An Online Seminar Environment for Low-Bandwidth Seminars

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A modern virtual university environment requires communication tools for synchronous events like online workshops and online practice. The collaborative environment introduced here allows simultaneous usage of a shared 'virtual computer' in a team. A group of students is able to interact via audioconference, text-chat (as backup) and Virtual Reality (VR)-based non-verbal communication (gestures). Students and tutors are represented by avatars in VR to avoid bandwidth consuming techniques like video conferencing. A real collaboration like in local seminar events is possible. Participants enter the seminar environment with their standard web browser. The remote seminar room is based on an open-source multi-user VR client/server architecture (collaborative virtual environment, CVE), which is implemented in the Java programming language. The components used are mainly based on web standards like VRML and Java. All components are usable on desktop computers and wearable devices like PDAs (Personal Digital Assistants).

Figure 1: Online Seminar Environment, audio client, whiteboard client and collaborative virtual environment

The introduced environment is evaluated in engineering education, but due to universal whiteboard concepts, it is usable in all other disciplines. The approach presented here is based on low-cost PC hardware, low-bandwidth communication channels, and open-source/free software.

The whole system was implemented and tested at the University of Hagen in May 2004. A server at the university acted as main hub for a seminar. It hosted a chat application, an audio reflector, and a VR server. In addition, this server hosted the shared applications (Acrobat and PowerPoint) which were remotely controlled by the participants. After many tests in bilateral and multilateral collaboration sessions, a final seminar took place with a total of 12 participants from all over Germany. Some of them had modem-line connections (56kbit/s) only. The system worked very reliable and offered high quality communication to all participants. Seminars supported by the presented collaborative virtual environment are now part of the curriculum in engineering education at the University of Hagen.

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[2] A. Bischoff, WEB based Collaboration System for Workshop-like Events. Proceedings of IADIS International Conference, Web Based Communities 2004. Lisbon, Portugal 2004.

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