Toward Wearable Social Networking with iBand

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ABSTRACT
The iBand is a wearable bracelet-like device that exchanges information about its users and their relationships. This exchange happens during the common gesture of the handshake, which is detected by the device. As such, iBand seeks to explore potential applications at the intersection of social networking and ubiquitous computing. In this paper, we discuss the iBand technology and feedback from an initial study in which 11 devices were used at two different social networking events. The results suggest that control over personal information is an ongoing issue, but they also highlight the possibility for wearable devices to enable the creation of a set of invented *techno-gestures* with different affordances and constraints that might be more appropriate for certain social interaction applications.

Author Keywords
Social networking; wearable computing; ubiquitous computing; human relationships.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

In the past few years, there has been an explosion of online social networking. Web sites like *Friendster* and *Orkut* allow people to build relationships in an active social cyberspace. This development has been paralleled by the increasing attention received by wearable technologies in ubiquitous computing research. Our research is concerned with the convergence of these two domains. We are interested in exploring the social nuances and affordances provided by *wearable social networking*. We present iBand, a technology-enhanced bracelet that can store, display, and exchange information about its users and their relationships. iBand aims to explore the potential of wearable devices to augment real and virtual world social interaction.

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WHAT IS IBAND?

iBand is a bracelet that exchanges information when one user shake hands with another. Handshaking is detected via infrared (IR) transceiver alignment combined with a sensed up-and-down motion synchronized on the two devices in IR contact. IR transmission is only activated when the user's hand/wrist are in a pre-calibrated handshaking orientation.

A new user begins by entering contact/biographical data and creating a personal LED logo at a kiosk. This data is stored in a database, and the logo and a unique ID code are assigned to their device. Both the logo and the ID are transferred to peer devices when shaking hands. During use, the LED display (a simple 5x5 grid pattern on the top part of the bracelet, lying flat across the wrist) cycles through the personal logos of all the contacts collected. The logos cycle more quickly as more contacts are collected. When the user returns to the kiosk they can download and view their list of new contacts.

IBAND DESIGN

A social boundary typically exists between people in an introductory face-to-face interaction. Users need to trust that in augmenting their handshake, the iBand does not disrupt this boundary, for example by transmitting sensitive information. Results from an earlier survey suggested that most people felt comfortable sharing at least their name and email address with others at a social networking event [8]. However, the user can choose to enter only their name at the iBand kiosk, or to provide more information to be shared, such as a biography or photo.

It was important that the iBand looked like something you would wear rather than a piece of technology. It had to be as light as possible and comfortable to wear. For this reason use of a large display screen was felt to be undesirable as it was bulky and computer-like, although this choice may change in the future with the advent of bendable screens.

The iBand is adjustable in design for different kinds of users (male, female). The electronics are housed within a pocket in the bracelet itself and are hidden from view. A PIC microcontroller and 2-axis accelerometer form the heart of the device, which employs a low-power design. When worn, the circuit board and battery lay flat under the wrist and an IR transceiver is positioned near the back of

the thumb pointing toward the hand such that it is visible to an IR transceiver on another device when shaking hands.

Figure 1. The iBand and shaking hands with it.

RELATED WORK

A number of earlier devices share similar themes with the iBand. Lovegety, Synchro.beat [13] and GroupWear [1] are devices for meeting people with similar interests. Smart-Its Friends [6] are electronic devices that communicate when they are within range of each other and experience similar sensor readings. Portable Digital Proxies [14] are devices/applications representing users in physical space by broadcasting their profile, usually without explicit user action or intervention. They are characterized by being portable, peer-to-peer and always-on (e.g. nTag [10], CharmBadge [3], SpotMe [12]). Similarly, the concept of an Inter-Personal Awareness Device [7], instantiated in the Hummingbird, augments a person's awareness of others by providing a continuous sense of when other members of a community are in the vicinity. Unlike the devices described above, iBand is not triggered by peoples' location, distance from, or proximity to each other.

An important characteristic of the iBand is that it seeks to augment gestural language and leverage the social behaviour of touch. Zimmerman [15] uses touch to transmit information via a weak electrical current running between two people's bodies. More recently Microsoft [9] was awarded a US Patent for distributing power and information to on-body devices. However, in both cases, exchange happens in the absence of any specific gesture.

iBand shares similarities with social networking sites. Both encourage human connections: iBand can be considered a real world instantiation of a social networking application in the sense that people actually touch, sense and immediately meet each other face-to-face. This rules out Fakesters (fake identities) as described by boyd [2], who argues that while many Friendster users love Fakesters, they also reflect a fundamental weakness with trust in online communities. Authenticity is potentially not as serious an issue for iBand users.

An interesting aspect of online social networking sites is the prestige [4] associated with the number of friends and connections users possess. iBand, in its current instantiation, has an abstract LED logo display that animates in a fashion proportional to the number of contacts collected. BubbleBadge [5] is a public wearable display, which like iBand is designed to investigate how we wish to communicate and present ourselves in a ubiquitous world.

iBand has the potential to examine how network structures connect people, just as Paolillo and Wright [11] reveal the workings of the LiveJournal blogging site by visualizing Friend of a Friend data. Specifically they ask if user interests are useful indicators of their social interactions on the site, as represented by their selection of friends.

IBAND STUDY

We introduced the iBand at two events: an exhibition of research innovations in Amsterdam and a research lab launch in London. These events were attended by a wide variety of people from different organizations within industry, new media, education and academia. About 100 people attended each event, during which they were able to have a drink, chat and mingle. We were not in control of the organization of these two events, so we needed to be flexible in terms of allocated place and study time. We preferred this approach to a rigid predefined study setting so that we could observe any interactions and behaviours that might emerge from the use of iBand in real-world settings. Our overall goal was to gain qualitative feedback to help guide the next steps in the design process.

In the main social gathering areas at both events we set up a table with eleven iBands, kiosk software and an IR base station. Those wanting to try the iBand were given a very brief explanation, filled in their name and email address, and designed their personal LED logo before mingling about the space with their device. We realize that this means our study participants were people who were more likely to try new things as opposed to those who are harder adopters. However, as we were most interested in qualitative feedback, obtaining a full range of personality types was not deemed necessary for this initial study.

For data triangulation, we appointed one or two anonymous observers to collect data about people's reactions and social interactions. After returning their iBand, the participants downloaded the contacts they collected and gave feedback on their experience, either via an immediate audio-recorded semi-structured interview or by filling out a brief questionnaire a short time later.

The study was difficult for many reasons. Since we had a limited number of devices, we were not able to investigate behaviours that might emerge if a larger percentage of attendees used them. Clearly a higher penetration rate would be needed for certain applications to become valuable. We also felt the studies were not long enough to reduce novelty effects in use and feedback. We could not account for the participants' technical literacy, age or their familiarity with other attendees. Nevertheless, we were able to gain insight into the potential effects of iBand on social interaction, which highlighted a number of important social and technical issues related to wearable devices.

Social Interaction with iBand

We tested and evaluated a total of 11 iBands with 20 people: 8 in Amsterdam and 12 in London. In Amsterdam, 2 users were female and 6 were male, and they varied in age from 20 to 50. These statistics reflected the overall attendance at the event. In London, 3 users were female and 9 were male, and they varied in age from 25 to 60. In general, the attendees at this event were older than those in Amsterdam, but the majority of iBand users were under 45.

We noticed a number of differences in social interaction between the two user groups. The attendees in Amsterdam very much embraced the device, shook hands with many people and seemed to be more enthusiastic about using the iBand as a social networking device. They were eager to use the device for a longer period of time. Some went as far as to encourage others to wear the iBand, including bringing people over to our stand without any request from the researchers.

Figure 2. Wearable social networking with iBand during the event in London.

In London, people appeared to be more hesitant to really *use* the iBand as a social networking tool. Some people seemed happy to simply try it out for a few minutes between themselves and a researcher but were nevertheless curious about the device and eager to provide feedback.

These differences may have arisen for many reasons, ranging from cultural variations, nature of the events, familiarity between attendees, and so on. In London, many small groups of people who knew each other were packed together in a relatively small space. In Amsterdam, there was a wider variety of people from diverse professional and ethnic backgrounds. In any case, these effects highlight the degree to which contextual factors can affect the way iBand is accepted and used in different situations.

Specific Behaviours and Feedback

At both events we received many comments regarding iBand. Some participants engaged in a game-like collection of contacts, proudly showing the animating logos of the different people they shook hands and spoke with. They appeared to value the public display element of the device:

"Look what I collected!"

Other users reported greater ease in making new contacts and that the visibility of the device was an important factor:

"It really served as an ice-breaker, because I especially went out to search for other people with iBands to meet them. It made it much easier for me to initiate contact."

"'Hey, you have an iBand', and then we did our iBand handshake, but didn't talk about iBand at all, it was just sort of an excuse to go to that person and ask: 'what are you doing?'"

"I wouldn't want to incorporate it in a watch, because what I like now is that people can see that you have an iBand."

Some seemed to experience a stronger sense of identity or confidence while wearing the device:

"Oh, that's my logo! That's so lovely."

"I feel like such a cool guy wearing this bracelet."

However, some feedback was dismissive of the idea:

"No, I don't want to try it."

"I'll come back later."

Social Issues

Breaking the ice: The iBand seemed to serve as a catalyst for new self-driven introductions in these two studies. This may have been mostly because of the novelty factor of the device and the fact that only a few people were wearing them at each event. Thus, when two users met, they shared a common feature that most others did not, potentially leading to a new interaction. However, we suspect that this ice-breaking effect would be reduced or nullified if *all* attendees at an event had the device.

Control of information: Participants expressed some concerns about privacy, but nevertheless almost all filled in their names and email addresses at the iBand kiosk without hesitation. This could have been because there was a sense that others attending these specific events (as well as the researchers themselves) could be trusted to not sign them up to spam lists. We suspect this behaviour would be very different if the events were much larger or if the devices were to be used in the general public among complete strangers. In any case, one person in Amsterdam admitted that he entered a fake email address, suggesting a sensitivity over use of his personal information.

A participant in London proposed that future versions of the iBand have a button on the device for privacy control. The suggestion was that the button would disable the device from transmitting information if desired. The social effects of this are interesting to contemplate: the act of pressing the button would be a visible sign of discomfort or distrust in the other party. As no such sign would have necessarily been apparent before, this might have negative consequences during the formation of the relationship.

Technical Issues

We wanted the iBand to be as easy to use as possible, and so we pre-calibrated all of them to recognize a specific hand/wrist orientation and shaking intensity in order to save time and prevent the confusion of individual calibrations. However, these presets were not suitable for all, and some participants reported having to shake hands a number of times to get the device to work. Some also said that they paid special attention to a green light on the bracelet that would indicate whether or not an exchange was successful. Crosstalk between nearby devices may have also been a problem. However, both of these technical issues are easily addressable in future prototypes. Moreover, the participants generally said these technical inconveniences did not have a significant effect on the nature of their handshake interactions.

AUGMENTED VS. INVENTED SOCIAL GESTURE

When we started the iBand project, we were initially interested in how wearable technologies could be used to augment common social gestures like the handshake, the hug, the kiss, the bow, etc. Each of these gestures is rich and full of subtle nuances, and we quickly came to feel that it was impossible to introduce a new parallel or background technology without changing the fundamental nature of these gestures in some way. Our experience thus far with the iBand has reaffirmed this view.

In the case of iBand, the original gesture of an introductory handshake between two people is augmented with the exchange of personal information. In the past, this transfer was performed as a separate "business card exchange" gesture, and it typically came later in an interaction between new acquaintances. However, the iBand essentially combines these two gestures into a single new "handshake & business card" gesture and effectively eliminates the availability of either old gesture on its own.

Thus, iBand users are handicapped at the same time they are enabled in a different way with an "invented" gesture. Consequently, users lack a set of rules and conventions about how to use the new *techno-gesture* and must create these on their own as they use it. Through careful design, it may be possible for a wearable technology to enable an invented language of social gestures with its own affordances and constraints that have particular effects in certain kinds of social interactions. Such gestures might better support particular applications for which traditional gestures are felt to be inadequate. Whether or not iBand is or can be an example of such a transformative technology remains to be seen as we continue our research.

FUTURE DIRECTIONS

We are currently exploring additional functionality and different wearable displays for the iBand to support various social networking applications. For example, if users could store a list of their friends on their iBand, then a textual readout on their bracelet could tell them what friends they have in common with a new acquaintance. We are also building more devices in order to undertake longitudinal studies of use.

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