Chapter X

A VR-Based Virtual Agent System

Timothy K. Shih
Tamkang University, ROC

Ying-Hong Wang
Tamkang University, ROC

Yung-Hui Chen
Tamkang University, ROC

Abstract

Agent technology can be used to represent individuals participating in a virtual university. Avatars are virtual actors on behalf of students and instructors navigating in a three-dimensional (3D) virtual campus. This chapter presents a system based on virtual reality (VR) technology as well as agent technology that enables online discussions via different real-time communication channels. The system has a generic interface, which includes five scenes of a virtual university, as well as a set of plug-and-play communication agent tools. Each user is maintained by an intelligent agent that controls the navigation behavior based on a rule-based computation. Behaviors of each student are restricted and guided by intelligent agents. The system can be extended for the construction of any virtual university with 3D campus and online communication facilities.

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Introduction

In line with the growing popularity of distance education, we developed a series of distance-learning software systems (Deng, 2002; Shih & Chang, 2001; Shih, 2002; Shih, 2001; Holt, 1995) based on Internet and Web browsers. These systems were used in our university among different departments. On the other hand, 3D graphics and the associated real-time communication technologies were developed and used in video games. Video games get the attention of our younger generation. In addition, VR and computer graphics techniques have been used in education and training (Sala, 2002; Sala, 2003; Garnett, 1999; Zoller, 1990). VR can also help constructivist learning (Winn, 1993). We try to combine VR and communication technologies, with an educational theory, to develop a VR-based situation learning environment, which facilitates and encourages students using online discussions. We integrate our distance-learning systems developed under a generic VR-based communication interface.

We aim to develop an integrated distance-learning system that includes several frontier technologies to facilitate the needs of communication, analysis, and retrieval of e-learning-related activities. The project is based on VR and distributed computing, as well as the semantics analysis of French-based communication, which is based on a link grammar and corpus for an ontology construction. Toward the success of a three-year joint project among the participating universities, the group will deliver a runnable system that can be used in synchronized or asynchronized multilingual e-learning. Preliminary results of this joint project can be found at ELResearch.mine.tku.edu.tw.

This project is also incorporated with the National Research Council, Canada. In the past few years, the group has worked on a joint research project entitled “An E-learning Infrastructure for Mobile Virtual University” with the NRC, Canada. It was a three-year project under the international collaborative program of the National Science Council, Taiwan, and the National Research Council, Canada. Preliminary contributions of the project were presented at the Fifth Anniversary Event of NSC–NRC Collaborative Research Program, Monday, June 24–25, 2002. A demonstration of our project and information from the conference are available at: http://www.mine.tku.edu.tw/NSC-NRC5/.

In the past few years, we developed a few distance-learning-related tools. Some tools are for synchronized distance learning, while others are for asynchronized Web-based learning. For an overview, please visit our Web site:
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