

# Forbidden City Explorer: A Guide System that Gives Priority to Shared Images and Chats

Jun Munemori<sup>1</sup>, Thai Minh Tri<sup>2</sup>, and Junko Itou<sup>1</sup>

<sup>1</sup> Department of Design and Information Sciences, Faculty of Systems Engineering,  
Wakayama University

930 Sakaedani, Wakayama 640-8510, Japan

{munemori, itou}@sys.wakayama-u.ac.jp

<sup>2</sup> Graduate School of Systems Engineering, Wakayama University

930 Sakaedani, Wakayama 640-8510, Japan

s051066@sys.wakayama-u.ac.jp

**Abstract.** We have developed a prototype guide system, which was named The Forbidden City Explorer. This system has real-time information sharing functions including image data, chatting, and mutual location information. It gives priority to shared images and chats, supporting a friendly user interface and simple operation methods, especially creating shared images to be used by general people. We applied the system twice to the Forbidden City in Beijing. Users were Chinese. The results of the experiments are as follows: (1) The evaluation of the image data sharing function was timely. (2) With a simple operation, many shared images and chat messages were created.

**Keywords.** GPS PDA, guide system, Wireless LAN, Forbidden City, shared image, chat.

## 1 Introduction

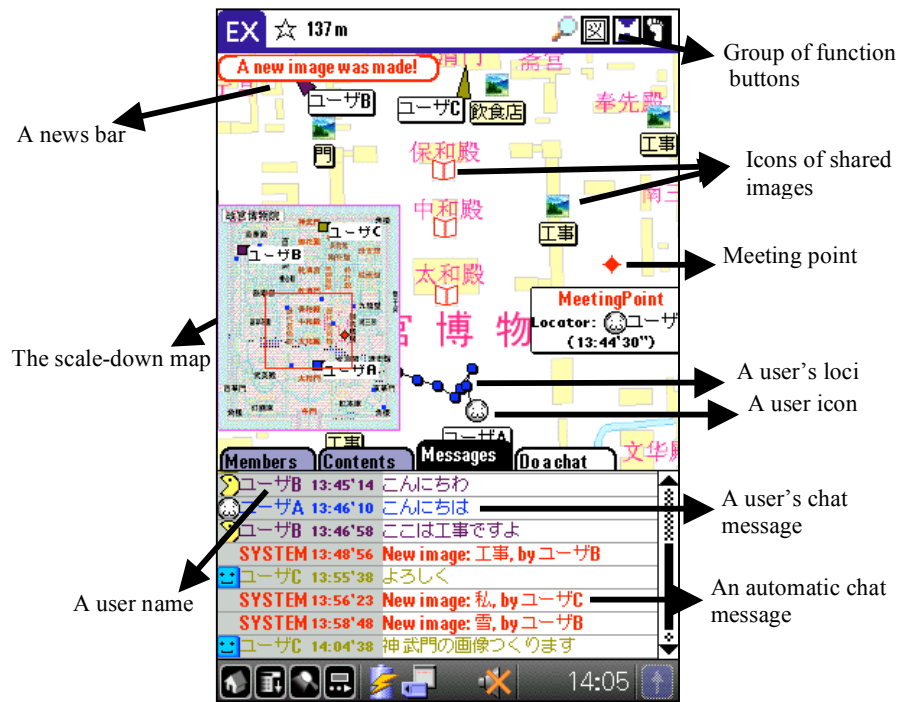
After years of research, many location aware systems using positioning information have been proposed [1]. GPS receivers have begun to appear in cell phones.

Up to now, we had developed the Beijing Explorer, which is a system for the guidance of the Palace Museum (Forbidden City) in Beijing, China [2]. It was an interactive location aware system, which exchanged a user's positioning information and situation to other users using a PDA with built-in wireless LAN, a Bluetooth communication card and a Bluetooth GPS receiver in real time. Its experiments at the end of 2004 showed that the service using positioning data and shared images, especially photos, are valuable and interesting. However, it is necessary that the system have a friendly user interface and simple operation methods to be used by general people. Furthermore, there are important problems: how to create shared images easily, coordinate chats and images in some way, and find images that are the topics of chats. Therefore, we have developed the Forbidden City Explorer (the Beijing Explorer version II), which gives priority to shared images and chats. This paper shows the development and application of the Forbidden City Explorer.

## 2 The Forbidden City Explorer

The Forbidden City Explorer is an interactive location aware guidance system using PDAs. Users of the system can get and present positioning data of other users real-time. Each participant brings his (her) own system. The GPS receiver of the system shows their positions. So, they don't need to act as a group. They can go sightseeing individually. They can understand the positions of other users and chat with each other. When approaching any historical site, they can take pictures and share them. So, they can understand the contents of the historical site deeply.

The whole system of The Forbidden City Explorer consists of a base station of a wireless LAN and many PDAs (SONY CLIE PEG-NX80V) as clients. The client system uses a wireless LAN for communication with the server. The transmission method is IEEE 802.11b wireless LAN with a speed of 11Mbps (using TCP/IP). Figure 1 shows a screen of the client system. It shows an area of 640m x 800m. Each dot corresponds to 1m on the map [3].



**Fig. 1.** An example of a screen of the client system

If the user is in the wireless LAN area (about 200 meters in diameter), the system enables the following functions: The client system shows the positions of the user and others. Each position is shown as a face icon in Fig.1. The user can share images and data. By touching any place on the screen, he/she can create them and draw on the image data freely. Hereafter, we shall call it SIO (Shared Image Object). The

system will inform the user by sound, news bar and automatic chat messages when shared images arrive (Fig.1). The user can view shared images by tapping on chat messages that contain keywords of those images or using the search function. When the user comes within 15 meters of a building, the image of the building will be displayed. The users can do chats in English, Chinese or Japanese. Chat messages are shown at the bottom part of the screen in Fig. 1. The user can share the waiting point between participants (meeting point-sharing function). The waiting point is shown as the red star icon in Fig. 1. The system shows the loci of the users. The loci are shown as fine lines in Fig. 1. The system has a self-assignment function if they can't get GPS data. Photos taken by PDA can be viewed on the web later.

The state, chat messages, sharing information, and location information of clients can be managed at the server end. The server controls users' position information, shared images, chat messages or any shared information. It operates receiving data, expansion of data, saving, creating and reading log files, and transferring data to other users.

### 3 Experiments

Six participants joined in two experiments at the Forbidden City. The experiments were carried out between the Hall of Supreme Harmony (Tai He Dian) and The Gate of Supreme Harmony (Tai He Men) in the winter of 2005. The procedure of the experiments was as follows: (1) They go for sightseeing individually. (2) They do chats. (3) They take pictures and input informal data. Then, they share it with each other. (4) They decide on a meeting point on the screen and then they meet at the point. Each of them took about 40 minutes. After the experiments, we performed questionnaire surveys.

### 4 Results and discussion

Part of the chat messages and SIOs in the experiments are shown in Fig. 2.



Fig. 2. Part of the chat messages and SIOS

Table 1 shows the number of chat messages, used set phrases used and SIOs taken during the experiments. ( ): the results of last year's experiments (the Beijing Explorer's experiments).

**Table 1.** Number of chat messages, set phrases used and SIOs

	No. of chat messages	No. of set phrases used	No. of SIOs
Chinese experiment	29(17)	5(0)	14(6)
Japanese experiment	36(35)	9(0)	23(9)

The time of experiment and users are almost the same as last year but SIOs increased twice (changed from 7.5 to 18.5 images per experiment). The reason may be that the operation was improved to become easier so that the users were able to create more. The total number of chat messages rather increased (changed from 26 to 32.5 messages per experiment) since numerous set phrases were used (changed from 0 to 7 sentences per experiment). The large amount of SIOs means that the users were enthusiastic about creating an SIO.

## 5 Conclusion

We have developed "The Forbidden City Explorer", a prototype system that provides sharing images, chat messages posted by users and performed practical experiments in the Forbidden City, Beijing, China. The experiments were interesting. The numbers of SIOs and messages were increased comparing with the Beijing Explorer.

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