Networking for Pervasive Computing

Kevin Henderson
Advanced Networking Lab, Bradley Department of Computer & Electrical Engineering

The goal of pervasive computing is to enable computing anywhere at anytime. Person-to-person communication can be enhanced within the pervasive paradigm by providing additional collaborative dimensions, such as shared objects and interaction with the environment. The goal of this project is to investigate the components and design principles needed to facilitate user-to-user and user-to-device collaboration in a pervasive computing system. Working towards this goal, a research team of faculty members, graduate students, and one undergraduate student is developing a system that facilitates communication in a collaborative setting such as a business meeting or classroom session.

To create this system in which peers can collaborate in an ad hoc manner, the team is using a combination of Microsoft Windows CE and Pocket PC devices. An individual user can start up the software program on their device and create a "session" which other peers are allowed to join. Or, if a session has already been created by another user, the new user can join that session. Users are also able to create additional sessions in an area if they wish collaborate with a different group. For instance, one user may want to create a session for his research team to collaborate, while another user may wish to confer with members of her student organization.

Once in a session, users can advertise different "objects" that are shared among the group. The types of objects to be supported include files, uniform resource locators (URLs), and services. If a user wishes to advertise an object to the rest of the group, they simply use the software to navigate to the "Publish New Object" page, where they can select the different options available for that object type. Once an object is published by a user, other users in the session can then see details about the object on their own device and will have the option to obtain a copy of the object.

Thus far, the undergraduate research project has dealt with the user interface (UI) of the program to manage interaction with sessions and objects. This program executes on a PocketPC device. In the spring of 2004, the basic design of the UI was completed and implemented in prototype form, as illustrated in Figure 1. Additionally, the ability for a user to publish an object was incorporated into the application. These functions were successfully demonstrated and, also, led to a better understanding of the system components and mechanisms to describe system components using the Extensible Markup Language (XML).

Future work for the fall of 2004 includes the addition of several new features to the application. These include the ability for users to re-publish objects they published in previous sessions, the ability to publish all types of objects (currently, the application only supports publishing URLs), and the ability to support interaction with one or more other devices running the application.

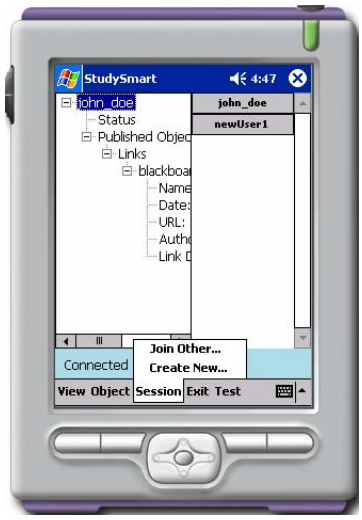

Figure 1. Illustration of the user interface.