

# Production of a low cost **Immersive VR Environment for** training purposes

## Introduction

The widespread deployment of VR training facilities is currently limited by one major factor: cost.

This research seeks to counter this drawback by developing low cost technological solutions for two of the major requirements of an immersive virtual environment:

- Display technology
- Position and orientation sensing •

It is an additional goal of the work to integrate these systems with a commercial content creation package to allow the delivery of a wide diversity of VR training scenarios.

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#### **1. Low Cost Immersive Virtual Environment**



screen with 4 standard projectors,

#### 2. Position and Orientation Sensing

•Current commercial systems that deliver high accuracy are prohibitively expensive. These mainly operate on magnetic or acoustic principles.

•A solution based on computer vision principles has the potential to offer a much cheaper alternative whilst still

#### Inside VR Environment



<sup>1</sup> Grimes, H., McMenemy K. and Ferguson R.S, "A transportable and easily configurable multiprojector display system for distributed virtual reality applications," Proceedings of SPIE - The International Society for Optical Engineering, vol. 6804, pp. 68040G, January 2008.

### **3. Content Delivery for Training**



Software is required to drive the multi-projector display and acquire and act on sensing information so as to deliver the sensation of being in an immersive virtual environment.

•Virtools is a content creation and delivery system suitable for driving a multi-channel output display environment. It can also accept interactive control input from a wide variety of sources and render good quality graphics.

•By using the camera on the widely available gaming device (Nintendo Wiimote) additional benefits accrue:

> olmaging is done in the infrared spectrum oInbuilt Bluetooth technology gives a wireless connection oOnboard image processing allows for automatic marker detection.

•The accuracy of the position and orientation sensing is suitable for both:

oSensing general movement within the large scale VE. oSensing changes in orientation when using a HMD.

### 4. Current Case Study

When training many people it is important to provide uniform and reproducible scenarios, especially ones that are as multi-sensorial as possible.

Content has been created for the low cost VE specifically to simulate some of the training scenarios that nursing students undergo when preparing for clinical and community practice.

The benefits to both students and educators of using such a VR system are currently being evaluated.

broadcasting the device's information Vrpn signal across Tcp/IP Workstation with Virtools Virtools running. Displa Virtual Reality Application using the vrpn information.

•Virtools interfaces with its input devices via VRPN.

•VRPN was easily extended to acquire its input data from the Wiimote.

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By combining these elements a fully functional

low cost immersive virtual environment has been created.



Photograph of current training room in the School of Nursing at Queen's University Belfast.

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http://www.ee.qub.ac.uk/isac/

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