

# ReConnect: A Mobile Tool for Enabling Social Interaction

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## ABSTRACT

In today's information age, we have become accustomed to a lack of face-to-face interaction with people. We have lost some of the benefits and experience of human-to-human conversation with people in informal situations. We are often afraid to approach someone for fear that they will be bothered or uncomfortable. Cultural and social differences can cause misunderstandings in the meaning of body language (such as eye contact, arms crossed, looking down while walking, etc). Some people are extremely outgoing while others are extremely introversive. Being the recipient of an extremely friendly greeting may or may not be welcomed depending on your cultural background or your mood on a particular day.

We propose a system that suggests whether or not to engage someone in social interaction and to notify others of one's degree of extroversion. Using common interests and current degree of extroversion as a basis, some people are more approachable than others. ReConnect is a handheld Bluetooth and GPS-enabled PDA device that is designed to simplify the initial stage of human-to-human interaction. It helps to bridge social and cultural barriers in the "social handshake."

## Author Keywords

Interaction design, mobile device, strangers, wireless, community, public place, emotional and affective UI.

## ACM Classification Keywords

H5.3. Group and Organization Interfaces.

## CONTRIBUTION AND BENEFITS STATEMENT

Describes a flexible and engaging means for initiating the "social handshake" by breaking down the initial communication barrier thus bridging social and cultural boundaries. Can help users connect to others with less fear of rejection.

## INTRODUCTION

Not everyone is vivaciously outgoing, and many people feel uncomfortable in social situations. We intend to develop a working prototype to enable and encourage day-to-day people interaction.

This product will be a handheld device relying on Bluetooth to locate people in one's vicinity and GPS to

determine one's location. Bluetooth will transmit desired interaction levels between devices as well as details (such as interests). Based on suggestions that the device gives to the user, one may choose to strike up a conversation with someone in the vicinity.

## PRIOR WORK ANALYSIS

Several projects have affected our approach to the design and implementation of our project. We have been influenced by previous work that served to connect people in one way or another. Although we have not been able to test a previous artifact, we did significant reading about previous projects.

The prior projects ranged from a device that let one know the general mood of the group around him to a device that showed general familiarity of those around without facilitating face-to-face interaction, to a device that might ask a friend to introduce you to someone with which you have mutual interests, to a match-making device. The common thread is helping one to feel connected to others.

## Lovegety

The Lovegety [1,5] is a matchmaking device that comes in male and female versions (blue vs. pink). Each device can be set to one of three moods. When a male and female device are within 15 feet of each other, they emit a sound and flash green if they are set on the same mood or flash red if they are set on different moods. The two parties may search for each other in a 'marco polo' kind of interaction.

This work is relevant to our project in that it is proximity sensitive to other devices and the purpose is social interaction with other people.

The difference is that the Lovegety attempts to initiate love by forcing communication between devices. Rather than being a one-dimensional match-making device, our product will enable all levels of social interaction by providing suggestions on who to strike up a conversation with. In addition, we will not be using sound notification.

## Familiar Stranger

The Familiar Stranger [6] project with its Jabberwocky device allows one to become more familiar with the 'familiar strangers' he encounters. A familiar stranger is someone that one frequently observes but does not directly interact with. The device served to recognize and extend

the concept of familiar stranger by notifying the owner about the familiarity of the current location (number of red LED lit). This is a measure of the number of familiar strangers that frequently visit the place. It also shows present activity - the number of familiar strangers that are currently there (red LED flashing). It provides a visible record of history and state.

The owner may manually classify the current group of familiar strangers into one of two categories (blue or green) by pressing a button. Future encounters with a familiar place will indicate general familiarity (red) as well as personal grouping information (blue or green).

The Familiar Stranger project is relevant to our project in the matter of context. We use the number of times a person is detected to increase the apparent desire for interaction. In addition, we are also concerned with privacy issues.

The Familiar Stranger is different in that they keep the barriers between people. Familiar Strangers remain familiar strangers. We are contriving a social context, where you can become familiar with someone after seeing them once. With ReConnect, total strangers may encounter each other and form a social relationship upon first meeting based solely upon common interests and desire for interaction.

#### **LoveBomb**

The LoveBomb [4] is a device that fits into the palm of the hand. There are two buttons: a heart and a tear. A user can push a button to express an emotion. Other users within range will receive the message by their device responding to love (heart) messages. The device vibrates in a rhythmic heartbeat-like manner. Several love messages will increase the strength. Similarly sorrow (tear) messages are communicated through irregular vibrations

The LoveBomb project is relevant to our work in that it “is interested in using computational technology as a medium for interpersonal emotional communication.” Whereas early work in the area dealt with computers showing emotion or being sensitive to human emotion, ours is a human-centered interaction project (a human-centered system). Like our ReConnect project, the LoveBomb uses proximity awareness and enables conveyance of human emotion.

The differences between the LoveBomb and our project deal with being anonymous. While theirs is somewhat ambiguous and gives the overall “vibe” of the room. Our is not anonymous – ReConnect deals with individual people. You are able to see the general mood relating to desired social interaction for an individual.

#### **Hummingbird**

The Hummingbird [8] is a wearable device to support communication. It allows a user to be aware of others located in his physical proximity. It was built on the concept of IPAD (inter-personal awareness device). The

purpose of an IPAD is to support awareness between users – not communication between them.

The hummingbird was used in a skiing test project. If devices belonging to the same group are within approximately 100 meters, they “hum.” If several are in the same vicinity, identity is displayed. The device was built using a Nintendo GameBoy, which used the serial port to communicate with a small radio transceiver.

The relevance of the Hummingbird is that it uses proximity awareness. It treats users as individuals, by using a unique identifier for each device. User studies showed that people found uses for the device that were not anticipated. We also will rely on proximity awareness and will treat each as individuals. In addition, we expect user testing to open up new possibilities for context and uses.

The differences are that we will not incorporate sound due to the effort of making ReConnect more private and personal. Since we assume everyone will have a device, the sound would be prohibitive in groups. In addition to unique ID, our device will provide exact location.

#### **Social Net**

The Social Net [7] is an application that uses patterns of co-location to infer common interests between users. It uses wireless, peer-to-peer, RF-communication such as Bluetooth. It built on the ideas of previous projects which used RF-communication to broadcast a user’s presence as well as detect others.

Social Net keeps a record of encounter: time and duration. It infers common interest between people detected by recognizing patterns of physical proximity between them, over time. For example, if two people regularly exercise at the same fitness center at the same time and days, it would be concluded that that have something in common.

Based upon shared interests, Social Net attempts to find a mutual friend in both person’s friend list. The mutual friend is sent a suggestion to introduce the two people.

The Social Net project is relevant in that it is a “friend” device (rather than matchmaking or stranger as other projects). It uses the concept of a friends list. The device maintains a unique ID. It uses the frequency of encounters with an individual to make decisions. We will use the frequency of encounters to move up the desired level of interaction that two individuals see in relation to each other. We will also use BlueTooth.

One of the differences is that Social Net automatically associates frequently encountered people with an “unknown” list which the device attempts to locate mutual friends to introduce the two unknown people. Our concept goes to “encountered”. People detected are presented (without personal information) with their desired level of interaction displayed. Additional information may be exchanged between devices to see about common interests. Our ReConnect project has no need for friends to introduce

the users – they simply received suggestions on who to interact with and may choose to strike up a conversation.

### **Ambiguity as a Resource for Design**

This paper [3] is a survey of different types of ambiguity: information, context, and relationships. Ambiguity can be a useful tool – it can be engaging.

The relevance to our project involves making our device more engaging by incorporating an amount of ambiguity. We will incorporate ambiguity of information... the more times you meet a person will increase what is visible about the other person's desire for interaction (as well as what they see about you). However, it is ambiguous when you view the desired level of interaction because it is based on (a) your base setting, (b) increased by frequency of encounters (c) affected by changes you make about your desire to interact with a particular person (d) affected by changes they make as a result of past experience with you.

### **Extending the Concept of Awareness to Include Static and Dynamic Person**

This project [2] involves the concept of the awareness of people. It is based on static as well as dynamic information. Static information is collected prior to interaction and includes skills, goals, etc. Dynamic information is based on observations of activity, or a person's behavior. The concept is to select people with who to interact based on static and dynamic information.

It is relevant to our project in that we are working to build a dynamic device. We may incorporate categories (like playful vs. serious) that will be used to affect the interaction level desired by a person.

Ideally, we would incorporate dynamic information – about number emails (to indicate current amount of interaction), other habits, and conventions. We will save this for a future version.

We are using truly static information, but the way it is distributed will be dynamic – it will appear dynamic. We have a lot of things stored but hidden from the user's view. Multiple pieces of static information will ambiguously affect the desired level of interaction.

The differences relate to their project providing to a virtual environment – we are using a real environment. They are trying to detect and provide more information to use in the matching process. We don't think this is necessary. Static data will be distributed dynamically to provide suggestions. The users will make the decision about who to interact with.

### **REVISED PROPOSAL**

Our proposed ReConnect device will be a small handheld device, similar to a Palm Pilot, which is Bluetooth enabled and has an attached GPS receiver. The ReConnect device will be able to locate other ReConnect users in its Bluetooth broadcast area. It would use the GPS data from their

devices to give locations of the users in the area. When two or more ReConnect devices come into range of one another, their desired interaction levels as well as personal data and location is exchanged via a Bluetooth ad hoc network.

### **Features**

The ReConnect device will enable social interaction between users with the intention of maintaining current relations, reviving past associations and suggesting new relationships by eliminating some of the uncertainty and anxiety. The ReConnect device will enable social interactions through a variety of features. First off, the ReConnect device will allow a user to manually set their desired base interaction level. This base level will automatically be adjusted on a per-person basis and sent to the appropriate person in the vicinity as the user's desired interaction level. The ReConnect device will incorporate ambiguity into the desired interaction level to make it more engaging for users. The desired level of interaction is ambiguous because it is based on the user's base setting, increased by the frequency of encounters, affected by the changes the user makes about their desire to interact with a given individual, and affected by changes made as a result of past experiences with an individual. The user also has the option of setting the base level to zero, or "Meltdown mode, which would exempt it from the modifiers. This setting would let others users know to leave an individual alone.

Another feature of ReConnect is that it will provide other users with a set of your context-based interests. For example if the user was at a formal event their interest in Shakespearean sonnets might be provided; whereas, their obsession with betting on illegal dogfights would not. This information would be sent out with the desired interaction level, the user's unique id and the user's location.

The ReConnect device would also be able to receive other users' desired interaction levels, their personal data, id and location. The device would then look at the data provided by other users and attempt to make suggestions based upon a user's interests and other data. This suggestion would just that, a suggestion. ReConnect would only make this suggestion available to its user in an unobtrusive manner, and would not attempt to alert others to this suggestion.

The final feature of the ReConnect device would be its ability to allow the user to create notes about individuals that are associated with their unique id. These notes could contain a variety of information about the other user (like your opinion of them, their phone number, etc). This information would never be given out and would only be used internally to adjust the desired interaction level with that individual in future encounters.

### **Target Population**

The ReConnect device will become more beneficial the more people who have one. The target population truly is the entire world population. However, this is a rather

unrealistic target population; therefore, the target population for the purposes of this course will be people who are English speaking and who have a desire to use or test this device. This device is aimed at individuals who would like more social interaction but are very not socially inclined. Individuals who have few problems with social interaction could use ReConnect as a tool to better manage interactions.

### Changes

We made several changes to our proposal based on the prior work and a critique of an earlier proposal. We added the concept of a “meltdown mode” which will be the lowest possible setting for the device. This setting will not be affected by the interaction level modifiers and will carry an interaction level of zero. The purpose of this setting is let others know that the individual does not want any interactions from anyone.

Another addition to ReConnect is the incorporation of frequency of detections of a stranger. This information may increase a user’s desired level of interaction in minor way, thus increasing the chances that you would want to interact with the stranger. This change was inspired by a prior work [6].

A final addition to the ReConnect device is the increasing divulgence of information. After a user has interacted with someone else, ReConnect will transmit more personal information to the other (provided they have a high rating on the user’s device).

Along with the various additions to ReConnect, there are also some ideas that have been removed. The first is the ability for ReConnect to suggest paths to get to individuals that a user wanted to interact with. This was not feasible since ReConnect is designed for indoor use and such paths would need detailed information about the structure and layout of buildings.

Another exclusion from the original proposal is the ability of ReConnect to perform searches for people in the vicinity that have a particular interest, or set of interests. This was removed for various reasons and may be employed in future revisions of ReConnect.

### SCENARIOS

Our proposed device will work to eliminate several problems associated with day to day interaction among people as illustrated in the following scenarios.

- *Problem: Not everyone is good at reading other people’s mood and hence friendships can be hurt.*

Alice is already having a horrible day. She just wishes she could crawl back into bed and wakeup tomorrow. But, unfortunately for her (and her coworkers) she has to go to work. Bob, not the most observant guy, misses the visual warnings signs and cheerfully greets Alice. This leads to Bob promptly getting his head bitten off.

*Solution:*

The ReConnect device will provide a way to allow Alice to quickly alert others of her foul mood.

- *Problem: Not everyone is outgoing enough to introduce themselves to strangers and hence potential friendships are never realized.*

Chris's flight has been delayed and he will be stuck in the airport for the next four hours. Chris is not the most outgoing guy in the world; he pulls out a book and starts reading. Little does Chris realize that sitting across from him is Diana who shares his love for old John Wayne movies.

*Solution:*

The ReConnect device will allow Chris to find out who is in his general locale that has similar interest as him.

- *Problem: Not all environments lend themselves to normal social interaction.*

Eric is working on his class homework assignment in the library. Eric is having a particularly hard time understanding the material in this chapter. Eric does not know a lot of people in his class let alone people from the other sections. He is wondering if anyone here was also working on the same material, but does not think it is appropriate to start asking people since it is the library.

*Solution:*

The ReConnect device will allow Eric to locate other people in the vicinity who are also in the same class allowing for both parties to benefit. It would do so in an unobtrusive way allowing everyone in the library to work in peace.

- *Problem: Not everyone is good with names or faces.*

Fred is attending a yearly conference with a few of his colleagues. During one session Fred swears the man sitting two rows in front of him looks familiar. But, unable to remember the man's name, Fred avoids him and misses out getting to talk with a fun acquaintance he met at a conference six months ago.

*Solution:*

The ReConnect device will allow Fred to make notes about a person he has met and then automatically recall those notes at a later time when that person is in his vicinity.

- *Problem: You never know where or how social interaction will start.*

Greg commutes back and forth to work everyday using the city’s light rail system. The commute for Greg usually takes about 30 minutes, in which Greg normally spends reading or listening to music. What Greg doesn’t know is that Harry also takes the same train as Greg and works in the same building as him. Both share many of the same interest and could become good friends.

*Solution:*

The ReConnect device will increase the desired interaction level for both Greg and Harry due to the number of detections between the two. This will increase the chance of the two meeting and becoming friends.

**DEVELOPMENT PLAN**

We will develop the ReConnect device in two stages. The initial prototype phase will consist of design analysis, prototyping and user studies. The long-term phase will involve construction and development of the actual device and system. Future work will incorporate advances in technology as well as new features to the system.

**Prototype Phases**

The prototype stage will last about five weeks and will emphasize concept and design. It will be broken up into multiple phases and deliverables:

- The first and most important stage is the concept and project proposal.
- This will be followed closely by a low fidelity prototype to show user interface design.
- We will then conduct a user study to verify our concept and user interface.
- A functional prototype will follow, which incorporates everything learned to-date.
- Another user study will be performed to validate the emerging system.
- The final stage will be a finalized prototype and presentation. A paper will summarize the results of the project.

**Prototype Implementation**

The final prototype will be implemented using Java on a personal computer. User studies will be performed with real people interacting with virtual users. Simulated GPS coordinates will be provided for location. The BlueTooth and GPS modules will be communicated with via standard API commands. Development of the final prototype will include:

- Implementing a wrapper API for obtaining (canned) Data through BlueTooth and GPS. This will be based on the real hardware specifications (and APIs).
- Lightweight interface prototyping. This will, by nature, be an iterative process. We will design and refine our interface.
- Interface implementation
- Back end implementation

The prototype implementation will consist of several main functional modules. The design allows for simulation (BlueTooth and GPS) to be replaced with actual hardware functionality during the long-term stage of the project. The functional modules of the prototype include:

- UserInterface module
- BlueTooth functionality
- GPS receiver
- PersistentData module
- DataTransfer module
- SuggestionJudgment module (makes decisions on suggestions to present to the user)
- OutgoingDecision module (determines desired interaction level sent to others )

**Long-term**

The long-term phase includes the development of the hardware and software on specified equipment. The long-term phase is expected to last approximately 6 months. The first step of the long-term development cycle will be to acquire the necessary hardware. At the moment, we are looking at a BlueTooth enabled palmOne device. There are three current models that would fit our requirements. They are the Zire 72, Tungsten T3 and Tungsten T5. All of these devices run a variation of the Palm OS 5.0.

To enable GPS, we will need a GPS module attached to the handheld PDA. We are currently looking at the Pretec SDI GPS Card for Palm. At the current time, the GPS hardware has accuracy limitations. We expect that by the time the implementation phase arrives, technology will have improved the accuracy available to the general public. Current GPS modules that connect to Palm are very inaccurate and/or exist as external, separate devices. We expect that by the end of development to have a proprietary device that will include both GPS and BlueTooth built-in. This will likely be a custom device but would still run Palm OS.

Once the hardware has been acquired, we will start development of the system on the handheld hardware device. We will be using a Palm development environment using C++ or Java. Currently there is are several IDEs supporting Palm devices. These include many languages (C#, VB.NET, VB6, C++, and Java).

We will start system software development using the user interface design and structure from the working prototype. We will incorporate the BlueTooth and GPS modules implementing the real functionality to replace the simulated GPS and proximity data. The last part of development will enable handhelds to interconnect. This will be followed by extensive testing and usability studies.

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