Extended Destination Board: Supporting Awareness for Cooperation working and Informal communications

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Abstract

In the process of the knowledge creation, informal communications encourages inspiration of new creative ideas. To support such informal communications, it is important to provide *awareness*. We focused on the "Destination Board" as a tool for providing awareness. Traditional destination boards have a problem that users have to operate manually when they update their presence information. To ease this burden on the user, we developed "Extended Destination Board (ExDB)" which automatically updates presence information. The information is inferred according to the schedule entered by the user. Since ExDB can show detailed information of the user, the system presents it regarding the user's privacy according to the viewer.

1 Introduction

Informal communication among a group encourages inspiration of new creative ideas. Sometime, the conversation at a cafe is more creative than the formal meeting. It is important to support such an informal communication in the process of knowledge creation.

Recently, instant messaging tools or voice chat tools are enable us to have a conversation with someone who is in remote. However, we tend to be lacking awareness when the conversation partners are in remote.

Awareness is vital to occurring some informal communications. Dourish explained awareness in his paper (Paul Dourish, 1992):

> Awareness involves knowing who is "around", what activities are occurring, who is talking with whom, it provides a view of one another in the daily work environments.

Because the first step of occurring a conversation is to know the context each other, informal communication can be supported through providing the awareness.

We focused on the "Destination Board" as a tool for providing awareness (Figure1). It shows locations of the members. For example, it shows that the member is currently here, out of university, lunch, or so. Some of destination boards are tables which are written members' name and their location. Some of them are tables with several magnets. The user put the magnet on the cell of table which show the location. Traditional destination boards show only where the member is. We expected that destination boards will help informal communication if they also present other context information of office members.

Figure 1: Magnet type Destination Board

Traditional destination boards have some problems. First, we have to operate manually when we update our presence information. Thus, if we forgot update our presence information, it might present incorrect information. Second, we need to view the information at the specific place. So it is of limited use in a distributed office environment.

We have designed and implemented "Extended Destination Board (ExDB)" which solves some problems of the traditional destination board. ExDB presents not only the user's location but also the ongoing schedule of the user. ExDB infers the ongoing schedule of the user according to the location. The system regards the user's privacy that occurred when the system presents some detailed information. Since we can access this system by using Web, we can browse the presence information through this
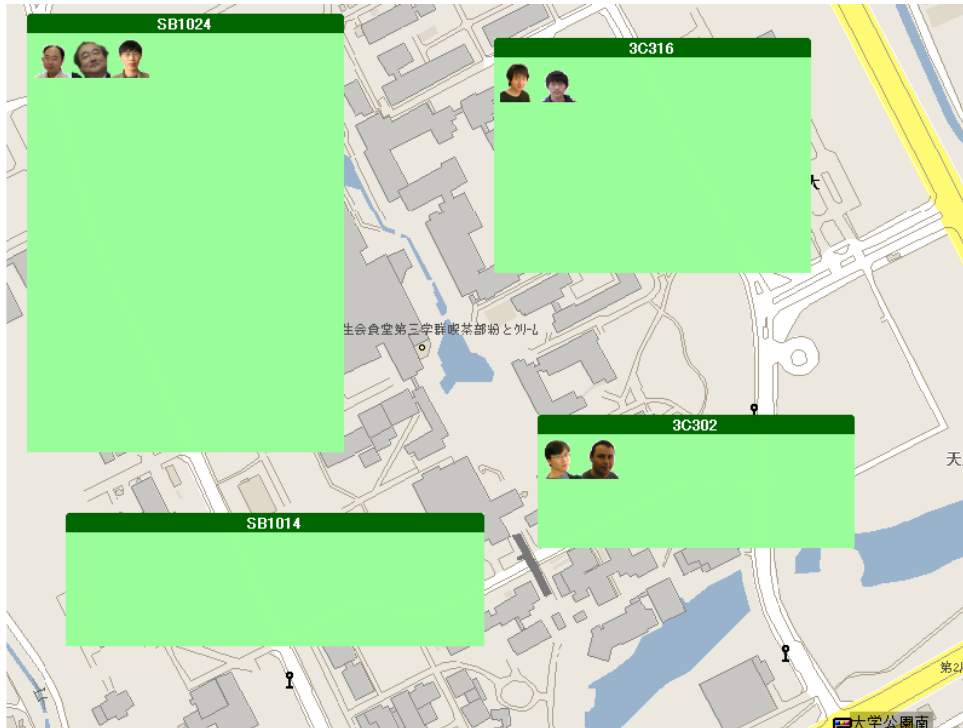
Figure 2: ExDB interface

system at various places.

2 Extended Destination Board

Figure 2 illustrates the screen of ExDB. The operations of ExDB are similar to the operations of traditional destination board. We can update our information of the location by dragging the icon. For example, when we move from *SB1024* to *3C316*, we drag the icon from *SB1024* to *3C316*. We can also update the location data by using cell phones. To update the information by using cell phone, we need to select the location label from the list.

Figure 3 illustrates the screen of the scheduler. In this scheduler, we can input some schedule data. The red boxes show schedules. We can set whether ExDB shows or hides the detailed information to some people. The people who are registered in database has categorized by several tags. We can put tags on each schedule. The people who have all tags put on the schedule can browse detailed information.

2.1 Using ExDB

We describe two scenarios of using ExDB. Scenario 1 is the scenario which uses the inferring

activity. Scenario 2 is the scenario which concerns the privacy of the user.

Scenario 1

Bob is attending the meeting now which is prolonged over the expected time. He has scheduled the meeting with his boss at his boss's office after the meeting. Now, his boss is waiting Bob.

The boss checks Bob's current context using ExDB because he does not show up at his office on time. ExDB checks Bob's schedule. The schedule says that he must be shown up. But his present location is the meeting room, which is different from the current location. Thus, the system checks Bob's previous schedule. Since the location of his schedule is same as his current location, the system infers that Bob is still attending the meeting. Finally, the system shows that he is still attending the prolonged meeting.

Therefore, the boss can know Bob's current status.

Scenario 2

Alice has a class in the afternoon. She wants to show the subject of the class to her friends in the same department. To set the exposing level of her presence information, she tags "Same depart-
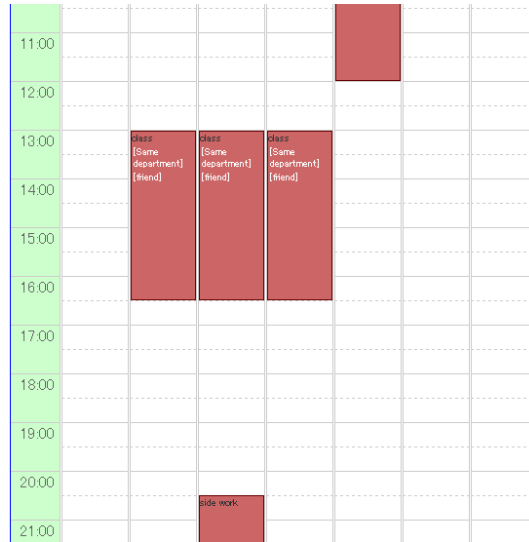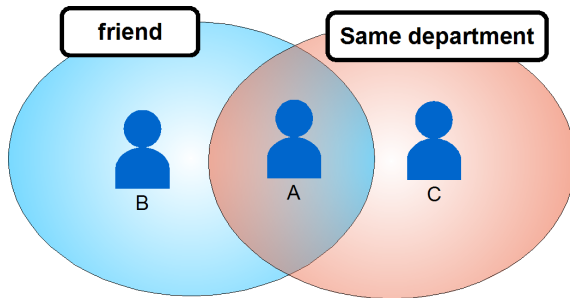
Figure 3: Scheduler on the web

Figure 4: Example of users and tags

ment", "Friend" to her friends in the same department. Then, she gives a permission for accessing her schedule of afternoon class to those who have tags "Same department" and "Friend". She also sets an alternate massage as "Attending a class" which is shown when someone does not have a permission tried to access the information. Then, if the user has both of the tags like *A* in Figure4, the system presents the subject of her class. If the user does not have either of them like *B* or *C* in Figure4, the system shows the message "Attending a class" to the user.

2.2 Automatic update of presence-information

ExDB infers presence-information for updating it automatically. The presence-information is inferred according to the schedule entered by the user. However, usually, users cannot act exactly

according to the schedule. A schedule can be hurried, postponed or canceled. Schedules can frequently and suddenly be changed. Thus, just presenting a schedule is not enough, and it is necessary to judge which schedule is going now. ExDB uses user's location data to judge it.

To infer what the user is actually doing, the system compares the present location and the location scheduled on the day. ExDB finds the activity which is closest to the current time taking place at the present location. ExDB infers it is the ongoing activity.

When there is no machting schedule, the system infers that the user is doing the unscheduled action.

3 Implementation of Extended Destination Board

We describe the structure of ExDB(Figure5). It consists of "input part", "inferring part", "managing part", "display part" and the database. Inferring part infers which schedule of the user has been processed currently. Managing part controls the access to the user's detailed presence information. Display part gets the presence information from the database and displays it. Input part receives inputs of the location and schedules from the user.

3.1 Inferring part

This part infers which schedule of the user has been processed currently. First, it detects the
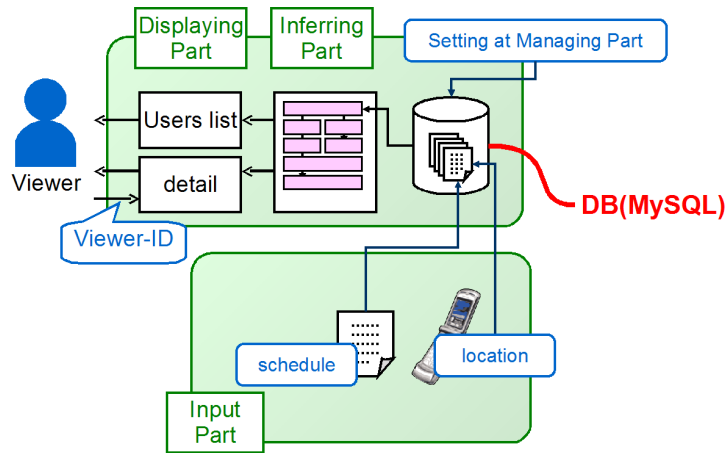
Figure 5: Structure of system

change of the user's activity. The system detects the change of the user's activity in two cases. One is when the current location does not match with the previous location. The other is when the schedule changes at the time in the place. If the activity is changed, the system infers which schedules in DB is progressing currently (Algorithm1).

Algorithm 1 Get activity

$difference = \infty$
$ongoing_schedule = $ null
for all $schedule$ such that $schedule.place ==$ $location$ **do**
  if $difference \geq \|schedule.start\_time -$ $current\_time\|$ **then**
    $difference = \|schedule.start\_time -$ $current\_time\|$
    $ongoing\_schedule = schedule$
  end if
  if $difference \geq \|schedule.end\_time -$ $current\_time\|$ **then**
    $difference = \|schedule.end_time -$ $current\_time\|$
    $ongoing\_schedule = schedule$
  end if
end for
if $difference \neq $ null **then**
  return $ongoing\_schedule$
end if
return "the user is doing unscheduled activity"

3.2 Managing the level of detailed information part

This part controls the access to the user's detailed presence information. First, the user puts tags to each viewing users. Each tag represents the relation between the user and the viewing user. Second, the user who provides his/her schedules determines what tags are necessary to view his/her detailed information. ExDB checks viewing user's tags, and allows to access the detailed information to viewers who have all of necessary tags. If the viewing user is not registered in the DB, the system does not display the detailed information.

Because the system cannot identify a person in the case of using touch panel, the system treats touch panel as a kind of a viewing user. This enables the user to change the level of detail according to the places where ExDB is installed.

3.3 Display part

This part gets the presence information from the database and displays it. We implemented two interfaces. One is a touch panel interface, and the other is a cell phone interface. These interfaces get presence information from the server on the web. Thus, several ExDBs can share the same information.

First, we explain the touch panel interface. We assume the touch panel is installed at the entrance of office rooms. To change the display of presence information according to the installed place, the system records the difinition of where the display is installed.

Figure2 illustrates a screen snapshot of the

touch panel interface. Several green rectangles drawn on the map illustrates the rooms. The icons of a face is displayed on the green rectangles to illustrate the user in the room.

Figure 7: Users list

To browse the detailed information of the user, viewers touch his/her icon for a few seconds. Then the display of showing detailed information appears. (Figure 6)

We describe a scinario in Figure2 and Figure 6 In this case, the initial setting defines that the system shows the real name of the location. When the viewer touch the face icon at the left of "3C316," the display which show detail information window is displayed (Figure 6).

Next, we explain the cell phone interface. When the viewer accesses the system, the system presents a web page that contains all users' list (Figure 7). It has several links to the detail of each user. To browse detailed information of the user, viewers follow the link to the page of presenting the details.

When the viewer accesses to the details, the web server requests the terminal ID of his/her cell phone's to identify who wants to browse the information. The web server responses a web page that presents the user's detail following to the setting of the managing part.

Figure 8 shows that the system presents the detail of the user. In this situation, the viewer is allowed to browse the detail of the user. In the display of the cell phone, the system shows the user's current schedule , current location, and the time when he/she will be back there. We show the case that the viewer is not al-

lowed to browse the details (Figure 9). In this case, although the current location of Yamada is "3C302," the system presents it as "——" because of the viewer's allowed permissions. Similarly, the system presents the activity as "——," In fact, his activity is "Writing!"

Figure 8: In the case that the user is allowed browse detail

Figure 9: In the case that the user is not allowed browse detail

3.4 Input part

The users input current location and their schedule. To input the location using a touch panel, the users drags icon which presents his/her context from the previous location to the current(Figure2).
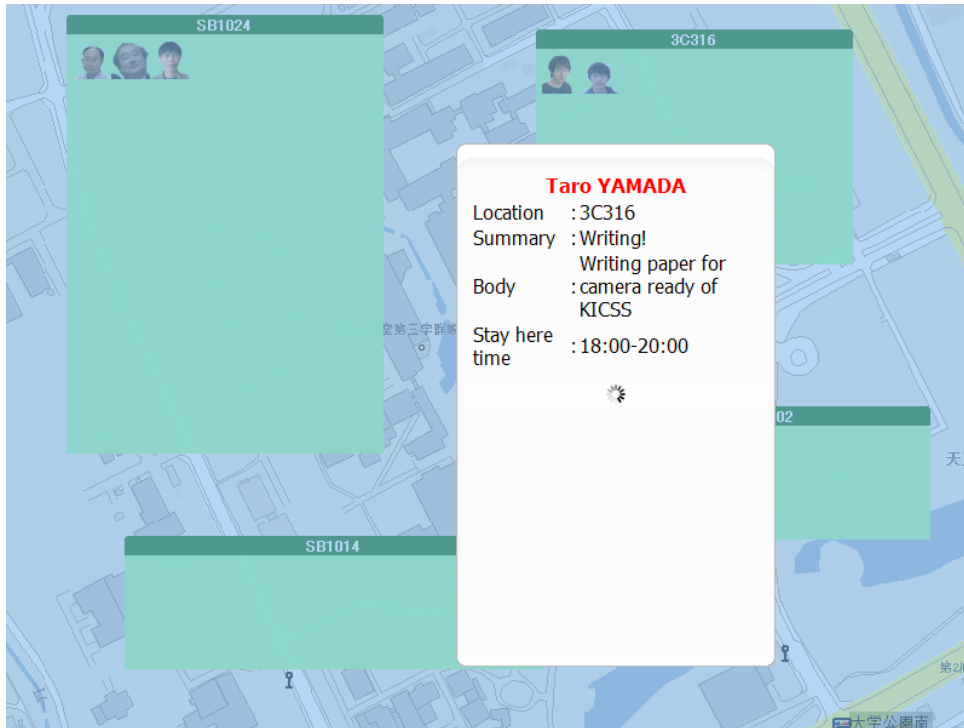
Figure 6: Display of the detail on touch panel

The user can also input the current location using a cell-phone. When the user inputs current location using a cell-phone, he/she chooses the location from location-list registered by the user. When the user selects the location and pushes the submit button, the application requests the server to update. If the current location is not listed, the user can register a new location by entering a location name to the textbox.

In the current implementation, locations are inputted manually. GPS is becoming popular and other positioning systems have also being developed. We expect that location will be input automatically using those systems in future.

ExDB can also import schedule data in the form of *iCalendar* which is a standard format and used in many PDAs and PIMs. Users can utilize their schedule data input with other tools. The system stores those schedule data in the database.

4 Related Work

There are many researches about awareness, privacy and large screen communication tool. Dourish suggested importance of awareness (Paul Dourish, 1992). He developed *Portholes* that supports awareness and experimented the usage
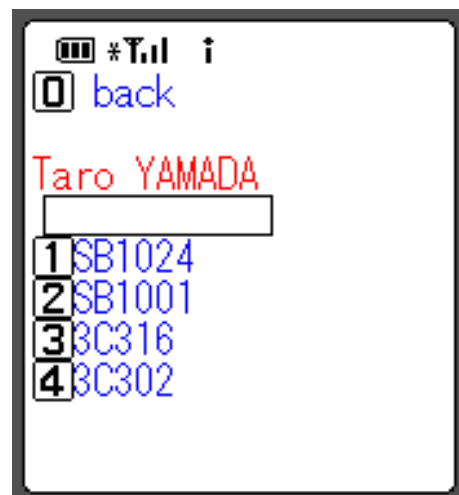

Figure 10: Interface of inputting present location

of it. Greenberg suggested a method of show-
ing presence information using some icons (Saul
Greenberg, 1996). This method is used by gen-
eral instant messaging tools. Kuzuoka developed
a method of presenting awareness using tangible
representation (Hideaki Kuzuoka, 1999).

On the other hand, there are many researches
that use large screens in sharing space for pre-
senting awareness and promotion of informal
communications. *Notification Collage* (Saul
Greenberg, 2001) shows many elements that
posted by users. The elements include the live
video, sticky notes, snapshot of personal desktop
and more.

IM Here (Eline M. Huang, 2004) is a sharing
instant messaging tool that runs on sharing com-
puter with large screen.

5   Conclusion

We handled destination boards as one of tool that
present awareness. We have designed and imple-
mented extended destination board. It updates
the presence information automatically with in-
ferring activity according to users' schedule and
location data. Additionally, when viewers want
to access some detailed information, it shows in-
formation keeping users' privacies.

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