

ABSTRACT

CREATING NEW VISUALIZATION AND HUMAN INTERFACE DEVICES FOR THERAPEUTIC VIDEO GAMES

**by
Kunal Jayant Doshi**

Virtual reality (VR) gaming environment as a tool for rehabilitation of patients with upper extremity disorders is fast gaining momentum. VR based motor training systems provide an engaging, motivating and adaptable environment where the motion of the limb displayed in the virtual world is a replication of the motion produced in the real world by the patient's extremity.

The goal of this thesis was to create a generic gaming system which can be interfaced to a number of different Human interface devices (HID) and produce rich graphics to create a virtual environment which closely resembles the real world. This would overcome the current limitations of the 'HANDS UP' game developed by the Neuromuscular lab which accepts only a web camera input and uses color marker detection to recreate the limb movements in simple two dimensional environment.

Three dimensional worlds designed in Virtual Reality Modeling Language (VRML) were controlled using SIMROBOT and Virtual reality toolbox in MATLAB to create better visualization. The Human Interface devices currently used for Virtual Reality video games are expensive and cannot be afforded for home use. Various new HID's like the Flock of Birds, Nintendo Wiimote and IMU 6 DOF V3 were tested for their use in the virtual gaming environment. Each device presented their own set of advantages and problems. The thesis work involved understanding and resolving these problems and interfacing the devices with the gaming system.

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DEVICES FOR THERAPEUTIC VIDEO GAMES**

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APPROVAL PAGE

**CREATING NEW VISUALIZATION AND HUMAN INTERFACE DEVICES
FOR THERAPEUTIC VIDEO GAMES**

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To my beloved family and my late grandmother, 'Jayaben Doshi'

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