SocialButton - Mobile Technology Enhancing Social Interaction

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Abstract

We are exploring the use of small displays as an instrument to enhance social communication. Our focus is on encouraging communication between strangers by revealing the existence of common friends. In the following we present the concept of the SocialButton, a wearable mobile device which displays aspects of friend-of-a-friend networks. A group study has provided us with an initial understanding regarding the potential of the SocialButton to influence our social environment.

1. Introduction

Most of everyday encounters are ephemeral and between strangers. They happen to be a mutual glance while passing on the street or a discreet observation of somebody on the same bus while going to work. Sometimes people identify themselves with non-acquaintances just because of their behaviour, appearance or age, without any objective reason. Most of the time, such incidents bear potential to trigger a conversation, which might be favoured by the persons involved but is avoided because of a missing starting point. In these cases, knowing that both have something in common can help to overcome the barrier of the first contact. Being in public spaces involves seeing and being seen by other people. According to Goffman [8], they will commonly seek to acquire information about an individual entering their presence or to bring already existing information into play. In this process visual aspects and fashion signs have significant influence. They contribute to the image people automatically construct around other individuals by e.g. trying to localize them within a social group. The SocialButton-device makes use of this incident. It is a fashion accessory which displays information on social connections. The appearance of electronic fashion devices can be changed quickly offering the possibility to react continually to pre-selected flows of information [12]. Moreover, as wearable computing starts to permeate our daily lives, it is time to investigate its potential to influence direct interpersonal behaviours.

Two ways of social interaction can be distinguished: Focused and unfocused. The first requires acknowledgment of each other's presence involving not only face-to-face conversation but also non-verbal interchanges (flirting). The second doesn't involve this acknowledgment: one checks the other through an asymmetrical relation, which means without being noticed [9]. While most distance-based social applications explore the active transformation of unfocused into focused interaction (see Section 2) we developed a new device that passively aims the user's peripherical attention without imposing a focused interaction (in Section 3.1). As an ambient display, the Social-Button fades its information into the users' environment offering the choice of focusing their attention on the system or not. We also propose a new approach to effectively display personal information without revealing private details (see Section 3.3). At the end of this paper we describe a field study analyzing the potential of the SocialButton to influence social behaviours (Section 4).

2. Related Work

Nowadays, social applications such as weblogs, social networking websites or internet forums are widespread [6, 5]. These systems, however, are bound to personal computers connected to the Internet and they are therefore missing face-to-face communication. Proximity based mobile systems designed to enhance social interactions in the physical space are still an emerging field. In the great majority they are software applications running on mobile phones or laptops, communicating via W-LAN or Bluetooth.

The Nokia Sensor [13] application, for example, allows mobile phone users to communicate within short-range distance (up to 20 m) via ad-hoc Bluetooth connections. The users discover the profile of each other and exchange messages in order to meet in person. During our research we realized that most initiatives of looking for a person whose profile corresponds to one's own derive from flirting in-

tentions. Flirting provides the necessary motivation to exchange several messages that are usually necessary to track down the location of the other person. Because of the omnidirectional broadcasting characteristics of Bluetooth the device itself cannot give any hints at the direction. Although Nokia Sensor is intended to be used in any situation, its use is limited by the prerequisite of matching profiles and the necessary effort to find the other person.

Another system based on comparing profiles is LoveGety [4], a mobile device designed to help users in their search for a partner. It secretly signals the user's romantic availability to other users through vibration and conveys notifications when matching profiles are found. Different from Nokia Sensor, LoveGety is automatically triggered, which means that information is sent and received passively in a scatternet-like environment.

A last related project is Damage [16], a bracelet that displays the activity of a message application (Slam) running on mobile phones. The bracelet contains six LEDs: five representing individuals, and one representing the activity of the whole group. The LEDs pulse indicating messages received or other meanings determined by members of a defined group. The bracelet helps to be aware of the communication activity. It is, however, restricted to a small group of five close friends and only functions as a visual output interface of the Slam system.

3. SocialButton

3.1. Wearable Social Display

We define the term Wearable Social Display as a display that is carried by an individual and publicly shows information of others.

The act of wearing it implicates sharing or even bestowing information on other persons around. The character of the information and its way of transportation can either be determined by the person wearing it or automatically react to the person's surroundings. Others might see information dealing with themselves displayed on your device. This application bears the potential of creating a feeling of connectivity, since a new experience is established by seeing personal information on other persons' bodies. We compare this feeling with the experience of seeing somebody else wearing one's clothes.

In a scenario (see Section 3.4) the Wearable Social Display is worn by all persons present at a given place. Once the devices mutually notice the presence of others via Bluetooth, they automatically communicate, exchange and compare information from their individual contact databases, and display matching contacts (see Section 3.5 for technical details). This feature is related to the ephemerality offered by electronic fashion. As electronic textiles become widespread, it is easy to imagine electronic clothes that can quickly change visible features. We believe that Social Wearable Displays have a strong potential to change the way of interacting with information.

The SocialButton is an example of Wearable Social Displays. It fits within the palm of the hand, and once attached to the clothes of a user, it scans the environment for other SocialButtons. In order to find common friends, it compares the contacts data bank of users' mobile phones. Once a common contact is found, the buttons communicate and exchange a personal symbol previously defined by each user. Afterwards, each button displays the newly received symbol. Finding his personal symbol on another device, the user will be aware of this exchange as well as of the person he shares a friend with.

Unlike most mobile technologies, the SocialButtton doesn't aim at capturing the users' primary focus but targets the periphery of their attention. In this sense it doesn't influence their authentic and intuitive social behaviour. According to Weiser and Brown, placing information in the periphery enables the user to attune to more things than he could if everything was at the centre. They affirm that "by recentering something formerly in the periphery we take control of it" [15].

In practical terms the SocialButton doesn't interrupt current actions by suddenly vibrating or showing new information. Instead, it fades new information into the existent one within some seconds. In this way no information will be displayed if the users' encounter is too quick. In these cases they were considered too fast to permit a talk.

3.2. Friend-of-a-friend Information

Several kinds of information could be shared and displayed by the SocialButton to motivate person-to-person interaction. Among them the friend-of-a-friend information was chosen for three reasons.

The first is concerned with ergonomics and usability. In former projects like LoveGety the user had to manually set up his personal profile in order to allow the device to find similarities with other users. In our research process, we compared mobile phone address books of 22 students selected arbitrarily among different first semester classes at our university. The correspondences we found turned out to be a good way to set up matching profiles. This data can be easily sent from the mobile phone to the SocialButton (see Section 3.5.2). It allows users to save annoying set-up time and is an advance in usability.

The second reason deals with privacy issues. Sharing information about one's contacts is an indirect way of showing personal information. The SocialButton does not reveal concrete details about one's habits, affectations or belong-

ings, but it uses symbols to represent the contacts two persons have in common. When considering user acceptance, this feature reduces scepticism that may be caused by security concerns on revealing private data [14].

At last, the intention of the SocialButton is to motivate social interaction, and comparing people's social networks sets a thematically adequate starting-point to do so. Conversations motivated by the SocialButton are likely to begin on the common contact, which avoids the constraint of directly talking about oneself.

3.3. Privacy concerns and symbols output

As mentioned, the SocialButton's output is a visual display. Instead of using plain text we designed a system based on graphical symbols.

Each device has an individual symbol assigned to it by its user. This symbol appears on the display of other devices as soon as common contacts are detected. In order to find out who a user has contacts in common with, he has to look for his personal symbol on others' SocialButtons. Since just the owner of the symbol or his close friends know the relation between this user and his symbol, it operates as a privacy system encoding personal identities.

Furthermore, close friends may remember the symbols of each other so they are able to notice that one of them is around whenever they recognize one of these symbols on a third person. This aspect can lead to a new kind of collective behaviour, where identities for group members are defined.

A final advantage of using symbols as visual output is that they are easier and faster to read than words, especially considering the small size of the displays.

The SocialButton's personal symbol must be fully uploaded to the SocialButton via Bluetooth. The system also contains preconfigured symbols for those not familiar with the technology.

3.4. Scenarios

3.4.1 At the bus stop: 2 users

Two strangers A and B are waiting at a bus stop. A's and B's devices browse the area for other SocialButton users. A's device detects B's device and vice-versa. They check their databases looking for common contacts and find a common friend. A's symbol is displayed on B's device and vice-versa. After a while A recognizes his symbol on B's device and waves to him. A focused social interaction is established. A and B start a conversation in order to find out who the common contact is.

3.4.2 At a Party: 3 users

A and B, C and B, D and B are friends. A, C and D have been invited to the same party. A, C and D do not know each other (Figure 1). A is the first to arrive. C arrives second. A's device detects a common contact with C, and vice-versa (1 in the figure). A's device displays C's symbol and vice-versa (2 in the figure). D arrives and, again, all devices detect each other and compare their data sets (3 in the figure). Each device displays two symbols fading alternately. C's device displays A's and D's symbols, D's device shows A's and C's symbols, and A's device displays C's and D's symbols.

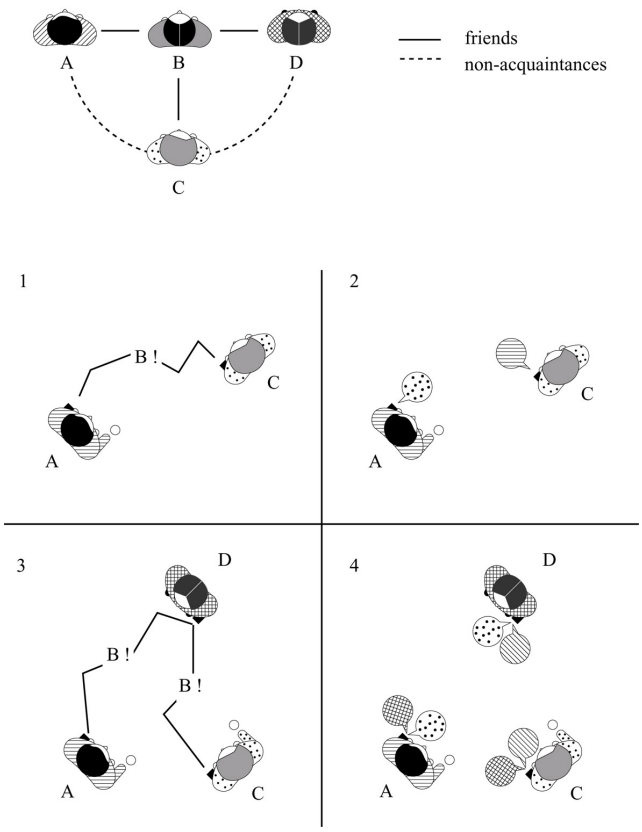

Figure 1. Use scenario: party

3.5. Technologies and Database

3.5.1 Wireless Technologies

Two different wireless technologies were analyzed and tried in the context of this project: Infrared and Radio Frequency.

The first technology considered and the first prototype developed operated via Infrared. The Infrared, however, did

not result in a natural interaction. The users had to point their devices at each other in order to ensure the data exchange. Radio transmission with its omnidirectional characteristics turned out to be the best technology. The optimal connectivity distance for our system is of approximately 10 meters, as it is usually achieved by radio devices (Bluetooth) of Class 2 [1]. Present mobile phones fulfilled our requirements for connectivity, display, and computing power, and therefore were chosen as our prototyping platform.

3.5.2 Database

There are several ways of collecting data to determine the personal network of each user: electronic address books, mobile phone communication logs, social networking websites, buddy lists, just to cite some. After a short research with students at our university (see Section 3.2), we decided to develop the SocialButton as an add-on-device for mobile phones, using their address books as contact database. This database is converted into a text file and is automatically uploaded to the Button on a regular basis by an updater application running on the phone.

3.5.3 Java for mobile devices

The SocialButton's behavior is controlled by a Java application. This application tells the device to scan permanently for other SocialButtons (energy saving issues were not considered at this point). If a detection is confirmed, the application sends the button's contacts data set and waits for the data set of the other SocialButton. Once the foreign data set is received, the application goes through each contact looking for similarities. By finding a matching contact, i.e. common friends, the predefined image is sent, and the received image is displayed.

In our prototype the SocialButton has been simulated by mobile phones. In this case, the application has to run on both devices for the exchange to take place. The prototype's application was developed using Java's Micro Edition, J2ME [3]. J2ME was chosen for its compatibility with almost any standard mobile phone, while interpreters for the powerful Python, e.g., usually require phones with Symbian OS [7]. During the application development, we used the Mobile Processing environment [11] because it offers some pre-defined functions and classes, such as a ready-to-use Bluetooth library, and therefore an easy access for designers or non-programmers to Java.

4. Field Study

As just mentioned, the system was tested with a J2ME application running on mobile phones. These were attached to the users' clothes simulating the use of the SocialButton. Two test sessions were accomplished, both with students from our University's Department of Design. The personal symbols of all participants were taken from their profiles on the online communication platform of the university, Incom [2]. The ones who still had the default symbol in their profiles were asked to set up a personal one in advance. Some minutes before the test we collected the mobile phones of all participants. On each device the respective symbol was uploaded and the Java application installed.

The aim of the first test was to evaluate the use of the SocialButton as an ambient display as well as the capacity of recognizing personal symbols while focusing the attention on something else. 18 students from the first semester took part in it. Before a lecture, that was not related to our topics, they were asked to wear the displays/phones leaving them visible to the other students. They looked at the displays in the first minutes but their attention was drawn to the lecture afterwards. Some questions were stated at the end of the lecture. The answers demonstrated that all students were able to understand the lecture, which means that they were not distracted by the devices. 11 stated to have seen their symbols on others' SocialButtons, and 9 admitted having recognized the symbol of somebody else on some display. All of them admitted to be interested in possible connections coming up from their social network.

The second test focused on practical aspects, such as the necessary distance to recognize the symbol, the different positions at which the device can be worn, and the experience and perceptions during the social interaction. Four graduate students took part in it. They wore the mobile phones attached to their clothes for one day. Afterwards they were interviewed and the above aspects were discussed.

The test showed that the optimal distance varied according to the symbol of each user. A simple symbol was recognized at large distances, while an ornamented one was only recognized within 2 meters. This aspect made us conclude that the selection of the symbol is likely to be related to the personalities of the users. The more open a person is, the more recognizable her symbol will probably be. A similar behaviour occurs concerning the position of the SocialButton. Someone who wants to control the activity of her Button will wear it on the chest or on the wrist, while a more careless person can use it on the back or her bag, for example. Again, all of the participants were interested in the relations they might discover in their social network. The effect of using the body as a screen stimulated a discussion on alternative outputs. Useful information such as weather forecasts or email status were discussed, which could be implemented dynamically through other symbols.

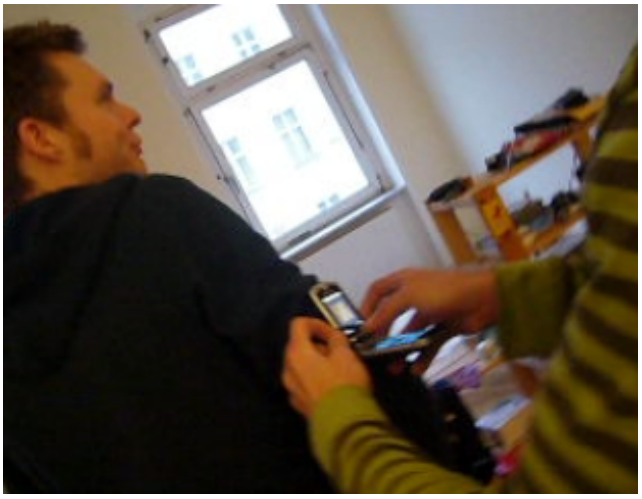

Figure 2. The system was tested through an application running on mobile phones attached to users clothes

5. Further Development

With the SocialButton we explored the possibilities of everyday communication technology to establish contacts between strangers within existing social networks. Focusing on coincidental encounters, the application has been designed for mobile and ad-hoc situations. Since social networking tools always expose private details, we propose a system of individual symbols and shared wearable displays to encode inter-subjective relations.

After two field studies, we scheduled some aspects for further development. Firstly, we consider to develop a blacklist system. Not all entries on an address book represent people whose friends one might want to start a conversation. For example, the local taxi service may not to be considered as a common friend, and therefore should not be included in the data set exchanged between the Buttons.

Secondly, we want to look at means to reinforce the users' motivation to start a conversation with unknown persons: such as giving more hints about the origin of the triggering contact by classifying friends into categories (university, sports, night clubs, etc.), or even revealing the identity of this common friend if both users express mutual consent.

Moreover, the system might be used to determine the status an acquaintance has in one's individual social network. Acquiring contextual data and logging the frequency or duration of meetings are ways to gain this information. New salutation rituals can also be established to mark closer friends, such as whacking the devices [10].

Finally, fully working prototypes should be developed and tested with a larger group of people. These prototypes would include a flexible high resolution screen, a microchip capable of the necessary operations, and a casing comfortable enough to be worn at any opportunity and for a longer time. This step, however, requires external technical and, above all, financial support.

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