

Seamless Interactions between Real and Virtual Environments

Sejin Oh, Youngho Lee and Woontack Woo

GIST U-VR Lab.
Gwangju, 500-712, S.Korea
{sejinoh, ylee, wwoo}@gist.ac.kr

Abstract

With rapid development of hardware and software, virtual reality (VR) systems are applied to various areas, such as remote meetings, games, and virtual heritage systems, etc. However, most VR systems simply focus on controlling the virtual environment according to explicit commands inputted by users. Moreover, they do not consider bi-directional interactions that reflect the changes in virtual environment to real environment, and vice versa. Accordingly, it makes users perceive seams between real and virtual environments, and thus diminishes immersion effects.

This paper presents the framework that supports seamless interactions between real and virtual environments by exploiting context. It allows to share the context between real and virtual environments by dynamically generating configurations between sensors and services in the two realms. Accordingly, it changes virtual environment according to the context generated in real environment, and also reflects any changes in the virtual environment to the real environment. Therefore, users hallucinate the virtual environment as prolongation of the real environment, and thus they seamlessly interact with both realms. The proposed framework consists of three components; ContextPublisher forming dynamic configurations for context sharing, ConfigurationManager managing conditions for the configurations and ContextSubscriber receiving the needed context from other sensors or services.

In order to evaluate usefulness of the proposed framework, we implemented virtual heritage system by exploiting the framework. It allowed participants to naturally experience the system with PDA by changing the virtual heritage environment according to context generated from the PDA. Additionally, it also made services show adaptive responses suitable for the context in the virtual environment. Thus, the system showed how user can seamlessly interact with the two environments according to the context. Furthermore, we presented usefulness of the framework through quantitative and qualitative experiments of the system. Therefore, we expect that the proposed framework can be foundations for naturally applying VR systems, e.g., virtual educations, virtual system-based interactive entertainments and so on, to everyday life.

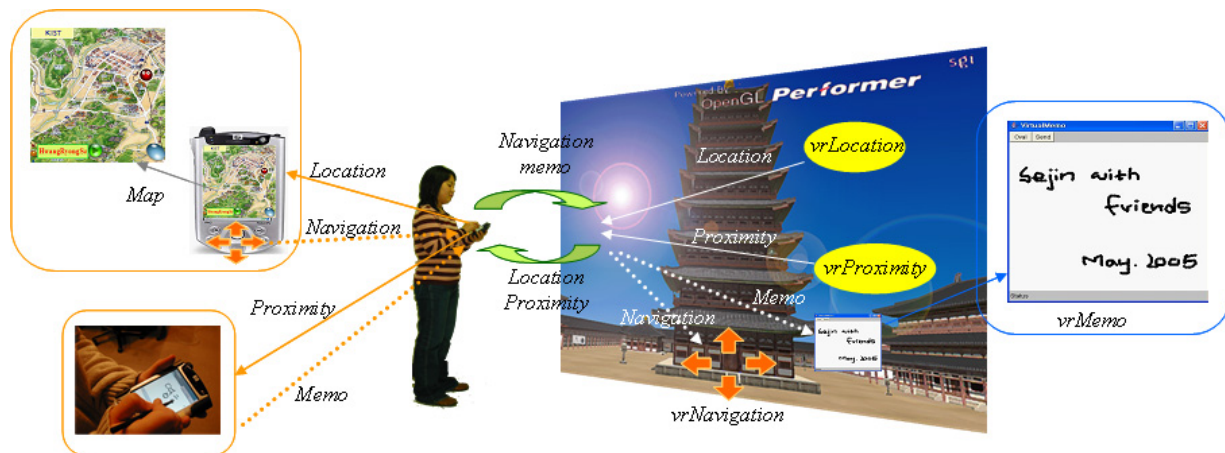


Fig.1. Seamless context sharing in the implemented virtual heritage system