Skog: Online Social Network in Physical Space

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Abstract

Current social interaction on Internet is continuously taking an important role in everyday life. In Estimate every computer user will have their account or identity on at least one online social network service in the future. Despite that all this manners occur in the virtual world, is possible to bring these useful information from the virtual space into physical space? This paper presents a design-oriented research on a way to bring available people connection, profile and published personal information on virtual space into interactive physical space by enriching the context. Observation was made with focus on how the virtual community influences the social behavior. Concerning tangible computing this design more focuses on full-body interaction and manipulation with face recognition or voice command.

1 Introduction

We are in the world of communication, and digital technology has recently come to replace traditional way of communication, communicate with mailing barely used by most of people nowadays. Especially focus on the online network community, which is dramatically widespread at the present time. This technology becomes a common communication channel throughout the digital world. These Social Network Sites are based on virtual world application; however, there is an argument that naturally human community building depends on fully embodied “human body.” While Internet and online communities have separated physical place and social space (Kortuem and Segall, 2003). There are several research works approached to bridge the gap between physical and virtual world.

The focus of much ongoing research blend the digital community with physical social community has been to investigate how informative personal data can be visualized into interactive space e.g. Hello.Wall (Prante et al., 2003) and When Peer-to-Peer comes Face-to-Face (Kortuem et al. 2001). Specifically, Kortuem G. et al’s wearable communities (Kortuem and Segall, 2003) looked at how available information in Social network communication services can be exploited in physical place based on augmented face-to-face communication. This research explored on how this archetype interaction influences social behavior.

Many of the studies have revealed a widespread problem: an obstacle of lacking adequate hardware for example Wearable Communities which, is needed each participant put on this specific device. Plus it concerned on the context awareness, which some time can be a barrier to not start making communication. Another research problem: publishing informative data was not in an informative art research. Although a very enticingly ambient wall like Hello.Wall, represents information as abstract periphery purpose. “How can public display or screen encourage people in same physical space to make a face-to-face communication?” By using all available public online social network data and illustrate them into persuasive picture. Additionally, this device should be enough attract people around the place.

Formulating activity especially involve with tangible interaction in interactive space address one possible solution to bridge the gap between virtual community and physical social interaction (Kortuem and Segall, 2003). Instead of giving all participants with augmented community device, this research brings group of people focus on a large screen
display. People in share space are attracted to it and this could lead to social interaction by its functionalities. Concerning in some circumstances that people unable or uncomfortable to make a contact and conversation in particular occasion such as academic conference, education workshop, party, nightclub, etc.

Seemingly, people in same space or occasion, has something similar or share same interested. Exploiting information on Online Social Network user's information including profile, interested, personality, etc. Analyzing these vague data and visualize them to public screen encourage people in shared physical space to make a face-to-face communication is the main purpose for this research.

2. Background

2.1 Related Work

Tangible Social Networks (Kalanithi and Bove, 2009) demonstrates at least two interactive physical objects, which were adapted for exploration and observation of interaction with online social network applications particularly Facebook and Myspace with tangibility interface. Several graspable objects and graphic user interface were implemented and tested to overcome the limitation on desktop GUI with online social network application. This research purposes the invention of interactive physical objects represent people in their network employs reciprocally exchanged interactive physical objects that automatically establish and provides direct communication channels between the people exchanging them. Even though, this research based on an idea of interacts with graspable object, the distance between users is not considered in real world communication aspect.

The Familiar Stranger (Paulos and Goodman, 2004) explores the ignored relation with strangers in everyday life. Identifying the properties and phenomenon of the Familiar stranger relationships in observed public places motivates this research. Portable device or mobile phone application with wireless technology was introduced to collect the number of people pass by the particular area and time. Indicator displays the level of familiar people in this area. However, this research did not mention on how to support those people to make a communication to each other.

Interactive Public Ambient Displays (Vogel and Balakrishnan, 2001) concerns the research and development of design principles and interaction frameworks, which implement an interactive public ambient display prototype. As the interaction techniques and discipline, this research mention technique and framework to provide different interaction phases including Ambient display, Implicit Interaction, Subtle Interaction and Personal Interaction. Exploit this knowledge from this field of research can support a broad understanding in placement and installation of interactive public artifact including the benefit from observation the result in user interpretation and manipulation. According to space design for Skog this device framework and knowledge would be applied in the similar ambient screen installation.
Wearable Communities (Kortuem and Segall, 2003) use the research framework of computer-mediated communities to investigate wearable computers’ social potential. Using the online communities aspect to support multiparty conversations organized around affinities and shared interests, bringing together people who don’t necessarily know each other personally but based on embodied, real-world human encounters augmented. Regarding to the author believe the fully embodied “human moments” would reunite separated physical place and social space in community building. This example is one the closest device as Skog is concerned, nevertheless with the limitation of the customization and technology of wearable communities device, Skog is more focus on the place rather than the specific device.

Hello.Wall (Th. Prante et al., 2003), a large display wall-sized, that shows information via light patterns by supporting three zones of interaction in 3 different distances which are Cell Interaction, Notification and Ambient Zone. A display emits abstract representation of public and private information considered the informative art. Informative Art developed the integration of information in everyday human environment and a dynamically updated information display with the aesthetics aspect. Hello.Wall brought up an idea of esthetical information display, though Skog is more based on functionality rather than artist aspect. But esthetical sense and intuitive interaction are applied in Skog’s design.

Semi-Public awareness display by Huang and Mynatt (Huang, Elizabeth and Mynatt, 2003) developed prototype with one display that combine four different information sources. From the result showed users preferred persistent displays offering “opportunistic glances and were receptive to harmless personal information being displayed. Multiple users mode skog in design phase stands beyond this research result focus on how one display offer multiple user information and harmless to those privacy aspect.

3. Design Principles

According to design-oriented research with tangible interaction in interactive space, most of the context involves awareness, peripheral, situated action and sort of in-space action and behavior study. Therefore, this research conceptualizing the interaction system related and following the design principles:

Identity: Virtual Identity is the manifestation of one’s self in the digital world (Palen, 1999). Broadcasting the digital identity is one of the aspects of this research. In order to service the face-to-face communication, their background from digital community information will be gathered in the system and exploit it by graphical visualize it. However, this would base on strong concerning of personal privacy.

Privacy: Privacy indicates, “information considered totally innocuous to some is considered personally private others” (Palen, 1999). As mention in identity design principle, some online digital information is not supposed to be published in public space. However, the system does not publish all of the data such as age, date of birth, or any specific numerical important data, but analyze these data in background, find relationship and expresses them in another way.
**Public and Personal information:** Personal information such as profile, interested, pet, sport, etc. are used and analyze with particular algorithm to result the possibility of user interconnection. Formulating social interaction with these information provides basic social community information to support face-to-face connection in public space.

**Calm aesthetic:** Designing public artifact concerning ubiquitous computing some how relates to the term calm interaction. Providing interactive service, an artifact display user’s periphery in particular location and becoming a part of the environment (Weiser and Brown, 1995). A dangling string from Weiser and Brown would be the proper example of blending the calm technology to environment. Applying this design principle came up with visualization of user relationship project on the wall. Furthermore, embedded mini camera in LCD screen is another part of calm interaction design.

**Comprehensive:** Interact with device must be comprehensible, user may not understand the system immediately but the system would intuitively encourage the user to discover the meaning through subtle action (Vogel and Balakrishnan, 1999). The ambiguity can be a source of design in the artifact display to draw user interaction and reveal the meaning and functionality naturally. (Gaver et al., 2003)

**Public Interaction Flow across threshold:** Interactive artifact in space would provide affordance and need to reassure the potential for personal embarrassment is low. Keys from this research will be applied such time spend, information flow, comfort and convenience experience and walkway from this artifact gracefully. (Brignull and Rogers, 2001)

**Immediate usability:** According to the crossing the threshold principle, in order to provide those design aspect, having intuitive usage should be concerned and training and instruction should come after the encouraging exploration and learning on the process. The design device is temporary installed, so mostly user manipulation will be from inexperienced users and immediate usability is very important. (Brignull and Rogers, 1997)

First three principles were used in the picture prototype and application flow design phase. Regardless, though other 4 design principles will be used in design physical prototype and install in real physical space phase, these principles were considered and influenced the making of application flow and functional implementation.

### 4. Initial Prototype and pilot study

A Pilot study was conducted with 1 male user by briefing the overall concept of online community in physical space. This was done without leading description on the project in order to encourage user to express his very personal thought. The main purpose of this pilot interview is to discuss a several scenarios and claims in design. An interview runs with graphic presentation from laptop that displays initial interface, artifact and physical space simulation, interaction flow and mode of interaction.

#### 4.1 Initial prototype

Regarding the design principle, the initial design was done in Photoshop to support a pilot study; focus on illustrate what this artifact would looks like in the real space. However, some
of design principles regarding placement and position were not applied in this initial design phase for the early feedback and claims aspect. The initial prototype inherits Theo Watson and Kyle McDonald’s “Portrait Machine” (Openframework Portrait Machine, 2009) idea. In my design, a small camera is embedded to vertical large display and when user approach to the screen, it will capture and analyze by face recognition searching in system database to match the possible personal face.

Fig. 1. Interaction Mode when user approach to Skog.

Normally, Skog run a set of random pictures from previous user that takes the picture and picture of related person. How can the system know the relationship between people in this interactive space? Exploit the online community contact list by accessing Facebook, MySpace, Twitter online social service API (Facebook API). The data is collected and provide for face recognition system to search and compare each user’s face and name with existing database. The API allows applications to use the social connections and profile information to make applications more involving, and publish activities to the news feed and profile pages of these online social network applications. (Facebook API)
When user approach the big display, it would ask for action, which is saying “Cheese” to start taking user’s photo as display guidance on the screen in Fig. 1. After the system analyze user’s face, if there is user’s name in the database then application shows a set of random picture of user as mentioned above. In contrast, if there is no user’s profile in the database, it will automatically ask user for register by just put any account of online social service (If they have). In the design, it only provides 3 online social services, which are Facebook, Myspace and Twitter by the popularity and the service should be rich in context enough. Regarding Enticing principle (Brignull and Rogers, 2000), Skog register system has only one page intuitively form with virtual QWERTY keyboard.

Concerning the short-fluid interaction, the process for registration provides an intuitive and affordance application flow. All operations are based on touch screen with icons that serve the online social application distributed cognition aspect. With the interactive space and calm aesthetic approach, the system allow user to take 3 more picture in funny or humor actions. Concerning the informative art (Skog and Holmquist, 2003) presentation that could attract people around the particular area, normal straight view of people may not possible to attract people in “ambient display” area (Vogel and Balakrishnan, 2003). The idea of talkable and playable photo is able to create interesting
and attractive context. By encouraging people make fun of their face and also make fun with other pictures on the display. Providing a immediately usability guidance from the random demonstration photo and existing photo of people look at the next picture in the right or bottom direction for example. User can interpret the concept of Skog as show the demonstration photos on screen.

Another interaction mode is multiple-user mode, when two or more user approach to the screen simultaneously from each side of Skog, it analyzes these users and displays the intersection of the contact list from both side. This mode is designed to enable when both users have their profile in the system. (Fig.3.) A metaphor tree branch visualizes the connection between 2 people.

4.2 Pilot study
According the user study method in early phase (Sato and Salvador, 1999). The pilot study was conducted with 1 male user with design background focusing the observation on gathering crucial opinions on design aspects, which is important for the design phase. Interviewing with picture presentation was a method chosen for this user study. Sound recording from digital camera was also used in the interview but no pictures or video were made from interviewee due to the personal privacy aspect. The main question based on the design principles is to allow the user to express how he interprets this device by just see the graphical prototype. The interviewee has a strong background in the design field as mentioned. He has more than three online social network accounts including Facebook, Hi5 and Windows Live Space but his most well known is Facebook. He uses Facebook occasionally to contact his friends and family in his hometown and he often visit and takes
around 10 minutes each. One interesting point from this user is his main purpose for Facebook is not to making new relationship with someone who he do not know before from online community service, but only for communicate with his friends, close friends and family. So he does not prefer to allow his contact list unable to control and mess up with many unknown persons.

Evaluation of the observations conducted by the question based on the design principles as mention earlier and how user reflects on Skog initial prototype. Without a detailed description I showed Skog in the environment in Fig. 2 and ask for his interpretation of it. He was not take long time to answer what it should look like in the real space. Moreover, he also felt curiosity and attractiveness to interact with it. Moreover he interpreted Skog as a big screen and a big projector that shows only random pictures. So he did not felt Skog distributes any community but only share the information even I explained the background system and how the algorithm to get those pictures show on screen, his main argument was the artifact still does not has its meaning and value. So this would not encourage people to feel more enthusiastic to make a face-to-face communication in his point of view. However, he thinks Skog could encourage people to get involved the activity in the space from its attractive. Finally, he had a strong feeling about online community influence physical world in a way.

5. Refining the Design

Regarding the pilot study result user crucially reflected on Skog as a big screen showing pictures randomly and it still needed some improvements on functionality and meaning to user. Analyzing pilot study feedback and reconsidering the design theory made me realize to focus more on user’s attributes. Led to the implementation of the flower of personality in Fig. 5 that based on astrological zodiac signs. These 8 different flowers are calculated by date of birth and raw data gathered from online social network database.
Fig. 5. Zodiac flower of personalities and prediction.

These flowers are generated after user creates profile on Skog (See Fig. 6.). Each user gets one flower, the idea is to provide context supporting the activity for example a topic of flower that user get before get the space or it can be a badge and put it on participant’s shirt. These

Poppy
You love the finer things in life, and you love to share them with other people. You have a flare for design, a good eye for detail, and a knack for putting things together with style.

Honeysuckle
You are sweet to the senses of others. Meaning, you naturally entice others with your charm and grace. You have a smooth confidence that attracts a wide variety of friends and business partners.

Lavender
You freckle your landscape with beautiful ideas. You love to share these ideas with other people and get more new insights as you do so. You are expansive in your expressions, and you always seem to be able to find your muse. You are amazingly productive, creative and have an active mind.

Lily
Water lily flower signs are perceptive and deeply psychic. Water runs through all the flower signs but especially through yours and this accentuates your intuitive abilities. You are sometimes able to absorb ideas and thoughts of those around you. You can be emotionally swayed by other people’s feelings too.

Morning Glory
You tend to think and plan first before you take any action. You are organized and very observant. You have a natural eye for detail, and can be very analytical.

Narcissus
Narcissus zodiac flower signs can be very influential and enjoy sharing their philosophical ideas with others. You are direct, to the point, trustworthy and honest. You are naturally wise, and you also are gifted with good luck.

Sunflower
Sunflower signs are warm, open, and natural leaders. You rise to any occasion with confidence and assurance – you have no doubt that you are the perfect person for any challenge, and you know how to reach to the top.

Chrysanthemum
You have many layers to you, and just as soon as someone thinks they have you identified, you pop out with another blossom of surprises. You like clarity and honesty in all things. In fact, when situations are murky or unhealthy you are the perfect sign to come in and clear the air or heal the situation.
flowers are assigned to user based on harvested data which are user's profiles consist of date of birth, personal interests, activity, music, sport, political opinion, etc. For example user that born in January, love outdoor activities and rock music has more opportunity to get “Poppy” flower as a flower of personality.

Fig. 6. Skog assigned flower represent possible user personality.

Another added feature in this phase is linking between pictures, which, represents the shared interests connecting users (See Fig. 7.). Similarly this feature also implemented on online social community site database, especially in detail user profile in Facebook. In contrast, links between users may not be the same as assigned flows; it is more focus on user interests and opinions. While, flower is predicted from date of birth but using interested and activity as a support data. Skog system analyzes all available information of each user and generates the possible common interests with the size and color of the link. From the Fig. 7., Skog represents the link without any description but with the intuitive size and color that is able abstract indicator of the relationship between users. My crucial design aspect is to encourage face-to-face communication and users will normally find the answer to the meaning of colors, size and why they are linked each other by talking.

Both two functions interact with the user when they approach the Skog screen and the system is able to recognize user face (user's profile is in the system) First there is a highlight surround the current using user and their links. Also Skog display the flower of personality at the top corner of any user with same flower as current using user. There was an argument on how convenient between regular sign in the social online community account and using face recognition to indentify user. Realizing most of the profile picture in social network site is normally difficult to identify who is actually is with unclear or using view or their pet as a profile picture. Therefore, Skog needed user to register and indentify their account and taking a front view of user at first time using. Then face recognition plays intuitive interaction role to entice user play around with it instead of fill in user account every usage.
6. User study: focus group

The Design was evaluated with the design walkthrough method (Polson et al., 2001). The qualitative research was conducted with 5 people with 3 different nationalities. These focus group members are all students in the HCI field but with different background, which are system analysis, organization and system development. All of them know each other. These five members are very close in age, which are

1. **User A**  
   - Sex: Male  
   - Nationality: Swedish  
   - Age: 26  
   - Occupation: HCI Student  
   - Background: System Analysis

2. **User B**  
   - Sex: Male  
   - Nationality: Palestinian  
   - Age: 26  
   - Occupation: HCI Student  
   - Background: System Analysis

3. **User C**  
   - Sex: Male
Nationality: Swedish
Age: 23
Occupation: HCI Student
Background: Programmer, System development

4. User D
   Sex: Female
   Nationality: Taiwanese
   Age: 31
   Occupation: HCI Student
   Background: Database Administrator, Consultant

5. User E
   Sex: Male
   Nationality: Palestinian
   Age: 25
   Occupation: HCI Student
   Background: Programmer

The design evaluation was conducted in a private conference room with one projector, one round table and more than 7 chairs surround it. I was the facilitator who lead the presentation and formulated interview questions during the presentation. Audio was recorded during all the session with a digital camera and notes also taken by the facilitator. The user study began with a design brief and explanation of the concept of online community in physical space. Then a short video clip about “portrait machine” was shown to give the participants an early idea of what the design could be in real space. After the video presentation, Skog’s system diagram was showed and is described in detail see Fig. 9. After that the presentation illustrated how the system flow and scenario is (See Fig. 8.). There were also 5 main questions during the presentation consisting

1. Individual interpretation on how online social network influence social behavior?
2. How do you interpret the design?
3. Usability and workflow, how good are they?
4. Sign-in VS Face recognition, which one is more convenient in public space?
5. Discussion on benefits and drawbacks.
Fig. 8. Focus group study flow diagram.

Fig. 9. Skog overall diagram.
7. Result

According to the answers considering online social network and the possible effect on social behavior and interaction, all users agree that bridging the online social community and physical community would influence user behavior. They felt the benefit would be an expression of participants’ common ground. This would encourage the face-to-face conversation in the different way. Especially, when we are in the new place with new people for instance, academic conference, designer workshop, nightclub, etc. Starting a conversation with new people’s common ground is useful information, to know a briefly kind of person that you are going to communicate with.

In the design walkthrough question, overall, from the group study interview, three participants understand the concept quite fast and interpreted Skog as a large screen that support the face-to-face communication as expected. One common opinion was the suitable location such as party, academic conference and workshop. They seem to agree that Skog could be really useful in these particular places. One also mentioned the feeling when he was at a party or event when he does not know anyone in the place. He mentioned the possibility of Skog to encourage user communicate with someone in the similar type as them. Four out of five users interpreted application flow and user interface as understandable and intuitive usability. They all agreed to the aspect of face recognition function as being able to generate attractive and entice usability to user. However, commanding with voice to take a picture may not be comfortable for some users in one personal opinion.

All participants agree that the communication problem in new place occurs for someone or some places. They thought about illustrating social community in flower and link could broaden enthusiastically manipulate with the device. Besides, Skog could really encourage user to start a conversation with other people while, it could make the space more interesting and attractive at the same time.

There were two interesting comments on the design, which are 1.) The visibility of user relationship view was raised up while the presentation was showing the tree of relationship. They had a strong suggestion on user relation view mode when user approach to the screen and recognized by face caption mode. User picture and linked line should be highlighted and distract it from other surrounded pictures and links. 2.) The number of participant should not too less or too much. Considering 6-10 peoples would not need Skog, but they could approach and make a contact directly. On the other hand large amount of people such as big concert or football stadium are not the Skog’s main aspect.

To sum up, one main crucial aspect of this user study was observing how they interpreted Skog. The result indicates the Skog can really help face-to-face communication in a way. Bringing the available social online community information and distribute them as a tool would able to facilitate physical social interaction in real world.
8. Discussion

My prototype and user evaluation were encouraging, so next step is to create a physical prototype in a real environment. There are a several discussions that concerns the next design phase: 1) Skog’s main function is to encourage people making a contact but on the other hand in case that user start making a contact directly in the physical space, Skog system should be able to update the user’s community status by for instance exchanging name card via mobile phone. 2) Moreover, with the mobile phone benefit, Skog could also track user’s position in the space and display the position on a screen, so users who discover the relationship diagram can also find the specific position of one who they want to contact. 3) Leaving a note to user picture on the display is another idea from discussing in user evaluation. This feature allows user to leave a note to person who want to contact with on the screen, so later that person can contact back.

More on comments, claims and suggestions are considered in the design of the physical prototype. There was an argument on the number of link between user pictures, which could make the diagram mess up with a lot of links cross each other. A suggestion to limit the maximum number of link and another interesting comment is the system should at least assign one link to each account to avoid the case that system manipulates some account with no link. This could be a drawback if Skog analyze and base on its relationship algorithm solidly. So to avoid these problems and enrich the face-to-face communication context, providing at least one link with any related data between users could be another solution to be considered.

My future work will be implementing this physical prototype with gathered data and install in physical interactive space. Using openframework, which provides library for face recognition in tangible interaction part to develop application backend. Combining this framework with opensource API harvest user profile from social network site especially Facebook. Finally apply the design interactive space in real space principle and install device based on usability aspect.

9. Conclusion

This research started with the question: how can we encouraging people in same physical space to make a communication in real world by display online social community context? Regarding on Skog design research and observation, user basically agreed on using these common grounds for communication with provided social community. Plus graphical representation of possible similar person connection is guided user someway to make a conversation. Therefore blending community in virtual world into physical world would facilitate communication in place especially where people needed basic information to start the conversation with some unknown persons. On the down side, the device could be useless when it is placed in improper space such as a huge space with 10,000 people or too small sapce which, people can arroach each other easier.
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