A Mobile Application to Support
Phatic Communication in the Hybrid Space

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Abstract

This paper presents a prototype implementation of the PengYo application that offers a cross-platform interaction method between an online social community and mobile users based on the "beeping" phenomenon. PengYo provides a novel interface that explicitly supports the practice of beeping, a nearly-globally applied implicit communication method of calling somebody and hanging up before the call is answered. In contrast to the traditional beeping-method, PengYo provides a custom-tailored user interface and user interaction style for beeping, following the real-life cognitive model of "tapping someone on the shoulder". PengYo builds a platform for further investigation of the beeping phenomenon and its usage patterns, that very little research has been done on so far. The results of further research studies that base on PengYo might deliver crucial information for redesigning and enhancing existing channels following the user-led communication phenomenon of beeping.

1. Introduction

Advances in internet technology and social computing techniques enabled new forms of social interaction. We have seen the rise of social computing and the web 2.0 allowing millions of people to globally connect to each other forming an interactive and cooperative environment. The enormous success of social networks, for instance Facebook (http://facebook.com), rests on addressing basic human needs like self-representation, communication and curiosity. More specifically, users maintain individual profiles containing relevant media like photos or videos which they can share, communicate via messages, 'pokes' or chats and finally follow what their friends are doing by reading walls, status messages, or watching recently uploaded media. The problem that occurs with the adoption of such an online community is that 'it

practically eliminates the need for real interaction' and causes 'friend-inflation' [1].

As information and communication technologies (ICT) and new mobile devices now allow us to constantly be connected to the internet while walking through real world spaces, 'hybrid spaces are formed by the blurring of borders between physical and digital spaces' [2]. This latest trend leads to a paradigm shift on the user interaction style: Whereas the web 2.0 is used via static interfaces complying with a pull character in hybrid spaces the shift to mobile interfaces creates the mobile web 2.0 being everywhere at any time and therefore enabling social interaction triggered by the user himself from the real world.

In a social context, it has been shown that human communication using ICT has various different niches, and that there is a need communication channels that go beyond the well known phone call, SMS or MMS. This is well illustrated by considering that users often materialize a specific communication technology for rather unexpected purposes that the respective medium was not intentionally designed for. Such an example of users diverting the use case of given communication technology can be observed on the phenomenon of 'beeping' or 'flashing'. Beeping is described as the practice of users dialing a number and hanging up before the call is answered [3]. Beeping does not transfer any explicit content or information. However, the recipient sees a missed-call notification on his display. This includes the timestamp of the missed call and the phone number of the caller. Additionally, the newer generation of mobile phones lists the name, picture and other profile information of the caller according to the contact details from the callee's phone book. The meaning of this missed call is in fact intentional and used depending on the respective context; for example 'the message behind the beep can mean "call me back", "I made it home" [3] or just "I am thinking of you". Users have created their own

set of distinct social practices around the ICT of mobile telephony which is not explicitly meant to be used in that way. Beeping is particularly common in Africa, but also used in Asia and Europe. According to Spanish Telcos beeping activities becomes an operational issue for them as this phenomenon is used by millions of mobile phone users and is an increasing trend, with no explicit cost being charged [4].

Our aim is to create a novel interface that explicitly supports such 'user driven' social interaction practices that users inherently utilize on conventional communication media. Therefore we developed "PengYo", a mobile application that explicitly supports the traditional practice of mobile beeping, mashed up with social networking and interaction capabilities known from online social networks, e.g. friend-mapping and personal messaging. Using multimedia enabled mobile phones, global positioning technology and high-speed mobile internet access, PengYo merges the global trend of beeping and common communication practices in online communities by providing a mobile interaction method in the physical world towards fostering relationships between online networked friends.

2. Beeping as a Phatic Communication Channel for Mobile Phone Users

Sometimes I just scan through the mobile phone book and see who I have not seen in a while and beep them. Sometimes they call back. I don't expect it', says Filicien, a university student [3].

Certain aspects of face-to-face communication are lost when using ICTs to connect with one another. This can include facial expressions, body language or physical contact such as tapping someone on the shoulder. "Beeping" or "flashing" occurs when someone dials but hangs up before the call is answered. This practice can be compared to virtually "tapping someone on the shoulder" [3, 4] and is a nearly-global example of how new technological factors enable mobile phone users to practice self-driven forms of social interaction. The meaning of a beep is perceived different from different people and at different times. As a digital homonym, the message behind the beep depends on the relation and the common history between the sender and the receiver and therefore reflects and reinforces relationships [3].

According to [3], one can identify three kinds of beeps – call back, pre-negotiated instrumental and relational. The most common beep is the call back, i.e. the beeper implicitly asks the recipient to answer the missed call with a voice call. The pre-negotiated instrumental beep takes into account that the interacting parties mapped a certain code of beeps with a particular meaning. One beep could mean e.g. "call me back", as two beeps for example might mean "Just arrived at home safely; I'm fine." The most interesting beep for us is the relational one. It is especially popular amongst teenagers, good friends and family members. In that context the beep reminds a friend or a loved one that "I'm thinking of you" or "You are important to me" [3]. Given the capability of the mobile phone to vibrate, the senders' intention carried along with the beep gets physically translated into a vibration motion. This manner of physical interaction by virtually tapping on the friend's shoulder provides people with an implicit communication channel to let each other know that they are being thought of, without having to explicitly put this into words as using a phone call or SMS. The beeping interaction reflects social and cultural structures but moreover can be used to strengthen and create relationships and reinforces social norms. A person who wants to express the interest to be connected to someone or bring it to a spot in poorly related friend's mind can do that without having to compose a customized message. This phenomenon states a new phatic form of communication as it lowers mental borders in making the first step to connect to people. As beeping always is for free it is global in scope. Nevertheless the behavior is local as the adoption usually is bound to persons who are entered in the mobile phone book. Donner's recent study analyzing the trend of beeping states the need for further scientific examination of this worldwide phenomenon [3]. In consideration of the actual developments around hybrid spaces [2, 5] and the ongoing shift of online social networks and respective interaction stylesfrom static to mobile interfaces e.g. [6-8], we developed PengYo aiming to track and further examine the beeping practices in selected online communities.

The beeping practice using mobile phones finds its analog in social platforms by the communication tool of "poking". In Germany's biggest community StudiVZ (http://www.studivz.net/) it is called "gruscheln" which is a combination of two German words meaning "to greet" or "to cuddle up to someone". In Facebook (http://facebook.com/) the same function is named "poking"; when poking someone, no message will be delivered - only a notification that someone has poked you.

We believe that the ongoing shift of social networks from traditional web- to mobile phone applications will affect the beeping behavior. With the continuous interaction possibilities provided by a mobile handset, i.e. sending beeps from everywhere at anytime, the interaction within social communities will change, too. As of now, online social network users can virtually poke their contacts on a stationary computer, which the respective friend will see once he has logged in. This might be hours or even days later. On the other hand, mobile users can only "beep" friends whose numbers they have stored in their local mobile phone book. PengYo bridges this exact gap between the "beeping" phenomenon on mobile phones and the virtual poking practice in online social

communites. It provides a mobile platform for existing Facebook-friends send mobile pokes that will arise immediately as a notification alert on the friends display. By enlarging the personal network from local phonebook contacts, to a much wider pool of people who are incorporated in a social online network, we assume that the beeping behavior would change from local to global, too. In addition, we anticipate the number of relational beeps would increase as now globally dispersed people will have an new channel for phatic communication making them remember past moments which made them become friends instantly into their minds.

In order to examine such mobile beeping practices within online social communities we created PengYo a mobile poking application using the Facebook network. We put a special focus on the user interface and an implicit interaction style in order to foster the cognitive model of actually physically tapping on someone's shoulder.

In the following we will refer a beep or poke to a Peng as beeping as well as poking are already used to characterize similar but not same communication forms that PengYo provides
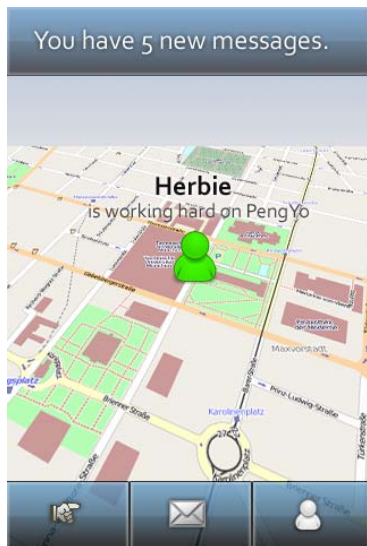

Figure 1: Main Screen of the PengYo Application with avatar, name, status message and functional buttons

3. The PengYo Prototype

The PengYo prototype works as a Location Based Service (LBS) and it uses Facebook as social platform with more than a hundred million users up to date. PengYo utilizes the Cell-Id of the mobile network provider to localize the friends within one's social network and displays their current location with an abstract avatar on an interactive map. The friends' names as well as their current status messages are displayed, too

(Figure 1). More personal information such as the birthdate or the profile picture can be retrieved from a profile page.

The PengYo application was explicitly developed for the iPhone, leveraging touchscreen technology and acceleration sensors for intuivie navigation and interaction that follows the natural "tapping one's shoulder" interaction.

Using the touch screen technology we implemented a intuitive interaction style to send "Pengs": The user simply has to shortly tap on a friend's avatar. Thus, the application facilitates ad-hoc connection and beeping-interaction with one's friends. This flattens down the time-gap between dialing a number and the actual ringing on the other side given in traditional beeping.

After the user has logged in, the map with a predefined view range is displayed with avatars of those friends whose real location is within that area. Now the user can explore the map or search further friends by either tilting the iPhone or zooming in and out using the two finger iPhone interaction style. In the first case the map will tilt in accordance to the tilting movement and direction too creating the impression of watching towards the horizon (Figure 2). In the latter case the range of view changes correspondingly maintaining the vertical point of view.
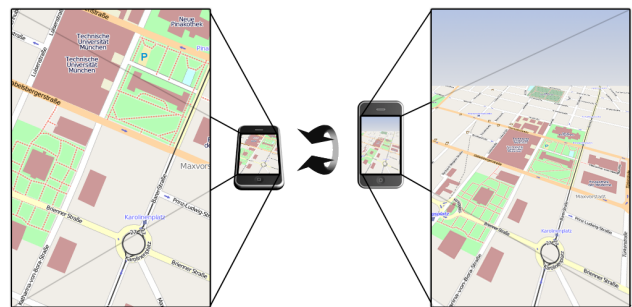

Figure 2: View control via tilting the iPhone

At the bottom of the main screen we display three buttons - peng, voice call and message, each function symbolized by an appropriate icon (Figure 1). If the user decides to peng a friend who is shown on the map he enables penging by touching the peng button and then pushes the icon of the friend with his finger. Almost at the same time the penged person's iPhone will vibrate and a notification will pop up posting that you have been penged by the respective friend . Giving voice calls or sending messages works the same way: enabling the function by touching the according button and then touching the person's avatar to interact with.

4. Use Scenarios

This work presents the Pengyo prototype application which provides a technical infrastructure to conduct further research on the user-led beeping-phenomenon. Launching the application in a field study, would enable us learn more about how and why people make use of beeping. The following outlines two examples of how standard interaction with Pengyo could look like:

Two years ago Peter, a student from Berlin, spent a month travelling through Europe. He met many interesting people from different countries. Amongst them there is Maria, a girl studying in Madrid. Maria was very kind to Peter as she helped him out finding a room to sleep in middle of the tourist season. Afterwards she took him with her and they had an authentic Spanish night in the streets of Madrid dancing the whole time. Being back home Peter searched Maria on Facebook and added her to his friend list. They stayed in contact by randomly writing each other messages half yearly until they discovered PengYo. One summer evening in Berlin Peter is dancing outside with friends. He immediately remembers that Spanish night he spend celebrating with Maria.

Figure 3: Use case visualization - virtually tapping a friend on the shoulder

As he is very enthusiastic about those moments he grabs his iPhone and gives Maria a "Peng". Maria in Madrid is startled by the vibrations of her iPhone and as she sees Peter's name on her screen she suddenly also reminisces about that time. She is very pleased that Peter thinks of her and pengs him back. After that they start a chat via the free PengYo messaging service and thereby they take part in each other's nightlife remotely.

Soon after that Maria decides to do her master thesis in Berlin. As the deadline is approaching she is very busy and spends day and night at the university library to finish on time which sometimes frustrates a lot. Peter knows about her hard situation studying in a foreign country and the enormous time pressure she currently feels. He looks at his PengYo application and sees Maria sitting at the university library. Her current status says: "No sleep since two days! Writing thesis really drags me down..." Peter really feels with her and decides to give Maria a peng in order to build her up. When she receives the peng she feels very happy to have a good friend who is thinking of her during that phase. For a short moment the peng helped Maria to mentally break out of her world of hard work, so that afterwards she returns to her thesis with new motivation.

5. Technical Overview

Designed as a communication mean to connect the virtual and real world, PengYo creates a mashup between an online social community, a mobile phone and global positioning technology by building a mobile Facebook application on the iPhone.

As a native application on the iPhone, PengYo makes use of the given platform capabilities in order to create a user friendly map interface. By utilizing the acceleration sensors of the iPhone together with Open GL ES rendering we are able to create 3D map environment, which the user can control by tilting the device (Figure 2) and using the touch interface. That visualizes best the idea of transmitting a virtual push on a friend's avatar into a physical push to him in the real world to give him a hallo.

Build on top of the social network Facebook, PengYo utilizes the strong user base and concentrated data collection. Traditionally such social communities hold a lot of private profile information, which were formerly only accessible through a desktop computer by browsing the website. Now with the open API (application programming interface) provided by Facebook, it is possible to transfer this data into an everyday life context. For example the information about who is whose friend, the network structure and topology is used in order to identify friends who are close by and show them to the user on a map.
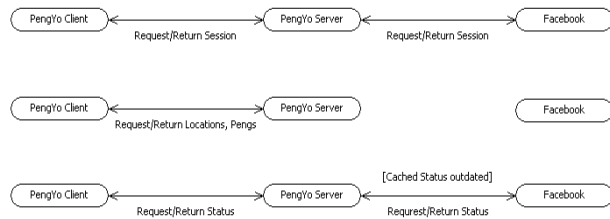
Figure 4: Communication between the PengYo client, server and Facebook

But with Facebook as our main data source we had to deal with the issue of how to handle the high number of requests and the hence resulting danger to be dismissed from Facebook. From the user point of view the data shown should be up-to-date and received instantly. On the other hand the polling for new data on the Facebook platform has to be restricted in some way in order to prevent a shutdown of our service. We tackled this issue following the caching principle. Whenever a Facebook specific request is send by the iPhone client, it is answered either from the server cache or by Facebook depending on frequentness of the query (Figure 4). In case of not Facebook related information, like the current position, messages or "pengs", the request is answered directly by the server from the associated database.

With this approach of using a server component as a mediator between PengYo and Facebook the occurring communication is heavily disencumbered while low response times can be guaranteed.

6. Conclusion and Future Work

The PengYo application was developed to support user-driven social interaction and to help us understand under what circumstances people will use such new ways of communication. We transferred the recently observed "Beeping" phenomenon among mobile users and designed a mobile phone application that explicitly provides the beeping-feature with an enhanced user interface, and enriched it with traditional social network functionality, profile information and location of contacts from one's personal social network. Thus, PengYo brings the social networking phenomenon from online communities to the real world.

With PengYo we have also set the infrastructure to further investigate the "beeping" phenomenon among mobile users. In the next step we will conduct a field study in order to analyse users' beeping behavior. With system logs we can track the time and frequency of beep-transactions, and investigate potential correlations with specific user profile information such as gender, age, education level or cultural backgrounds. In follow-up user interviews we hope to gather additional hints for improving the current user interface and interaction

design in order to better support the ongoing practice of beeping. The research results will set a common understanding of the nearly-globally practised beeping phenomenon and arise question for further research on possible other forms of meta communication. Moreover, it will inform the design of future applications that might incorporate a beeping-functionality.

7. Acknowledgements

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