CLEV-R: A Collaborative Learning Environment with Virtual-Reality

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Abstract

Recently more and more web-based, graphical applications have been developed. Due to a wider availability of broadband and greater connection speeds, these graphics have become progressively more complex and are now often accompanied by multimedia material. We aim to take advantage of these capabilities in the development of CLEV-R, a Collaborative Learning Environment with Virtual Reality. CLEV-R delivers a real time Virtual Reality (VR) environment, where learning material is augmented through the use of multimedia. The introduction of VR offers a new and interactive way to present learning material and provides users with a more motivating and stimulating way to learn.

CR Categories: I.3.7 [Three-Dimensional Graphics and Realism]: Virtual reality— [K.3.1]: Computer Uses in Education—Collaborative learning

Keywords: Collaborative Learning Environment (CLEs), Virtual Reality (VR), Web-based Graphics

1 System Overview

The CLEV-R system is a web-based multi-user VR environment that supports interactive e-learning for university students through the use of several different multimedia types. In addition to providing an immersive environment where users are represented by avatars, active learning is supported through intuitive interaction with tutors and fellow students. Natural methods of communication such as voice and text chat are available and the user may also direct their avatar to make gestures. Synchronous learning is available in the form of lectures, tutorials and meetings where multiple users are connected simultaneously. A more self-paced asynchronous learning is also provided and consists of students downloading and reviewing course notes. The synchronous aspect lends itself very easily for students to collaborate on group projects. Empirical research has shown that collaborative work can help students in attaining a higher achievement level [Laister and Kober 2002]. The VR environment mimics a university setting, offering many of the services available on a real college campus. For example, lecture rooms and group meeting rooms are provided to assist the students' learning. These rooms are augmented with shared whiteboards and presentation boards for delivery of learning content. Multimedia facilities, such as audio and video, can also be presented in these rooms if required. Tackling the social needs of students is one of the primary objectives of CLEV-R. To achieve this, informal settings have been developed where students can discuss course content, but also get to know one another and talk about non-college related topics. This helps students build a rapport with others and so removes the feeling of isolation, which has often been an issue in conventional online learning applications. An intuitive Graphical User Interface (GUI) has been developed containing communication controls, administrative tools and users' personal details.

2 Initial Results & Further Development

At present, an initial implementation has been developed demonstrating many of the features mentioned above. Initial feedback from students has been positive. The graphical representation of the university setting proved popular and interaction with the system was seen as intuitive. Users believe it could be of benefit in an educational context.

An important aspect in the development of CLEV-R, yet to be fully explored, is the optimisation of the system. The graphical nature of the VR environment makes the system bandwidth intensive and so we are exploring different message passing techniques to make the system more efficient. This will allow for the extension of CLEV-R for use on mobile devices such as Personal Digital Assistants (PDAs). The convenience and "anytime-anywhere" availability of PDAs makes them an ideal companion for students. Collaboration with the ABITS (Agent Based Intelligent Tutoring System) [Roche and Mangina 2003] research group is a further step in the development of CLEV-R. ABITS are developing intelligent agents to manage students and course material for Intelligent Tutoring Systems. When incorporated into CLEV-R, the agents will provide assistance for users and intelligently manage the learning material.

3 Conclusion

CLEV-R is a multi-user VR environment with multimedia that allows university students to learn, collaborate and socialise online. The 3D worlds used in the system are implemented using the VRML97 standard, which has proven to be an extremely efficient means of transmitting complex 3D information over the Internet. The GUI is being developed using Java, and the External Authoring Interface (EAI) gives this GUI some control over actions in the virtual worlds.

References

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