

The Implementation of a Dialogue Based Interaction Tool for the Usage in Immersive Virtual Environments

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Keywords: Virtual Reality, Immersive Virtual Environments, Education, Interactive Storytelling, Unity

Abstract:

The widespread use of game engines such as Unity has simplified the creation of immersive virtual environments. In addition to just being a tool for creating video games, game engines can also be used to create 3D simulations of reality with a high spatial reference. Using controllable avatars and other interactive devices, these immersive virtual environments with a spatial relationship to the real world can be experienced and visited. Moreover, semantic information, beyond the visual dimension (Edler et al. 2019), can be added to provide additional background information about the simulated virtual environment.

An immersive virtual environment without interaction options communicates semantic information about itself only through the content presented within it. In this situation, the user does not have the possibility to actively retrieve background information that goes beyond the displayed environment. In order to give the user the possibility to actively retrieve information about the environment, different selectable interactive options can be implemented. This kind of information transfer of a background story is already used extensively in the field of gaming through dialog-based interactions between the player and non-playable characters. Applications of dialogue based interactivity can already be found in the context of education (Petousi et al. 2022).

In this study, we also deal with an educational case study. It refers to the application of immersive virtual environments in geography school-education and follows the aim of exploring the potentials of immersive technologies and experiences for educational purposes (Klippel et al. 2019). The purpose is to introduce pupils to urban development concepts and scenarios through the medium of immersive virtual environments. It specifically relates to examples of smart economy in the context of smart city development. The link between the immersive virtual environment and the associated background information is performed by interacting with non-game-playable characters who provide this information through text-based dialogues. The non-playable character as seen in figure 1 serves as the interaction partner of the story line. Approaching this non-playable character as the player initiates the dialog that launches the main quest, in which the students have to help other non-playable characters in the virtual environment with different issues related to concepts of smart economy. During the process of completing the quests, the robot keeps explaining facts to the students via dialogues.

This study focusses on the methodical workflow of an implementation of a text-based dialogue system into an already existing immersive virtual environment. It elaborates how different dialog options are created, which leads to different outcomes of the provided background information. The presented workflow is addressed to all users who want to equip immersive virtual environment with a dialogue system that offers the possibility to provide background information about the environment. In this specific application example, the dialog system is used to provide non-playable characters and objects within a virtual mall with dialogs to introduce students to concepts of smart economy by providing action instructions to complete the given tasks.

Figure 1 a.) shows an example dialog that is displayed in the user's field of view as soon as he approaches the non-playable character. In this example, the user has two response options to the statement of the non-playable character. The implementation of this exemplary dialog in the Unity development environment is shown in Figure 1 b.) and illustrates the modular structure of the dialog with statements and response options between the non-playable character and the user.

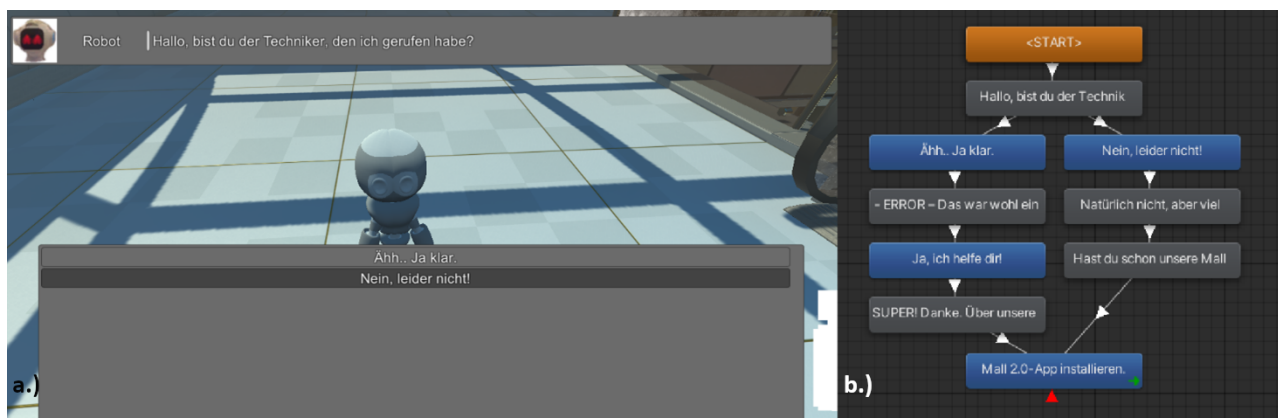


Figure 1: a.) Interaction interface in the field of view of the user b.) Configuration of the dialogue in the development environment

Acknowledgements

The project is funded by the Ministry of Education North Rhine-Westphalia (Az 412-5.01.02.03-154677)

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