A Collaborative Virtual Environment and Location Based Services for Mobile Users

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About 80% of our students are already professionals which study mainly in the evening and on weekends. Therefore, there is a need for mobile solutions of learning environments for synchronous events at a fixed timeslot. We developed a client/server based multiuser virtual reality environment (collaborative virtual environment, CVE, based on Java and VRML) to offer our students a 'virtual campus'. We modified a Java applet based DeepMatrix[1] client of the 'virtual campus' in a way that it can be used by mobile users (equipped with PDAs or smartphones). The modified client is now based on a Java application which runs on a Personaljava virtual machine. Personaljava [2] is a Java runtime environment for mobile devices with limited resources (e.g. graphic resolution of 240x320 pixel, no hardware 3D acceleration). Implementations of Personaljava are available for Windows CE, Linux, Palm and Symbian OS based PDA and mobile phone platforms. To provide location based services for local (campus) mobile PDA users, a GPS based localization is used together with the collaborative virtual environment.

Figure 1: PDA client of a collaborative virtual environment, Sharp Zaurus
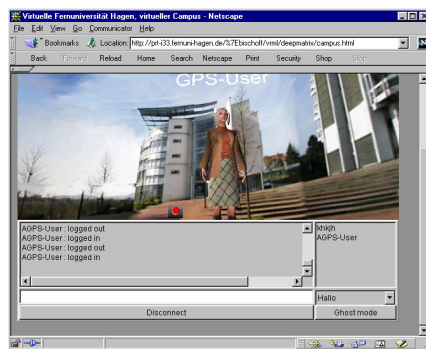

Figure 2: GPS tracked outdoor PDA user

The 'virtual campus' can be used as a 'mixed reality' shared environment for local and remote users. Movements of outdoor users are tracked by GPS localization. PDA interfacing with GPS hardware (GPS Mouse) is done by serial connection. An adopted java.comm library (with usage of Java Native Interface, JNI) for Personaljava allows access to the serial interface from high level Java language. The GPS API 'Chareon'[3] is interpreting the NMEA protocol and provides the Java application with the current position of the user.

The connection to the CVE server middleware is established by university-wide wireless LAN infrastructure.

[1] Geometrek, http://www.geometrek.com/products/deepmatrix.html, 2004.

[2] Sun Microsystems Inc, http://java.sun.com/products/personaljava/index.jsp, 2004.

[3] Chaeron Corporation, http://www.chaeron.com/gps.html, 2004.

[4] A. Bischoff, Multiuser Mixed Reality Umgebung für Lehre, Community und ortsbezogene Anwendungen. In: Jörg Roth, editor, 1. GI/KuVS Fachgespräch ortsbezogene Anwendungen und Dienste, Hagen 2004.