MIRRORED MESSAGE WALL: BRIDGING THE REAL AND VIRTUAL COMMUNITY

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Abstract. The Mirrored Message Wall is a cross-world digital public display located in both real and virtual world, for collective sharing of thoughts and messages and serves to connect the real world and virtual communities. The wall was installed at a university library foyer and concurrently at a 3D virtual campus for user studies. This paper presents its design, social factors considered in the design, implementation, and the findings of the user survey and observations. The results confirm that such an installation does encourage people to interact with each other and the results will inform a better design for the next version.

Keywords. Virtual environment; second life; interactive message wall; public display; social interaction.

1. Introduction

In present day, communication within communities are both face-to-face and in virtual platforms. 3D virtual world platforms such as Second Life (SL) allow users to create their own world in rich graphical environment, create 3D virtual objects programmed to perform actions and to communicate with others through their avatars (Crowther and Cox, 2009). Many in-world communities are created for collaborating, sharing information, and doing online business. Many universities also build virtual campus and offer lectures in virtual classrooms ("Education in Second Life", 2010; Ritzema and Harris, 2008; Callaghan et al, 2009). Numerous communities are also setup in-world for groups of users who have the same interest, culture, or belonging. However their interaction exists only in the virtual world with other virtual users and is disconnected from the real world.

In the real world, in spite of pervasive use of the internet, some

people within communities still depend on public display for information and communication as not everyone is internet savvy. It is not uncommon to see announcements, advertisements and news on both physical and digital bulletin boards in places such as universities, subways, apartments and shopping centres. The digital public displays are usually minimally interactive (Churchill et al, (2004)) and one-way dissemination of information by manager to passers-by (Peltonen et al, (2007)). However, they have the potential for promoting the sharing of community content and public participation.

There are many projects that experimented with public displays of digital messages, images or videos. In Joe Blogg (Martin et al, 2006), users send messages and images using mobile phones onto a public display. In Tex-Tales (Ananny, 2004), users send SMS text message captions to a large scale photographic installation. In CityWall (Peltonen, 2007) users send media content using mobile devices to a large public display. Blog wall (Cheok, 2008) displays poems on a screen based on users' SMS. However, none of these projects deal with the connection between the virtual and the real space.

This research is interested in using public display as a means to connect physical and virtual communities and promote participation and sharing. The design method is a "tinkering" iterative process starting with sketching, low-tech prototyping, user survey and observations and repeating the process again for refinement of design. In our previous work (Tan, 2010; Yeom, 2010) we proposed a mock-up of an interactive message wall and did initial user study to guide the development of the design. In this paper, we implemented a prototype of the Mirrored Message Wall, a public display for large group users, located in both physical and virtual public space. The physical version was located in a busy part of our campus library, and the virtual version in our university's virtual campus in Second Life (SL). User observations and surveys were done to identify and verify issues.

2. Mirrored message wall - features and design rationale

The Mirrored Message Wall exists in both physical public space and virtual space and is a bridge to connect users of the real and virtual worlds. With a blend of real and virtual, it collects the hidden thoughts of passers-by and virtual users and allows everyone to see the collective aspirations. It consists of three components namely the physical message wall, the virtual message wall and message wall database (DB) API server (figure 1).
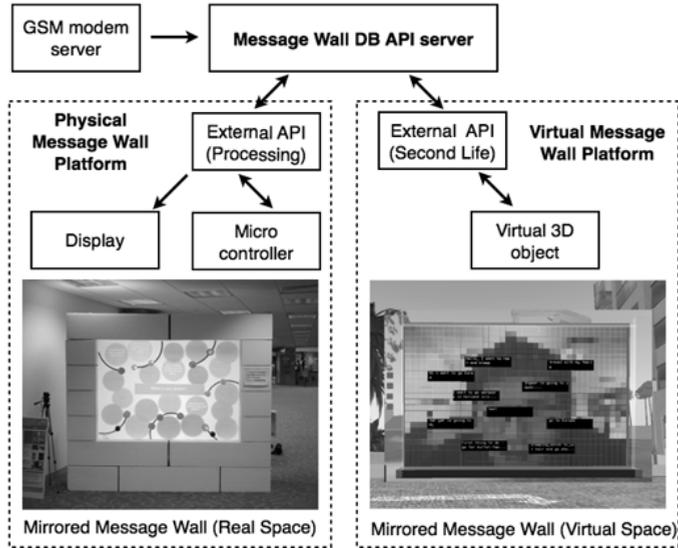
Figure 1. Message Wall in physical space (left) and virtual message wall (right).

The physical message wall consists of a rear projection system that is connected to a computer that in turn is linked by network to the DB API server.
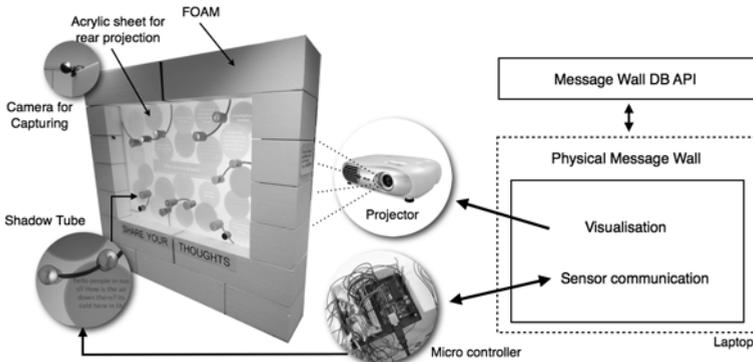

Figure 2. The Physical Message Wall Platform.

2.1 SOCIAL FACTOR - PRIVACY

In a community, awareness of other members may motivate participation of the community (Singer et al, 1999). So some public display projects for small groups share their status, image or movie clip (Greeberg and Rounding, 2001; McCarthy et al, 2001; Karahalios and Dobson, 2005) to indicate their

presence. However, for physical public discussion space located in a large common area, their shared information must take into consideration some social issues. For example, privacy is not an issue in a sharing process among members of a small group but in a large group, members are usually reluctant to open up and speak up their minds. This is because of their sudden enhanced sense of privacy. In the many research surveyed, most users are concerned about their privacy when online (Cranor et al, 1999; Rivera, 2004; Truow, 2003; Woo, 2006). We also found in our initial user observation (Tan, 2010) that most participants did not want to share their picture, movie clip, or voice with the public.

2.2. SHARING THOUGHTS AND MESSAGES - ANONYMITY

With the above in mind, the key consideration was to allow anonymous posting of messages for onsite users. By doing so we hope it can encourage more participation. In Second Life, the true identities of the avatars are not known so anonymity is guaranteed.

Messages can be posted using a mobile phone when a person stands in front of the physical message board, i.e. onsite users. Inside our university's Second Life Campus (virtual campus), users in their avatar personas (i.e. in-world users) can post messages by typing a message on the keyboard and posting it onto the message wall in the virtual world. Messages will appear real-time anonymously in both walls. To collect onsite users' messages, we use Short Message Service (SMS). When the (GSM) modem receives new SMS messages from the user at the physical message wall, it is sent to the Message Wall Server. Both Mirrored Message Walls in real and virtual space will display the message anonymously whenever a new message is detected. Displayed messages posted from the real world or virtual world are differentiated by different colour background. The messages posted from virtual world have blue background and those posted in front of the physical wall have yellow background. The message wall server saves messages and data from sensors and camera.

2.3 AWARENESS OF PRESENCE – ABSTRACTION, PRIVACY

To create awareness of presence, an abstract rather than a realism approach is taken. The reason is to safeguard privacy and also to maintain the anonymity in order to encourage more participation. The way it works is that a camera captures an image of people standing in front of the physical message wall and the image is pixelated and displayed as background on the virtual message wall indicating the presence of people at the real world message wall.

Silhouettes of human cut-outs in lighted shadow tubes indicate the presence of virtual users. When a virtual user (an avatar) is near the virtual message wall, a LED will be turned on showing a silhouette. The number of silhouettes on the physical message wall indicates crowd size in front of the virtual message wall.

Figure 3. Representing presence -- Pixelated Image Wall (a) and Shadow tubes (b)

3. Survey and observation findings of user study

The prototype model of Message Wall was exhibited at the campus Central library for user study for four days. The topic question was "What is your Dream?". Over 100 messages were posted on the wall from real and virtual space and 47 users participated in a questionnaire survey. Some participants were also interviewed. To observe users' interaction, their activities were captured with video camera. User created contents (SMS message) from the Message Wall DB API were analysed. This paper presents only the findings of survey from onsite users.

Figure 4. User observation with prototype model in the central library.

3.1. PRIVACY

In question 12 *("Are you willing to share your pixelated image with the public?")* of the questionnaire, we asked user's willingness to share their pixelated image with public. 90% of the participants are willing to share their pixelated image while in our initial user study (Tan, 2010) only 6% of participants were willing to share their photos with the public (Fig. 5). So, if their image is pixelated, they are more willing to share with the public. It is important to extend participants' range for sharing information to collect their rich created contents.
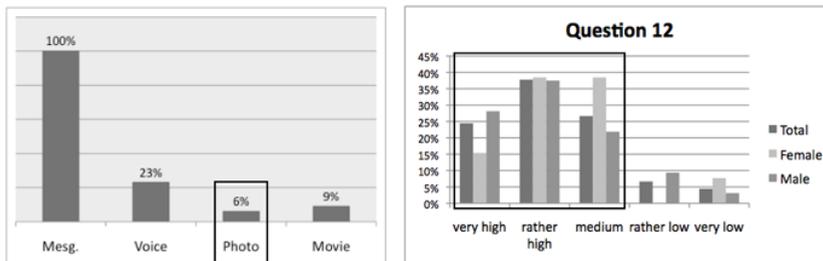

Figure 5. Willingness to share their photo in the initial user study (Left) and willingness to share pixelated image in this study (Right).

3.2. AWARENESS OF PRESENCE – ABSTRACTION

For question 11, *("Shadows on the wall show the presence of virtual avatars, does it help you sense their presence?)* of the questionnaire, only 47% gave a score of high and rather high (mean ranking of 3.17) (Fig. 6). Some users did

not understand what the shadows mean until it was explained to them. On the other hand, some users who have used our Second Life Campus understood it and found the idea of abstract representation interesting. More work is needed to understand what kind of abstract representation will be more engaging.
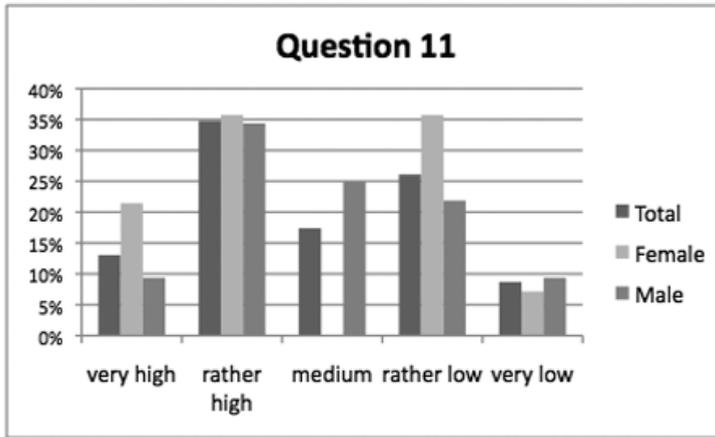

Figure 6. Result of (Shadow tube) Sense of presence question .

3.3 INTERACTION BETWEEN REAL AND VIRTUAL

An unexpected finding is that some avatar users from SL campus tried to communicate with the people at the physical message wall and vice versa. Even though the topic is *"What is your Dream?",* an avatar posted *"Who is down there at the physical wall?".* A user at the library posted *"Hello people in SL, how is the air down there? It's cold here in the library!".* It is interesting that people try to communicate with someone who is in another world even though they do not know each other. Local SL users posted messages mainly late at night or after midnight while the messages posted in the library were restricted to library opening hours.

3.4. ENCOURAGING USER COMMUNICATION

From the field observation and video observation, many users were interested to read others' posted messages on the wall. When a user is accompanied by friends, they talk about the messages [Figure 7]. The displayed messages become a catalyst to start a conversation. This action was also found in the virtual community -- once they are in front of the message wall, some avatars tried to "talk" (text chat) about the messages on the wall.

3.5 MEMORY AND MAKING A MARK

There were two unexpected actions. Firstly, a number of users took photos of the messages they posted, for memory sake. They seem to get a satisfaction from externalising their thoughts, have it publicly displayed for all to see and wish to capture it for keepsake. Secondly, some people ignored the topic and posted birthday wishes and love declarations instead. These users treated the message wall as a space to vent whatever is on their mind with free expressions e.g. *"Thesis is killing me!, "Happy Birthday to Pearl!"*.

Figure 7. Messages trigger conversations. Taking a photo of message on the wall for memory sake.

3.5 PROBLEMS WITH DESIGN

From user feedbacks and our own observations, we identified some problems of the Mirrored Message Wall. The visual design of the Message Wall can be improved to attract people. The graphic bubble on the screen is static and it takes too long (20 seconds) to appear on the screen after a user post a message. Most users could not understand the difference of bubble colour (yellow for real world posts and blue for SL post) wsithout reading the instructions. Since only the latest 21 messages appear on the screen, users could not see and navigate previous messages once new messages replace them. We use rear projection in place of front projection so as to avoid disturbance of projected images by people standing in front of the screen. However, it requires minimum 2 meters behind the screen to set up the projector. This takes up too much space and limits where the Message Wall can be installed.

3.6 FUTURE WORKS

So for future works, we will create a reply and recall messages function to promote interaction between users. Shorter response time between posting and displaying a message and more interactivity are required to attract users. A short-throw projector can reduce the rear projection distance and overcome limitation of where the message wall can be located. Also we want to set it up at a place for longer testing to collect more observation data and surveys.

4. Conclusion

Mirrored Message Wall has been implemented as a prototype and exhibited for user test to understand how users interact with the Message Wall and to examine the social factors that encourage user participation of the Message Wall.

Previous initial user study has shown the potential of this new media communication between the real and virtual. In this research, we design the pixelated image wall and shadow tubes to show the awareness of the presence of others in the real and virtual space. From the observation and survey, we found that people are less concern about their privacy and willing to display their own face when we use a pixelated photo instead of the actual photo. If we extend the range of user created contents beyond text, the Message Wall might capture richer user created contents and will attract more participation from users. The results also confirm that such an installation does encourage people to interact with each other and certain factors can deter or encourage participation. Public display can be a means to connect physical and virtual communities and promote participation and sharing. These findings on the social factors affecting use of the Mirrored Message Wall can be useful for designing new media application for smart urban environment and 3D virtual environment.

Acknowledgements

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