

Designing Unobtrusive Interfaces to Increase Naturalness of First Time Face-To-Face Interaction

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Abstract. Social Proximity Applications (SPAs) have facilitated social networking in the real world. However, most applications are deployed in mobile devices (i.e. smartphone, PDA, tablet) restricted to traditional input and output (I/O) interfaces i.e. button, keyboard and screen. For people with low interpersonal skills, the requirements imposed by traditional interfaces can make their problems worse. In contrast, this paper describes the Icebreaker T-shirt, designed with natural interfaces to ease face-to-face communication when meeting new people. We discuss its design concept, technical requirements and user experience based on an experiment conducted with shy users in which 73% reported that the shirt was helpful to their meetings with strangers.

Keywords: Augmented clothing, wearable computing, human-human interaction, social networking, user interfaces.

1 Introduction

Social networking has become a popular activity with the increasing number of social networked sites like Facebook [1], LinkedIn [2], and MySpace [3]. Those with introduction services that match compatible site members are gaining more attraction from Internet users since each member can search and look at the public information of others and invite them to be friends if he wishes. Dating websites like Lovestruck [4], Match [5] and OkCupid [6] are examples of online communities gaining benefit of accessing user information e.g. profiles and preferences. The use of SPAs is a step further that augments users online data into mobile computer-mediated communication (CMC) devices, thus facilitating communication in physical events where users are in the same proximate distance.

SPAs have been reported as helping high social skilled people but can be a drawback for those with low interpersonal skills since checking social cues, approaching others and initiating a conversation are their common challenges. In addition, operating an SPA embedded device using traditional buttons/keyboard and/or scrolling on texts up/down its traditional touch-sensitive screen while also making contact with latter.

1.1 Icebreaker T-shirt

Designed to be worn in real-world social events, Icebreaker T-shirt is aimed at making social contact easier by leveraging online social network information (e.g. Facebook and LinkedIn) on clothing. Radio Frequency Identification (RFID) technology is used to identify wearers when shaking hands; the shirt then indicates the wearers' social relationships via a textile-based display, increasing a sense of familiarity and helping select new acquaintances (potential friends, partners, colleagues) while maintaining the naturalness of the social interaction.



Fig. 1. Two prototype Icebreaker T-shirts, worn in a speed dating set up

As a preliminary part of a research programme into techniques for adaptation of social behaviour in individuals who self-report as socially anxious and consider themselves to have low social skills, four prototype T-shirts have been developed with unobtrusive interfaces (i.e. handshaking – a natural switch for controlling data exchange – and soft-circuit information display) and tested with socially anxious subjects. Using CMC together with the essence of ubiquitous computing and wearable design – that naturally place technology in the user environment prior to the reflective experience of the user – we examine to what extent unobtrusive interface and unconventional use of technologies can enhance the effort of the user to improve social skills when faced with situations requiring interaction with others, and perhaps lead to more meaningful relationships in the real world.

2 Background

2.1 Effects of online CMC on shy users

The Internet makes seeking new friends easier e.g. increasing communication and contact across time, distance and personal circumstance. Research on the relation between online CMC and shy people shows that the Internet highly attracts this type of user: without being overly concerned with social customs and interpreting non-verbal clues from interaction partners, the user can focus more on information content [7]. However, it allows identity distortion, unrealistic expectations in pursuing relationships, and withdrawal from face-to-face activities; thus making real-world contact harder for socially awkward users [8-10].

2.2 Benefits of wireless communication

Integrated with wireless technologies, like Wi-Fi and Bluetooth, in personal computers, SPAs are capable of augmenting online community in real-world events [11-13]. In addition, screen, keyboard and button –based devices like laptops, tablets or smartphones offer rich aesthetics for displayed information e.g. user data are transmitted and generated as picture/graphic/text that change quickly according to the user context. However, the physical properties of these devices and traditional interfaces for data input and representation require the user's conscious thought and effort in operating the applications. Despite being wearable or carry-able, they put the SPA-embedded devices as a separate tool and at a "distance" from the user.

2.3 Advantages of wireless personal area network (WPAN) and wireless local area network (WLAN)

Wearable computers have become popular tools for facilitating social networking. Unlike SPAs that solely rely on distinct, separate devices, wearable computers with WPAN enabled can be concealed as part of the user's clothing items. Without the users' effort, WPANs [14] and WLANs [15] connected via ad hoc networks can detect and broadcast his information to others in close proximity. However, this raises issue of privacy among ordinary users. For socially anxious/awkward people, this is even more of a concern.

3 Design

3.1 Requirements

Making friends is a gradual process of revealing information about oneself; when a user has low social skills, this is even more challenging. Developed on a hypothesis that familiarity might enhance comfort and relaxation when making contact with new acquaintances, the main functionality of Icebreaker T-shirt is to provide friend-matching clues that help the wearer to start a conversation and generate the conversation contents. Therefore, designing a social tool for this purpose, technology has to be integrated into the user's environment naturally with little or no extra efforts required in operating or accessing information. Social situations are dynamic and complex; cognitive overloading is a common incidence in the intended user due to being overly aware of feedback from the interaction partner and others; so avoiding forms of I/O interfaces that might cause disruption to the user's physical and psychological experience is our design goal.

3.2 Implementation and implication

Icebreaker T-shirt is equipped with a set of RFID reader and tag embedded on the cuff of its long-sleeve on the right to prompt the exchange of identities when two wearers shake hands. Many social applications and devices, with wireless technologies within networks [11-15] put users in a passive position e.g. automatically scan all users and their information, then broadcast their information to those that match throughout proximity and network. Users who want to keep their data confidential may switch off the devices or physically move away from the networks' coverage. Less troublesome to operate and giving the wearer fully control over their information, our shirt's privacy system uses a RFID reader that operates within 4cm. It turns a common handshake gesture into a switch controlling identity exchange. In turn the wearer has fully control over their privacy and their decisions e.g. the user

might find the person next to him/her not attractive so decide not to exchange information with them.

Next to the RFID system, there is a microcontroller designed to retrieve the wearers' public profiles and preferences from their Facebook pages via a smartphone. In the proof-of-concept prototypes used in the first experiment, this feature was left out, and information of test subjects was pre-stored in the microcontroller. The microcontroller then compares information of wearers based on their corresponded profiles (i.e. age and sex of people they want to meet) and similar interests (i.e. favorite films, music bands, sports and hobbies) and calculates a single overall compatibility score. The more things they have in common, the higher their compatibility level becomes. This level is used to define the amount of heat generated and sent to the soft-circuit display on the front of the shirt.

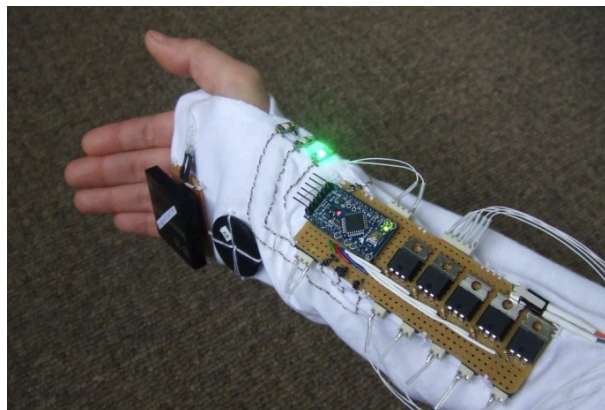


Fig. 2. The first prototype T-shirt's right sleeve embedded with RFID system, microcontroller, heat circuit and feedback LEDs telling states of identity exchange

To become fully immersed into the property of fabric, the display is equipped with conductive thread and heat-sensitive paints offering physical comfort to wearers. The degree of matching between the wearers is conveyed using a coloured bar chart: only the overall compatibility level is revealed (via colour change), thus not exposing their detailed information in public. The black bar chart converts into colours depending on their compatibility degree – higher compatibility triggers hotter colours i.e. red and orange, lower triggers colder i.e. green, blue and purple. Assimilating information display into the existing feature of the shirt allows its contents to appear in the central attention of the wearer when needed and plunge into the periphery when not. This principle of Calm Technology [16] is used as a key method to reduce cognitive load giving the wearer more background access to the information content.



Fig. 3. The display is constructed with heat-sensitive paints and conductive thread in the shape of a bar chart. The higher the compatibility level, the more heat is provided to the display causing the bar chart, initially black, to become more colourful

4 User experience and evaluation

An experiment was conducted to test the handshake method of the first prototype and evaluate its display that might enhance comfort and relaxation for shy users when making contact with strangers; thus helping the user to start a conversation and generate its content.

4.1 Experiment

A pre-test questionnaire was used to recruit test subjects from students in Queen Mary University of London during summer 2011. 11 were selected from 18 respondents who self-reported as socially anxious; the rest had known others before the experiment so they were not considered strangers. Consisting of 2 parts, the question-

naire part 1 is customised from The Henderson/Zimbardo Shyness Questionnaire [17] and used to study the nature of anxiety in socially related activities of test subjects. Part 2 is designed to collect demographics and preferences for compatibility determination i.e. age, sex, favorite activities, music, film and sport. The answers were then pre-stored in the prototype shirts' microcontroller. Each test subject participated in 2 speed-dating sessions: one with the shirt and another without.

With a concern that user experience in the with-shirt session might affect that in the without-shirt session, we designed the meeting order to have 6 subjects taking part in their without-shirt session before the with-shirt session and the rest vice versa. Each session could last 8 minutes maximum. Instructions for using the shirt, including the meaning of the colour changing bar chart, were given with a request to start each session with a handshake. User behaviour during both sessions was video and audio recorded, and used in tandem with feedback given in an after-test questionnaire for evaluation.

Table 1. An order of 12 speed-dating sessions participated by 11 shy test subjects (A-K). Person Z is not shy but takes part so that subjects A and K both have experience with-shirt (w. shirt) and without-shirt (w/o. shirt).

Sessions	w/o. shirt	w. shirt	w/o. shirt	w. shirt	w/o. shirt	w. shirt	w/o. shirt	w. shirt	w/o. shirt	w. shirt	w/o. shirt	w. shirt
Subjects	Z	A	B	C	D	E	F	G	H	I	J	K
	A	B	C	D	E	F	G	H	I	J	K	Z

4.2 Result and discussion

Responses to questions related to the required greeting method show that 91% have no negative opinion towards handshaking since it is a common greeting and reflects people's personality and influences first impressions. However, the majority of test subjects come from the UK and Western countries where this type of greeting are common in their cultures. To the questions concerning the functionality of the shirt, 73% say it was helpful to their meeting with strangers. One said: *"It gave a sense of having something in common to begin the conversation, something we both were interested in. Whereas when we didn't have the shirt, I felt we were only trying to make small talk."* A pair whose compatibility level equals zero and seeing no change on the display part of the shirt said: *"I couldn't tell if the display had changed but the compatibility seems to encourage and comfort."*

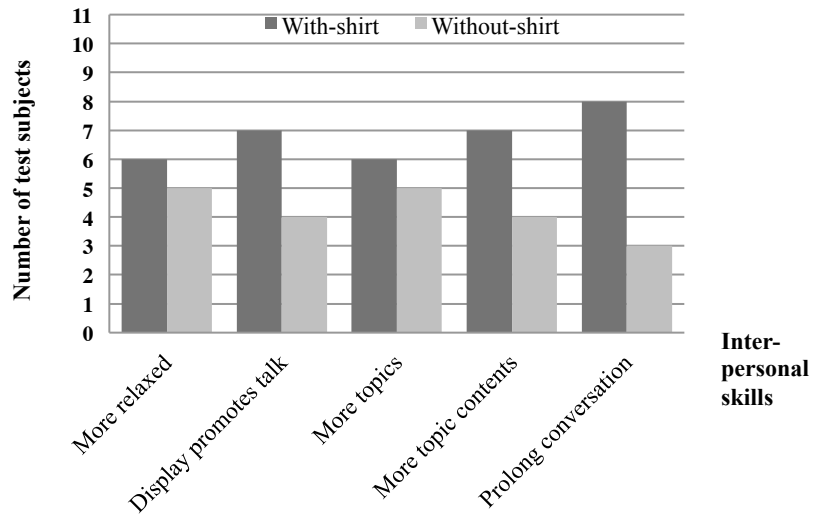


Fig. 4. User experience based on feedback given via an after-test questionnaire

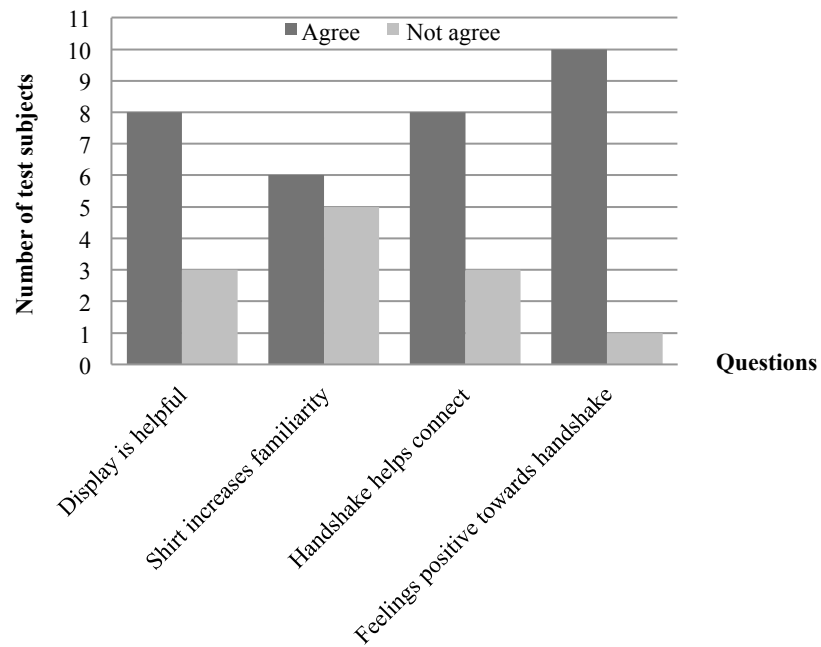


Fig. 5. User experience based on recorded video

For subjects who generated conversation topics from the compatibility display, the recorded videos show that after seeing the change of display, they asked each other about preferences (given via the pre-test questionnaire during the recruitment) so as to find out their commonalities; music and professional background were the most popular topics, hobby came second, whereas age and sex were not mentioned in any sessions. Unmatched answers (e.g. differences in their preferences) influence longer topic's length compared to the matched answers. However, this also depends on the inquisitive nature of the session partner – if one appeared to engage in the preferences which he or she was not familiar with, the other talked more about that preference. In some sessions, the unmatched preferences occupied almost the entire session. Revealing these preferences to one another serves as a source for conversation topics as well as content. This is where the dynamic of Slow Technology [18] plays its part in our design approach: using the compatibility level to indicate the existence of commonalities while concealing the details, the interface promotes interaction and reflection, thus enabling conversation.

Nonetheless, there is a slightly greater number of test subjects appearing more relaxed using the shirt. No subjects left their with-shirt session before the end of session, whereas some stayed up to only 5-6 minutes in their without-shirt session. 67% paid attention to the compatibility display, which was used to generate conversation topics. A pair observed the changing bar chart at the beginning of their session and used it to open a conversation, others paid attention to it either in the middle or close to the end of their sessions.

The sample tested was small, partly due to the condition that all subjects must be unknown to each other, and the algorithm used in user profile matching was less sophisticated compared to those used in speed dating sites or in reviewed literatures. However, the experiment has underlined some problems and potentials of this approach to designing technologies to improve interpersonal skills of the users.

5 Conclusion

We have presented a proof-of-concept social clothing prototype, designed to improve social interaction for shy users. Its design centres around its unobtrusive I/O interfaces, designed to fit naturally within face-to-face communication; we hypothesise that this eases the physical and psychological experience of the intended user. Preliminary results give tentative support for our hypothesis and suggest that the approach is feasible.

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