it felt a bit like someone just tapped him. He looks around and sees that 7-feet away, is a girl wearing the same shirt as him. She also notices this as they approach one another’s direction. John decides to approach her: “Hey we have the same shirt! I’m really curious what this design really looks like. My name is John.” They shake hands and the shirt gradually grows from a single star to the constellation Leo.

Within this scenario, the disclosure of personal information between the users (John and Cynthia) is *low*. The *Social Textiles* requires no data of the users’ identities to produce the interaction. The design of this particular *Social Textile* motivates individuals to interact by enticing them to uncover the underlying design of the shirt. The common interests and traits between John and Cynthia are left for the two members to discover. Since they both subscribe to purchase shirts

from this particular clothing brand, it is likely that they have particular tastes and lifestyle interests in common (represented by the clothing brand). The *Social Textile* does not disclose personal data or guide the social conversation towards any particular subject. Users solicit to gain access to the particular community, based on the brand-mediated design they purchase.

Universities hold school wide orientations in the beginning of each semester to welcome new students. Relationships and collaborations formed across disciplines serve to increase innovation and intellectual capital for the institution.

It is Joie’s first week of school at university. During orientation she receives a *Social Textiles* shirt and is instructed to wear it throughout the event. It is difficult to discern exactly what the shirt reads as it is made up of a series of alphabet letters arranged in a grid. While all the shirt designs look similar, Joie observes that depending on which color shirt people were wearing, the arrangements of the letters were slightly different. During lecture at orientation, the dean of student affairs speaks: “It is important to make friends outside your department.” In a cheeky expression, the dean continues: “Just to give you a tip for this week, meet as many people as you can with a different color shirt than you - often, new ideas are unlocked through interdisciplinary collaboration ;).” During lunch Joie takes the dean’s advice. She walks up to a group of people with different colored shirt designs and introduces herself: “Hey, I’m joie”. She reaches in for a handshake with Penny, who is wearing the same color shirt as her. When they shake hands, the group is astounded as they watch all the shirts within the group transform. The text on their shirts “disappear” to reveal that, two of them are EE (Electrical Engineering) majors,

one in CS (Computer Science), while Penny and Joie are both in Arch (Architecture).

This scenario highlights how *Social Textiles* can connect interdisciplinary members by revealing different information on the shirts. The disclosure of personal information in this scenario is *medium*, since generic information and semi-personal data is revealed about the users. This information is mediated through the community organizer (in this case, the university) where they facilitate interdepartmental communication between the students. Other potential information can be shown on the same shirts (ie. skillsets; hobbies and club affiliation; or institution name) to aggregate interaction among groups with different traits. In addition to facilitating icebreaking interaction and assembling interdisciplinary teams, the *Social Textiles* can also enable additional affordances for students attending the same university to encounter one another outside of the event (figure 1).

Online communities often self-organize through the digital infrastructure provided by sites like Meetup.com, Twitter.com and Facebook.com. In some situations, digitally organized communities assembled online translate into physical world events and gatherings to form offline support groups or civil activism pursuits. Special interest groups often self-identify and signal to one another publically, through the use of specialty patches, stickers and wearables.

Morgan is an avid fan of underground doom metal music. He does not have any friends who are into this genre, so he often follows particular digital community websites to congregate about his favorite doom metal bands. One day when Morgan went on the website, he found that they released a new *Social Textiles* shirt in

the merchandise section of the website. The shirt is minimal and looks like a regular black t-shirt. He decides to order it so he can use it to meet more people that are into doom metal. Morgan finally gets his t-shirt and wears it to work. As he walks into work, he senses the vibration motor. The vibration feels a bit like a squeeze in the arm. He notices that Ben is walking towards him, also wearing a seemingly regular black shirt. The two of them exchange glances as they realize that they are both doom metal fans.

In this scenario, *Social Textiles* connect people with specific niche interests. The disclosure of personal information is *high* since Morgan's interest in doom metal is highly specialized and personal information. The *Social Textiles* shirts can also serve to connect community members with common philosophical beliefs, personalities, emotional statuses and ethics. As illustrated in this scenario, *Social Textiles* has the potential to enable members to bypass superficial or generic interests. It has the capability of connecting people based on specialized personal information through "filtering" individuals, to tune social experiences towards more compatible ones.

Conclusion & Future Work

We believe that our system offers several advantages and distinctions over existing systems. Our contribution towards the development of social affordances through wearable computing textiles extend beyond initial hosted gatherings, and serves as omnipresent social catalysts for community organizers. As illustrated in the scenario applications section, *Social Textiles* can be applied across a variety of domains for connecting communities through icebreaking interactions.

As individual members are a part of multiple communities and are selective in what information they choose to disclose to the public through their fashion, our system is sensitive to users' boundaries for what is considered private versus public. *Social Textiles* leverages the nature of wearable commodities and its tendencies to reveal different levels of personal information, based on which community group they may have acquired the wearable through. The different community groups highlighted represents the degree of personal information that is disclosed through an individuals' association with them. The level of privacy in *Social Textiles* is maintained by the context and databases already possessed by various community organizers, thus maintaining trust among users of our system.

This paper serves as a conceptual framework for developing social affordances to aggregate interaction among unacquainted, collocated members beyond initial hosted gatherings. Future work will involve fully functional prototypes where we build upon our current proof-of-concept implementations, by incorporating current social media infrastructures and databases. Hardware components are to be miniaturized, waterproofed and integrated into the *Social Textiles* to progress the prototype towards practical, easy-to-maintain, and distributable products. User evaluations to test the effectiveness and depth of social interactions with our technology will be subject of ongoing work. To further facilitate community organizers, user-friendly tools and interfaces for designing, editing and producing *Social Textiles* will be investigated.

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