Building Educational Virtual Environments

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Abstract

The collaborative virtual environments have become a good media for supporting collaborative e-learning services. In this paper we present the Educational Virtual Environments (EVE) platform, which integrates a variety of communication a collaboration tools to support collaborative virtual environments focused on collaborative e-learning.

1. Introduction

Collaborative Virtual Environments (CVEs) are increasingly gaining visibility in the field of collaborative e-learning. Collaborative e-learning is any kind of learning process, performed by more than one person, that takes place mainly in a virtual environment [1]. This leads to the development of environments that support collaboration and interaction among users for educational purposes. We call these environments Educational Virtual Environments (EVE). The primary goal of an educational virtual environment is to provide affordances in order to reproduce conditions that augment interpersonal interaction in a physical educational environment, e.g. a classroom. This goal is effectively satisfied if the Educational Virtual Environment is represented by 3D virtual worlds where the users are represented by human-like avatars. Basic functionalities that should be offered to users are avatar movement, avatar gestures, text and audio chat channels as well as multi-user interaction on shared objects. Furthermore, the virtual worlds should be specially designed in order to support the educational procedure and to implement collaborative e-learning scenarios. Also, tools such as a shared whiteboard and slide presenter, together with the upload of learning content into the 3D environments would be very helpful in an environment of this kind. To achieve these goals, we have to use a platform for educational virtual environments in order to offer educational services to users in a sufficient way. In our days there are several research platforms that support on-line virtual communities [6]. These platforms are effective for supporting collaborative virtual environments. However, they are not designed to support educational communities and to offer the above functionality. Other research platforms emphasize on specific research issues such as facial communication, support of heterogeneous network, or reliability. These platforms are very focused and limited in breadth [4]. This gives rise to a proliferation of independent systems. The solution of integrating or combining work from different groups may be very difficult because of different philosophies and assumptions, making this approach inappropriate for educational purposes.

2. EVE approach

The above reasons led us to design and develop the EVE platform, which is targeted on supporting multi-user 3D educational virtual environments [2]. This platform is based on the use of VRML for representing the virtual environment, VRML-EAI for accessing the virtual worlds form external applications and Java networking for the network communication [7]. In addition, in order to support collaborative e-learning we have implemented an educational virtual environment, which is supported by the EVE communication platform. This environment is a simulation of a classroom giving the users communication and collaboration capabilities and necessary tools for realizing collaborative e-learning scenarios [3]. The users that participate in the virtual classroom are represented by avatars. The users' avatars are able to make various types of gestures: expressing opinions (e.g. agree, disagree), expressing feelings, mimics (e.g. happy, sad), as well as showing actions (e.g. move learning content, pick learning content). The virtual classroom is supported by audio collaboration, application sharing and text chat

functionality. Also, it provides a specific place where the users can upload their content and show it to other participants in the course. This space is a 3D presentation table. Moreover this table offers more functionality such as shared whiteboard, or simulation of a brainstorming board. The user interface of the training area is depicted in the Figure 1.
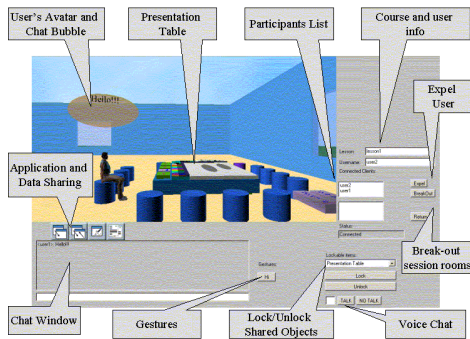

Figure 1: User interface of the training area

The functionalities supported by EVE prototype are the following:

Communication Channels: The easy and effective users' interaction is one of the main goals in the educational virtual environments. Our prototype supports the following ways of interaction among users: (a) voice chat, (b) text chat, (c) non verbal communication through gestures.

User's Representation and Awareness: The users are represented by human like articulated avatars. The avatars can support animations and gestures in order to support non-verbal interaction between the users.

Manipulation of Users and Shared Objects: The EVE prototype integrates two main tools for supporting the manipulation of participants in the multi-user virtual environments and the shared objects. These tools are: (a) expelling learner/participant: and (b) locking /unlocking objects.

Presentation Table: The most important feature an educational virtual environment should have is to a way to provide tools, which support the e-learning process. In our prototype we have implemented a presentation table, which is the central point in the training room. Using the functionality of this table the users can present their slides, ideas, to comment on slides, upload and view learning material as well as to view streaming video. The presentation table integrates the following functionality: (a) a 3D Whiteboard, (b) a brainstorming board, (c) a video presenter, (d) support of drag and drop learning material.

Application Sharing: Except for the use of the presentation table the users in a course can present material, which is located in their local desktops using application and data sharing. Furthermore, they can collaborate on documents.

Break-out session rooms: An innovative feature that is offered by the training area is the break-out session rooms. These rooms are small rooms containing a presentation table and have only 4 seats in order to host sub-groups of the students that participate in the virtual classroom. The break-out session rooms are used for supporting collaborative e-learning techniques that require students' separation during the learning process [5].

3. Conclusion- Future Work

This paper presents a prototype, which aims to offer necessary services and tools in order to support collaborative e-learning. This prototype is based on the use of 3D multi-user virtual environments and exploits the features of EVE platform. It simulates a traditional classroom, integrating tools for supporting the learning process.

Our next steps are focused on the composition and organization of the learning material, in order to correspond and deal with multiple learning scenarios. Also another important step for the improvement of our prototype is its evaluation by users, which will bring to the surface any possible deficiencies that it may have.

4. References

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