Mobile Assistance and Situative Remembrance Services

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German Abstract

Durch drahtlose Netzwerke wie WLAN, GPRS oder UMTS können mobile Endgeräte (z.B. PDAs) nicht nur zur Verwaltung von Terminen, Adressen und Notizen verwendet werden, sondern auch in Arbeitsprozessen sinnvolle digitale Begleiter sein. Kleine mobile Endgeräte bieten die Chance der Fokussierung auf wichtige Informationen und Dienste, die in einer »mobilen Situation« sinnvoll sind und den PC-Gebrauch nicht ersetzen, sondern vielmehr ergänzen können. Besondere Potenziale enthält die mögliche Situations-Sensitivität von Anwendungen. »BuddyAlert«, die hier vorgestellte Anwendung, »weiß« wo ein Nutzer sich befindet (wenn er damit einverstanden ist), welches Endgerät er gerade bedient, welche Aufgaben er mit wem zu erledigen hat und welche Information dafür benötigt wird. »BuddyAlert« kann dadurch Dienste bieten, die bisher nicht realisierbar waren.

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Wireless networks, such as WLAN, GPRS, and UMTS, enable mobile devices (e.g., PDAs) to play the role of sensible digital companions in work processes, in addition to their traditional role of managing personal information such as calendars, address books and notes. Pocket-sized mobile devices offer the chance to focus on the most important information and services which are reasonable in a »mobile situation«. They are not a substitute for PCs, but rather a supplement to them.

Situation-awareness offers promising potential for applications which support mobile users. It facilitates greater adaptivity and the type of pro-activeness that is not intrusive and is therefore welcome.

BuddyAlert, the application presented in this article, »knows« where the user is, which device he or she is using, which tasks have to be accomplished with whom, and what information is required. Relying on this knowledge, BuddyAlert offers situative services that could not be realized until now.

Buddy Alert

Availability management and reminders for important tasks and contacts should relieve the strain on users and systematically support them in their mobile work.

Sensor technology enables the device to recognize environmental parameters such as the current location of the user and the presence of other users. An inference mechanism recognizes situations (e.g., the user reaches a location, the user meets another user, etc.) that allow the system to process supportive actions. Such actions can include proactive reminders for common tasks for a group of users (these are the »BuddyAlert«) or the processing of appropriate information.

Functionality

The user interface enables the user to define new tasks and link them with Alert Events. These events are composed of persons, locations, and time. Should the user reach a given location or meet a given person, then the related task will be pushed to the Alert Space proactively.

Furthermore, short messages can be composed and posted at certain locations, addressing certain people (Memo functionality). This guarantees that the addressee will receive the message if and only if it is relevant.

The active messages, tasks, notifications and memos are collected in the start screen, the Alert Space. The icons in front of messages flag both the type and, in the case of a task, the priority. If the user clicks the icon, the details of the corresponding

Figure 1: All recent messages are collected in the AlertSpace

Figure 2: Three layers of data management

message will be shown. Besides the title and the place and time received, these details may also include additional information and notes.

Implementation

Buddy Alert has been realized as a Web application so that there are no limitations on the devices used.

The system architecture consists of three layers (cf. Figure 2). A global community server, which can be accessed by all the community members, manages information about device types, locations of interest within the group, and personal information disclosed to the community. The descriptions of locations, consisting of addresses, adjacencies, different types of sensor data that identify the location, and the available network bindings, are imparted in the form of location profiles. The so-called terminal profiles include the type-specific descriptions of user devices consisting of their characteristics, screen size, sound output capability, and so on.

In the middle layer, private servers store users' personal information separately for each user. For each user, this information consists of his or her current location, the device currently in use, personal tasks, composed and received Post-its, and user preferences. In the lowest layer are the users with their different mobile devices. They are equipped with a Web browser, in which the user interface of Buddy Alert is shown, and sensor hardware and software which provide sensory data identifying the current location.

A context management service recognizes the registered situations that are supposed to trigger notifications to the user. Personal instances of the context-manager running on private servers manage the personal part of the user context, and a special instance on the community server manages the shared part of the contextual knowledge. A personal information manager provides the user interface, handles the tasks and Post-its, and defines the rules for the recognition of relevant situations according to alert settings made by the user. It runs on the user's private server.

»Big brother is watching you«?

Users often worry about the invasion of their privacy. Privacy protection was therefore an important goal in the realization of Buddy Alert.

In addition to common security mechanisms such as the management and consideration of access rights, all private data is essentially stored only on the private servers, except for those parts explicitly disclosed by the user to the community. Additionally, according to the three layers of the architecture, users can prevent the transmission of sensory data at different points or define conditions for the forwarding of such data. Users may stop the sensor software on the device in use, disable disclosure to the community with one click, or let the information be encapsulated in a rule according to his or her preferences, including the specification of allowed time intervals and blocked locations for each subgroup of people.

Legal experts have investigated and accepted the security mechanisms of Buddy Alert within the joint project map (funded by the German Federal Ministry of Economics and Labor).

Ongoing Work

The ZGDV is currently working on the recognition of more complex situations which, in addition to locations, user devices, and the people present, also include a user's personal information, such as a calendar. The system must also be able to estimate the information needs of the user by adding project information to the user context and delivering the specific information relevant to a work situation (Context-Aware Retrieval, or CAR).

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