Interface Design to Support Situation Awareness in Virtual Puppetry

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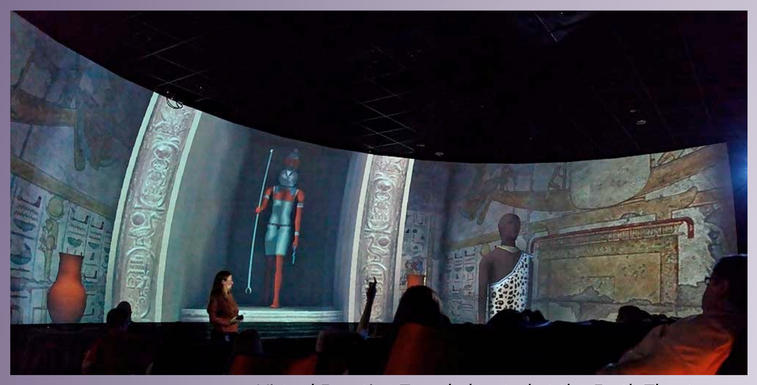
Motivation

- "Virtual Heritage" is the use of electronic media to recreate, or interpret, culture and cultural artifacts as they are today or as they might have been in the past.
- The goal of Virtual Heritage is to draw viewers into the virtual world and allow them to directly experience the overall context of the environment. Museums have increasingly found use for this technology.



Virtual Egyptian Temple located at the Earth Theater, Carnegie Museum, Pittsburgh, courtesy PublicVR

- Virtual spaces are almost always empty, silent and lonely. Lacking people, they lack social context and much of their meaning.
- The technology exists to add virtual characters to these environments; however, the actions of the characters often seem scripted. This is particularly evident if the characters need to interact with audience members.
- The broad objective of this research is to develop and evaluate techniques to allow puppeteers to manipulate characters that are capable of rich and engaging interaction with the audience.

Design Challenges

Virtual Puppet Controls

- What actions must the puppet be able to perform?
- What controls are provided?
- How do puppeteer actions map to puppet actions?

Situation Awareness

Situation Awareness is the ability of the operator to perceive, reflect and act on a highly dynamic environment

- What views/perspectives does the puppeteer need?
- How can the puppeteer integrate multiple views?
- How does the puppeteer make appropriate control decisions?

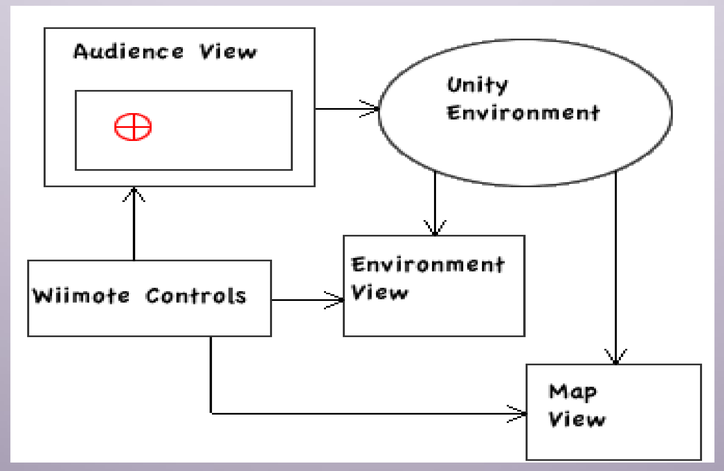
Design Principles

- **Cost Effective:** The interface design should use relatively inexpensive materials and software. Whenever possible, this means using commercial, off-the-shelf components.
- **Limited Training:** Little experience should be needed in order to be able to work with the interface.
- **Blended Control:** Complete, direct control of the puppet may not be practical. The puppeteer should be able to select from a library of animation scripts to perform common gestures, e.g. random eye contact when addressing the audience as a whole.
- **Multiple Perspectives:** The puppeteer is required to interact with the live audience and the virtual environment. The puppeteer needs to be able to transition his/her attention between these views instantaneously.
- **Direct pointing:** The puppeteer needs to be able to select elements in multiple displays without reorienting.

Prototype Architecture

Describe the way the system is put together what the role is and generally how it functions.

- **Audience View**
- **1st person Environment View**
- **3rd Person Environment View (also shown to audience)**
- **Map View (controls navigation)**



Technology Components

- **Unity 3D:** a game development tool responsible for modeling virtual environment and puppets.
- **Wiimote:** a gestural input device connected to a PC via bluetooth.
- **Glovepie:** a scripting tool that translates Wiimote gestures into traditional input.
- **Webcam:** provides live video feed of the audience to the puppeteer's interface
- **Custom Java Software**: Interprets Wiimote commands and Glovepie scripts and streams them into Unity for processing.

Ongoing Questions/Future Work

As work on this project continues, more questions will need to be addressed, such as:

- How will the interface adapt to different sized audiences?
- How will puppeteers adapt to using the interface?
- Will situation awareness be gained or lost by the use of multiple views of the environment?

- How will SA be affected by position, size, orientation of the multiple displays?