UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Dibris

Thesis Project Form

Title (tentative): Enhancing Virtual Reality User Experience

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Description

Motivation and application domain

The use of Head Mounted Displays (HMDs) in VR has changed the way we engage with immersive digital environments. However, inherent variability of individuals' ocular morphology,poses a significant challenge to avoid suboptimal visual experiences. To address this issue, it is crucial to investigate and manipulate key parameters such as ocular occlusion, ocular parallax, and virtual eye positions.

General objectives and main activities

Ocular occlusion refers to blocking or obscuring visual information based on the user's unique eye characteristics. By understanding and managing occlusion, VR systems can optimize the rendering of virtual content, ensuring that users experience seamless and realistic visual interactions. This approach mitigates the discrepancies arising from the diverse morphological aspects of users' eyes.
The thesis aims to design and implement a software application for HMDs using Unity (or a similar rendering engine) that should enable the adjustment of these key parameters in real-time, ensuring a dynamic and personalized experience for each user.
Specifically, the main activities will be :
Devise a set of visual perception and cognitive tasks that users can perform within the VR environment. These tasks should be designed to measure various aspects of visual acuity, depth perception, and cognitive performance. Implement pre- and post-custom visual rendering assessments to quantify the impact of the personalized rendering settings on users' experiences.
Develop a structured study protocol to collect quantitative and qualitative data on users' visual perception and cognitive performance. Execute the study, collecting data before and after the implementation of the custom visual rendering settings, and analyse the results to draw conclusions about the effectiveness of the personalized approach.

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn to employ an array of methodologies and instrumentation, including:
â€¢ Graphic Engines (Unity3D) and Shaders
â€¢ Virtual Reality (VR) technologies, 3D monitor/projectors and Head Mounted Displays
â€¢ Stereoscopic rendering
â€¢ Psychophysics methodologies
â€¢ Task design and data collection with subjects

Place(s) where the thesis work will be carried out: Bioiengineering Lab (PSPC), via Opera Pia 13

Additional information

Maximum number of students: 2

Financial support/scholarship: None