

Tools for On-Door Communications on WWW

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Abstract In this research we try and implement communication systems using the metaphor of a door on the World-Wide Web (WWW) as a media for informal communications. We call those informal communications through a door “on-door communications.” We presume a scenario such that we would visit our friend’s room in a student hall of residence; we would knock on the door and have a chat with the friend, and may leave a message on a message board on the door in case of the friend’s absence. Accordingly we introduce two tools for such communications. One is a chat system with some awareness features, viz shadow and auditory signals, and the second one is a message board for a handwritten-message exchange. When users visit a net door site, their shadows would appear on the door. A user would knock on the door to notify the others that the user would like to start a chat. The other is a whiteboard system for asynchronous communications, in which each handwritten messages are coded as a set of lines. We incorporate a feature for time visualization into the message board, so that messages in past would be fading out gradually. This paper reports on our design and implementation issues of those two systems.

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1. INTRODUCTION

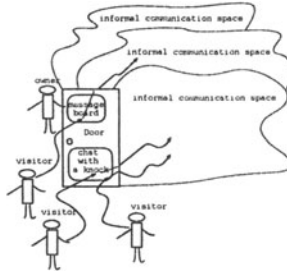


Figure 1 The Model of On-Door Communications

The motivation of this research is based on the experience of an extensive use of a message board on a door in one of the postgraduate student halls of residence. It was meant to be a message board for friends to leave messages only to the owner of the room. On the contrary, due to the fact that the room with the board was located in front of an elevator entrance, the board became soon to be known to many and used extensively as a message exchanging media by the other owners for many to many asynchronous communication with anonymous writers. The messages on the board included more of the entertaining content such as a joke and a quiz game enjoyed by many than the personal communication.

The objective of this research is to bring such communication systems using a door as a media into the WWW environment, and to examine the difference from the ones in the real world. Our ultimate goal is to observe the use of those systems and investigate interesting and novel applications.

We introduce two systems. The first one is a system for a chat at a net door, with two features for awareness, viz. shadow and auditory signal such as a knock sound. When users visit a net door site, their shadows would appear on the door to let the others to notice of the arrival of a visitor. A knock on the door would be used to notify the others of one's intention to start a chat.

The second one is a message board for asynchronous communications. Just as the one in the student hall, we designed and implemented it on WWW, which provides users with simple tools for drawing. Letters are coded as a collection of lines. On this board, any message can be written by hand making use of a mouse and a tablet.

This paper reports on our implementation of those two systems. We present the design of our systems as well as the implementation of the prototype systems. Finally we report on our discoveries on the difference from the real one in terms of a system structure, and discuss the issues to be dealt with in future.

1.1. AN OVERVIEW

This section introduces a net-door chat system. Two awareness tools are provided, knock and shadow. A knock on the door is used to let the others to notice of the arrival of a visitor at the door with an auditory signal. A shadow indicates the existence of visitors as well as that of the door owner.

The idea of knock is to let the receiver notice of the sender's urgent wish to communicate by audio signal, just as telephone bells and various types of the auditory signal for email arrival[?]. Our system provides users with a simple tool for knocking with a click using a standard input device such as a mouse. A click produces a sound of a knock on the door, so that anyone who has been opening that door page can hear. A chat system is provided for further message exchange.

Shadow works as follows. When the owner is in the room, the light can be seen through the door window as well as the owner's shadow. A visitor gives a knock on the door and starts chat with the door owner. If the owner is not available but any other visitors are out there, their figures can be seen outside the door, so that the new visitor can join the others in chat. If no one is around, the visitor can leave a message on the chat board. When a visitor comes across at the door, his/her shadow is generated outside the door so that the owner and the other visitors would notice of the new comer.

1.2. THE PROTOTYPE SYSTEM

We used JAVA for coding. The server is a JAVA application and a client is provoked as a JAVA applet. The server can deal with as multiple doors. The client side door knock system interface is written in the HTML, and can be used on the WWW. The visitors need WWW browser. After setting up the applet, the visitor inputs his/her handle name. The handle name is used to indicate the writer of the messages.

Starting of an applet of a caller or owner generates a shadow. Clicking the image of a door with a standard input device such as a mouse produces a knock. A client produces a sound of a knock on the door, so that anyone who has been opening that door page can hear. The knock sound is prepared in the Audio File Format (AU) and sent to a user

site as an initial data together with the JAVA applet for a client in the beginning of the communication. When an owner has connected with a door, his/her shadow appears on the door window, whereas the shadow of visitor appears in the foreground of a door. Fig. 2 shows a door on WWW at a client system.

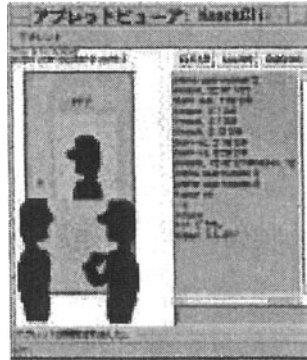


Figure 2 Knock-on-the-Door Communication system on WWW

2. THE ON-DOOR MESSAGE BOARD SYSTEM

2.1. AN OVERVIEW

A message board on the door has the following characteristics: 1. Messages on the board are short and written by hand. 2. It provides asynchronous communication. 3. Anyone can read and write; anything can be written on the board, including a message addressed to the others than the owner. 4. The board is write-only and has no eraser for the ordinary users; this is merely due to the fact that the original message board in the student hall did not have any eraser. 5. There is no authentication and users stay anonymous. 6. There has to be a way for the others to know of the existence of the message board; i.e. a feature of awareness is needed. The motivation for anonymity, 5 in the above, is this. The original message board in the student hall was used in such an extensive way that not only for friends left a message to the owner of the room, but also some other owners started leaving messages presumably to the room owner but anyone else enjoyed reading and replied. The writers stayed anonymous with code names such as Doracula and the board worked as an entertaining media for many-to-many communications.

2.2. VISUALIZING TIME

We added a feature so that old messages are presented in a faded color according to the time when they were written.

We locate this function at the client sites, so that it will be left for users to control fading as they like; some may be interested only in the messages written in a few days, whereas other may like to see the message written in a few weeks. A client maintains a cache of drawing information with time stamps, which has been obtained from the server. The client provides a user with a function to control the lightness of the color of the messages according to how long ago they were written. Fig.3 shows an example produced by our prototype system. The messages are washed out gradually according to the time they were written, and those written before the time user specified are faded out.

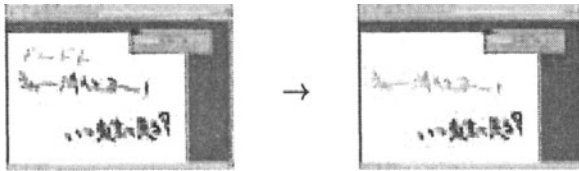


Figure 3 Fading messages away

Those colors are expressed in HSB(Hue Saturation and Brightness) and we control the saturation value to fade a message as follows. A message is composed of a set of LINE objects. Each LINE object has been time-stamped by the server. The color information of LINE objects is transformed into HSB from RGB at a client and the saturation parameter is recalculated according to the time stamp of a LINE object. Users specify the time duration to change the saturation. If one specifies a few days as the time duration, only those messages which were written in a few days would appear in a faded fashion. Those which had been written before the few days ago would disappear.

2.3. THE PROTOTYPE SYSTEM

We used Java for a server, and Java Applet for a client.

A *owner*, the owner of the board, has a link to the message board server on his/her home page on WWW. Through the link to the server, client systems are generated automatically with the use of Java Applet. A server and a client use our original connection-oriented protocol, the On-Door Communication Protocol(ODCP) for exchange of drawing information. When client system starts operating, it sends the server a

request for an ODCP connection. In practice, the server can have as many connections as possible as long as its system resource is available.

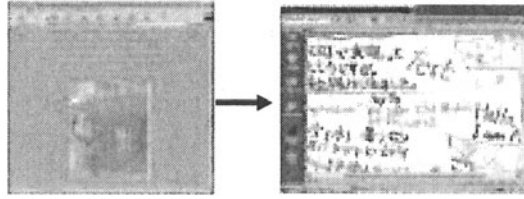


Figure 4 The owner's Web page and the message board

Figure 4 shows the message board attached by the control panel the pen selection. The size of the current message board is fixed as 1000×1000 pixels. A user selects a pen with the favorite color and thickness, and start drawing with an input devices such as pentablet and a mouse. When a user starts drawing, the client system starts sampling points of a line. Sampling is performed whenever the client system gets a mouse event which is a standard function of JAVA. Many users requested that they would like to own their own message board; some users requested that they would need multiple message boards for different purposes. With the current prototype system, a server can provide users with more than one board.

2.4. DISCOVERIES AND FUTURE WORK

There are several differences between our message board on WWW and the one in the real world. As we put it in one of the designed features of the system, the aged messages could be faded away. This feature of time visualization would not be possible on the board in the real world. Moreover, in the real world, the owner of the board manages the board, whereas in our system, the owner of the board is not necessarily the manager of the board server.

Writing figures could give us some indication of writers. We investigated an algorithm to deal with security issues on how one can guarantee that a user who leaves a message stay anonymous. The idea is to move some drawing points so that the written message would have no more individual writing characteristics in handwriting, however, it would be still readable. This sort of modification would not be possible with a message board in the real world. We shall also start looking at the use of the LCD panel on the real door of a room, which will display the web page on the network as well as to let the users to write the messages.

Moreover, we have started connecting a real whiteboard with a special pen holder and a sensor which detects the movement of the pen holder. The sensor is controlled by a PC on the network, so that messages written on this board appear on our message board on WWW. This will enable people who had no access to the Internet to leave messages on our system.

3. RELATED WORK

3.1. THE CHAT SYSTEM WITH AWARENESS FEATURES

Ubique[1] is a system that aims to create virtual places on the WWW. This system has such functions as "who is on-line", chat and instant message. The system also does not use auditory signal in chat.

CyberWindow[2] implemented the metaphor of a window on WWW, and interconnects the real world and the WWW environment with sound awareness. In this system, users in the real world carry hand held computers with a wireless connection to the network. The visitor uses one of the three types of message volume: "whispered", "said" and "shouted". The received messages are transformed into voice messages by means of a text-speech engine. A visitor can also show his/her emotions to the others by using various types of sound; laugh, applause and knock. In our system, not only awareness of sound but also visual awareness is given to a visitor.

3.2. MESSAGE BOARDS

The idea of time visualization is nothing new. The concept of aging messages was explored by Seligmann[4],[5]. Their Metaphorium project produced various messaging systems for novel types of user interaction and textless information navigation. In one system, a bulletin board is a beach, and a message written on the sand in a virtual island would be removed when a wave washed it away. In another system, a message written in the virtual sky with smoke would be faded away gradually in a few minutes. The idea with those systems is the aging process is supposed to be done by the nature although in the system it is done randomly. In any case it is not controlled by a user. The purpose of our time visualization is for a user to select the recent ones out of all the messages written on board. The user has a control on fading.

Flatland by Mynatt[3] is a computer-augmented whiteboard system for asynchronous communication, however, it is designed to support informal work in a personal office environment in which the board owner

leaves some memo and ideas. Time visualization in their use is originally designed to see some memo and ideas in past, whereas the one in our system has a different objective to see all the messages on the board at a glance with their freshness; that is why they are washed out gradually rather than a snapshot.

4. CONCLUSIONS

We reported the design, implementation and operation of the system as well as some issues to be dealt with in future. The differences from the board in the real world, include time visualization and the need to structure of the management. We shall work on sorting out those issues as well as to try and extend the overall communication environment to include the real world, by making use of LCD panels. Since our system can work with client systems with WWW access and the JAVA environment, it could make use of PDAs and mobile phones as client systems.

In the future we would like to distribute our software widely and investigate interesting applications of our system. We started working on other types of on-door communication systems such as under-the-door information passing system as well.

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