Abstract

December 20, 2010

A Study of Novel Interaction Methods Facilitating an Interaction with 3D Mixed Reality Space

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Mixed reality (MR), which can merge real and virtual worlds in real-time has come into wide use in various fields and attracted much attention. Many studies are focusing on a geometric and photometric registration, the output for users.

In the field of Computer-Human Interaction (CHI), there has been research some studies focus on post-WIMP (Window, Icon, Menu, Pointing-device) interface; expanding the workspace from a 2D display to a wide display or a 3D space with a stereo vision system, and using methods that realize a direct and intuitive input. MR is an example of post-WIMP interface because its workspace is 3D space. In this study, we proposed novel interaction methods for MR space.

1. RealSound Interaction: We present a unique and novel method using ON/OFF, direction, 2D/3D location of sound events, and sound information such as type, length, and volume of sound. In our system, users can use the sound as input into or an interaction device in the MR space; they can realize intuitive operations with familiar sound sources.

2. BrushDevice: The device using a metaphor based on familiar real-life tools that leads users to the correct operation but also provides an intuitive operation. We implemented the mechanism which can detect a brush tip moving to generate a realistic brush stroke. Then, we constructed an MR painting system that enables direct virtual painting on physical objects. In addition, we implemented a new BrushDevice which has visual and haptic feedback mechanisms for painting on virtual objects.

3. Spatial Observation: We consider about the manipulation of complex 3D virtual objects in MR space. The proposed method makes it possible to avoid unintended operations, and improve the operational feeling and responsiveness. To realize this, the system imitates the behavior and response of actual objects. Users can not remove easily, but can remove if determined to do so.