A chat system with knock-on-the-door sound and shadow

Keishi Suzumura[1], Natsuko Hikage[2], and Yuko Murayama[1]

[1] Iwate Prefectural University, Graduate School of Software and Information Science, Postfach 020-0193, 152-52 Sugo, Takizawa, Iwate, Japan

[2] Iwate Prefectural University, Faculty of Software and Information Science, Postfach 020-0193, 152-52 Sugo, Takizawa, Iwate, Japan

Abstract. In this research we try and implement communication system using the metaphor of a door on the World Wide Web (WWW) as a media for novel types of informal communications. We call those informal communications through a door ”on-door communications.” As an on-door communication system, we have designed and implemented a system for a chat at a net door. One has a door page on WWW and a chat system is presented there so that the others pay a visit to have a chat at the door with two features for awareness, viz. 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. This paper reports on our design and implementation of our prototype system as well as its operations.

1 Introduction

In this research, we call the informal communication which uses the metaphor of a door “on-door communication.” We have brought some systems on the World-Wide Web (WWW), such as the on-door message board[4], the chat system with knock and shadow, and the under-the-door communication system. This paper presents the chat system.

In the real world, one uses knock-on-the-door sounds and a bell to indicate the arrival of a visitor. Our chat system on WWW makes use of such sounds as a trigger for conversation. Moreover, shadows and lights on a door window tell a visitor tacitly the existence of a resident in the room. We look into such a role of a door as well as actions performed through a door. It is quite difficult to know of the existence of the others on networks compared to the real world. This paper presents our work on some awareness tools on the network such as a knock on the door and a shadow on a door window. We report on our experimental operation of our chat system with those awareness tools as well.

The next section presents the model of the on-door knock communications, and section 3 gives some related work. Section 4 describes the system design with awareness functions using auditory sound and shadow. Section 5 presents the implementation of

Suzumura K., Hikage N. and Murayama Y. (2004).
A chat system with knock-on-the-door sound and shadow.
In *Proceedings of the 1st International Workshop on Computer Supported Activity Coordination*, pages 81-90
DOI: 10.5220/0002659700810090

our prototype system. Section 6 reports the results from the experimental use. Section 7 present the difference from an ordinary chat systems. Section 8 reports the future work. Finally, Section 9 gives some conclusions.

2 The model of the on-door knock communications

In this section we describe the model of a knock-on-the-door communications. In the real world, one visits the door of someone's room and knows whether the resident is in or not presumably by looking at a door window if any as well as by hearing some noise from the inside of the room. Moreover, the visitor knocks on the door, alternatively she rings a bell to notify the resident of her arrival. In case of no answer, one would conclude that the resident is not available in the room. If the resident is in, he would reply to the visitor's request for communication. Figure 1 shows the model of the knock-on-the-door system.

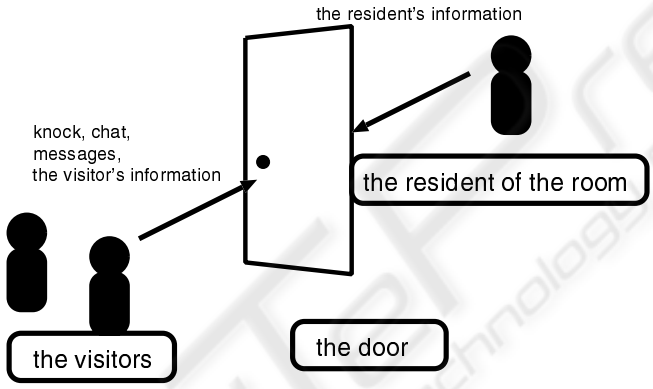

Fig. 1. the model of the knock-on-the-door communication

A knock-on-the-door system is composed of a door, the resident of the room, and the visitor. The door is a portal for an informal communication space with the resident. The portal has the user interface easy to guess for a user due to the door metaphor.

3 Related work

A protocol for User Awareness on WWW[1] provides with a discussion on awareness system with CGI and JAVA. This paper proposed an open awareness protocol to notify the presence of user to the other. Our KCP is designed for the same purpose but for auditory awareness. Sound has been used effectively for awareness[2].

The shadow view system[7] provides the user the function using the metaphor of the shadow. The shadow function is used in order to protect a usre's privacy. Nichols and

others[9] have focused on the role of the door like the mediator between the resident of the room and visitors. Ubique[3] 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 dose not use auditory signal in chat.

CyberWindow[6] 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.

4 The system Design of the knock-on-the-door communications

We presume the use of our system as the following scenario. The resident installs our system for a portal to his informal communication space. The others visit the door site. When a resident is in the room, his shadow appears on the door window. Visitors' shadow would be projected in front of the door-image.

In the following subsections, we describe the awareness functions, system configuration, and the knock-on-the-door protocol.

4.1 Awareness functions

The following awareness functions need to be implemented in our system.

1. to produce an auditory signal for a knock
2. to present the shadows of a resident and visitors
3. to provide users easy interfaces related to a door

An auditory signal should be provided for a knock sound. We may need some other types such as the ones for laughing voice and beep sound. Shadows are expressed as black images. In order to knock, one needs to give a click on a door image and a knock sound is produced.

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. The shadow of the resident of the room is displayed on the window frame portion of a door, and a visitor's shadow is displayed before the door.

After a visitor connects with a system, the a shadow image is displayed in front of the door image just as an avator. A visitor is aware of the existence of the others by their shadows. Similarly the shadow of a resident is displayed on the door window.

4.2 The system configuration

In this subsection we describe the system configuration. Our system provides users with the two services, viz. Awareness services include notifying the others of one's existence and intention to talk by a knock sound and letting user know of the others' existence by shadow, and a communication service. Our system has the client and server architecture.

- The client functions provide interface for users.
  - to knock on the door
  - to generate the knock sound
  - to display the user's shadow
- The server functions provide the user with other user's information.
  - to exchange of knock, chat, and shadow message information
  - to obtain the user information

The server manages the information from the clients. The information includes chat messages, auditory requests and user IDs. It needs to maintain such information. It provides clients with those information so as to provide clients with a message exchange service as well.

A client interfaces the user such as a resident and visitors to the server. It presents information from the server to the user such as chat messages, the other users' shadows and auditory sounds such as knock sounds. Accordingly it requires to have the functions for the user to give a knock on the door as well as to present a knock sound to the user. Moreover, it needs to display shadows. It sends information such as chat messages and request for a knock from its local user to the server as well. Fig. 2 shows this. The client system is installed on WWW. HTTP protocol is used for a client in order to connect with the server.

4.3 Knock-on-the-door Communication Protocol

After connection with the server, the client and the server communicate with each other using our original protocol called the Knock-on-the-door Communication Protocol (KCP).

KCP is a connection oriented protocol. The Protocol Data Unit (PDU) Table of a KCP protocol is shown in Table 1. PDU is composed of the ID of a door knock system, a command, and some data. KCP has three message types, viz. a knock message, a chat message, and a management message. See Table 2 for the detail. The knock and chat messages are sent to the server from a client. The server sends them to all the other clients which connect to the same door. The management message is used to eliminate a message, as well as to control visitorś access.

A user inputs a handle name after system starting. The handle name is used as a user ID in the chat system.

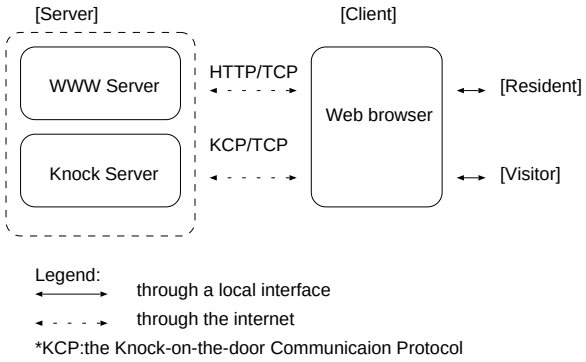

Fig. 2. the protocol of knock-on-the-door

Table 1. the protocol data unit

ID	**command**	**data**

5 Implementation of a prototype system

This section describes the implementation of a prototype system. The system was implemented using the JAVA language. The language is flexible so that it is easy to add new functions and services.

The server was implemented with JAVA application and the client was the JAVA applet. The JAVA virtual machine of server side is JDK 1.2. The interface by the side of a client was implemented using Abstract Window Toolkit (AWT). Using the web browser which can perform JAVA applet, a user accesses the page in which the knock system was installed.

Browser environment recommends Netscape Communicator 4.5 or more and Internet Explorer 5.0 or more.

Figure 3 shows an example screen image of the prototype system. In the figure the resident and two other visitors are shown. The maximum of three shadows can be displayed in front of the door image — i.e. even when we have more than three users, up to three shadows could be presented. When the resident comes to his door page, his

Table 2. The contents of each entity

Entity	**Format**	**Content**
ID	a string	an on-door ID number
Command	a string	a knock message, a chat message, a management message
Data	a string	a chat message

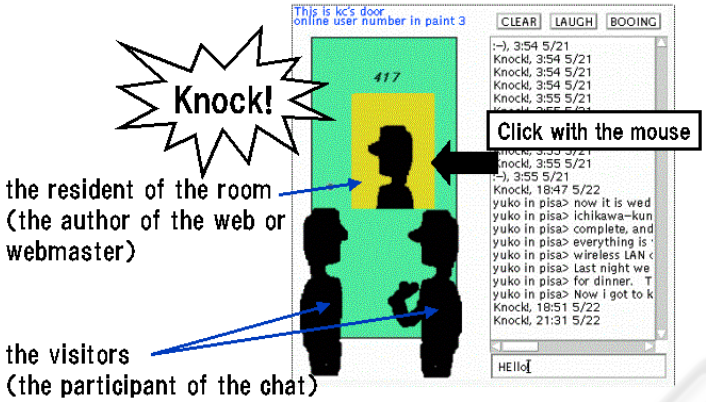

Fig. 3. A prototype system

shadow is displayed on the door window. A knock on the door can be done by clicking on the door-image with a mouse. The knock sound is reproduced using AU (AUdio file) format.

The prototype system deals with multiple doors. In order to enable this, the server publishes a door ID to the resident. The door ID is used in all the messages exchanged by clients and the server. The ID is used to indicate the chat group associated with the door with that ID.

With the chat system, we have added more function to express a userś feeling such as laughing voice. If a “LAUGH” button is pushed, laughing voice will be presented to the others just as a knock sound. Accordingly, the smile mark in text, “ :-)” would appear on a chat text line. Similarly, if a “BOOING” button is selected, it gives beep sound as well as the face mark, “:-<” would appear.

Each chat message is maintained in the server with a time stamp. This way the chat system can be used to leave a message as well, so that when one visits a door and leave a message.

6 An experimental use

6.1 An experimental environment

We operated our prototype system to study whether knock sound was used as a trigger for conversation or not. The experimental use started from May, last year. The server environment of the experiment is shown in Table 3.

Table 3. The server environment

a sever system	
OS / Kernel	Vine Linux / 2.6
CPU	Intel Celeron 1.7GHz
Memory	512M
Network	10/100BASE-T
JAVA	J2SE1.4 j
HTTP Server	Apache 1.3.27

The OS and browser environment is shown in Table 4.

Table 4. The client environment

OS	Browser environment
Windows Me	Netscape Communicator 6.1 Microsoft Internet Explorer 5.5
Windows 98	Opera6.0 J
SunOS 5.6	Netscape Communicator 4.7 Netscape Communicator 4.5

The knock-on-the-door system was installed into five places in total. Those of two clients are located in the campus intranet. The others are connected to the Internet(Table 5). Each door were assigned an unique door IDs. We assumed that all of visitors would be connected through the campus network and the Internet.

Table 5. The number of clients, and installed locations

ID	**the administrator**	**Network**	**the number of clients**
DoorA, DoorB	the student's web page	the campus intranet	2
DoorC, DoorD	the student's web page	the Internet	2
DoorE	the laboratory web page	the Internet	1

6.2 Logfiles analysis

We studied the conversation log to know in what way knock sounds and shadows had been used. In the following example, User *yuki* knocked the door to start conversation with User *tomimoto*.

```
yuki> Knock!, 15:26 5/8
yuki> Knock!, 15:26 5/8
tomimoto> hello, 15:27 5/8
tomimoto> I'am tomimoto with Iwate prefec-
tural Univ. 15:27 5/8
yuki> hi, 15:27 5/8
```

In the following log, although the knock is not performed, *yuki* has noticed the shadow displayed on his browser , and she was aware of *takahashi*'s existence.

```
yuki> Hello, 16:16 5/8
yuki> Who are you?, 16:16 5/8
yuki> Your name, please? 16:17 5/8
takahashi> I'm Takahashi, 16:17 5/8
```

Figure 4 shows the expressions used in a chat during the experiment. "Chat" indicates the text-only chat without sound, "Knock" is the knock sound, ":-)" indicate the face mark with laughing voice and ":-<" is those with beep sound.

32% of the conversation used text-only chat, and 68% used sounds such as knock sound, laughing voice and beep sound. Sounds are used frequently. Interestingly for the urgent conversation, at the time of the conversation, an user want to communicate with others quickly. Used of the text-only chat was 57% and used of the knock sound was 42%. In this case, very few used face mark. Presumably the knock sound has less semantics than laughing voice and beep sound. We conclude that the knock sound is applicable for various scenes. A state of conversation and an user's emotion could be deduced by analyzing how often each type of sound is used. We will study this in the future work.

We examined the usefulness of the awareness functions such as knock sound and the shadow. Our purpose is evaluating whether knock sound is used as a trigger for a conversation as well as whether one can notice of the existence of the others by displaying shadows. We analyzed the conversation log to evaluate them to surveyed the usage by questionnaire to the users.

The conversation logs show the followings.

- Sounds are used frequently in the begining of the conversation and the during the conversaion.
- One notices of the existence of the others by the knock sound.
- By shadow, a user notices of the existence of the others and invites them to join her in conversation.

We found some problems as well. Although we have implemented a function with which a user writes and leaves a message when the resident is absent, few users made use of it.

According to the user comments, few uses knew of the function. The left message is displayed on the same place as chat area. Moreover, among three weeks, there are 72 accesses to our system and 5 conversations were held. Most of the users could not make

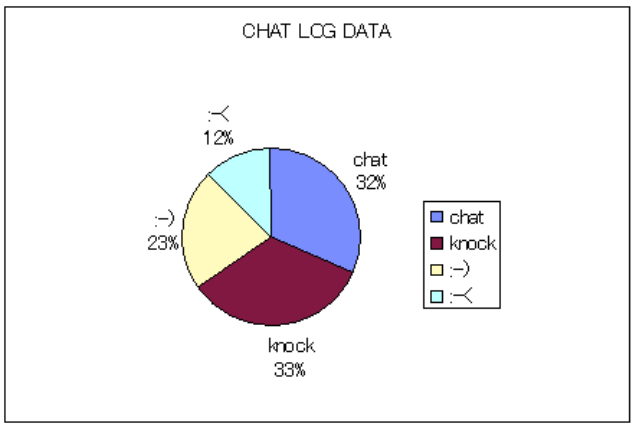

Fig. 4. the expression used in a chat

use of our system because the number of conversation held was small. The reasons are as follows;

1. Few users accessed to web pages.
2. The resident forgot to logon, alternatively duration of her logging on was too short.
3. Some users disabled the JAVA function of their browser.

The followings are required in order to investigate the above reasons.

1. The number of accesses of each web page.
2. The duration of a resident logging into our system.
3. The setting of a browser whether JAVA function is enabled or not.
4. How a user will make use of our system when she will be given no explanation about the system.

7 The difference from an ordinary chat system

The goal of the knock-on-the-door system is to enable users to be aware of the others' existence using knock sound and shadow. What is most different from the ordinary chat systems is our awareness function. In the experimental use, the knock sound are used as that a user tells the others about his existence and used as a trigger for conversation. Moreover, the knock sound was used in various scenes, such as for a response to a question, for a reminder of a response, and for a change of the subject of conversation, for a invitation to the conversation. The sound without the specific semantics such as the knock provides the user with the various applications.

In an urgent conversation, the speaker notifies of the renewal of the chat using the knock sounds to the other who is looking at another computer screen. Moreover, the expressions used conversation is different from the situations.

8 Future work

In the future work, we look into a web browser, and add the awareness functions such as a knock-on-the-door sound and shadow. We call such a system “On-door browser.” We will implement this system on WWW.

9 Conclusion

In this paper, we proposed the communiation system using the metaphor of a door. We looked into such a role of a door as well as actions performed thorough a door, and proposed the knock-on-the-door system. The knock-on-the-door system provides a user with an awareness function. The awareness function is implemented by the knock action and expression of user’s shadow. The next section, we proposed the model of the knock-on-the-door system.

In the section of “The system Design of the knock-on-the-door communiations”, we showed functions of the knock-on-the-door system and designed it. We experimented using the prototype system. In the experiment, the knock sound was used as a trigger for conversation. The knock sound was used when a user changed the conversation of a chat and went out of a chat room. By expressing a user with a shadow, the user notices of the existence of others and invites them to join her in conversation. From the above, we saw the usefulness of the awareness with knock sound and shadow, then described the future work.

In the future work, we will implement the on-door browser system and evaluate it.

References

1. K. Palfreyman and T. Rodden: A Protocol for User Awareness on the World Wide Web, CSCW’96, (1996)
2. W. W. Gaver: Sound support for collaboration, ECSW’91, pages 293-308, (1991)
3. K. Scott: Ubique’s Virtual Places: Communication and interaction on the World Wide Web, Workshop on WWW and Collaboration, pages 16-20, September (1995)
4. Y. Murayama, H. Gondo, N. Segawa, Y. Nakamoto and M. Miyazaki: A Message Board System on WWW with a Visualizing Time Function for On-Door Communication, Proc. of the 34th Annual Hawaii International Conference on System Sciences (HICSS34) pp.284 -293, 2001
5. Keishi Suzumura, Hiromi Gondo and Yuko Murayama, Tools for On-Door Communications on WWW, PWC2002, ISBN 1-4020-7250-3, pages 87-94, 2002.
6. Olivier Liechti, Mark J. Sifer, Tadao Ichikawa, Supporting Social Awareness on the World Wide Web with the Handheld CyberWindow, in Proceedings of the International Workshop on Handheld CSCW at ACM CSCW’98, Seattle, WA, November 1998.
7. Scott E. Hudson and Ian Smith. Techniques for Addressing Fundamental Privacy and Disruption Tradeoffs in Awareness Support System. CSCW’96, pages 284-257, 1996.
8. W. W. Gaver, R. Smith, and T O’Shea, Effective Sounds in Complex System, The ARKola Simulation, Proc. the ACM conference on Human factors in computing systems CHI’ 91(New Oreans), pages 85-90(1991)
9. Nichols, J., Wobbrock, J. O., Gergle, D., and Forlizzi, J., Mediator and Medium, Doors as Interruption Gateways and Aesthetic Displays, Proceedings of the ACM Conference on Designing Interactive Systems (DIS ’02). London, England, June 2002, pages 379-386.