

Auditory Stimulation for testing neurological deficits using Virtual Reality

Background: This Master Thesis is part of a large project, where human perception is investigated in virtual reality settings. Auditory stimuli are often absent in many studies, and if present are not rendered in 3D and are not interactive. Thus it is important to study auditory stimulation in virtual reality to understand the impact of virtual reality training and treatments.

In this project, a study on sound localization of different types of audio sources, will be conducted. The student will investigate the field of binaural technology (i.e. how 3D sound is processed by the brain and how technology can reproduce it), and develop a new test paradigm to create auditory stimuli in different locations of a virtual world.

Aim: In this project, the student will investigate, by developing a new auditory paradigm, how precisely the human brain processes sound sources in relation to the type of audio stimulus (living, non-living sound, speech, music, white noise, etc.).

Materials and Methods: Different audio sources will be simulated and manipulated in order to reproduce 3D sound perception. The auditory paradigm will be developed in Unity 3D. 10 healthy subjects will be tested with the auditory paradigm and their spatial accuracy in detecting sound sources, according to different audio types, will be recorded. A system usability study will be conducted to evaluate the audio generated.

Nature of the Thesis:

Implementation of the test setup: 65%

Evaluation: 25%

Analysis & Documentation: 10%

Requirements:

Background in Biomedical Engineering or Computer Science

Good programming skills

Basic knowledge in Unity 3D is preferable

Supervisors:

Dr. Prabitha Urwyler

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Institutes:

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References:

Begault, D.R. "3-D sound for virtual reality and multimedia". 293 pp, Academic Press Professional, Inc. San Diego, CA, USA 1994, ISBN:0-12-084735-3.

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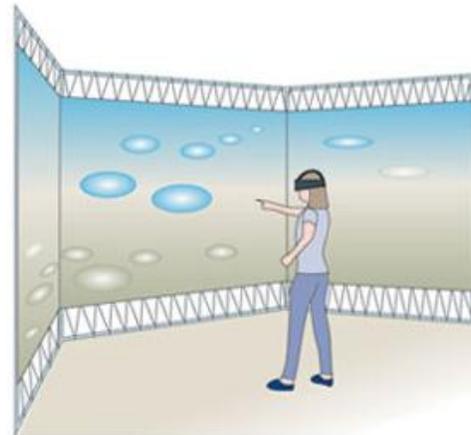


Figure - A participant wearing the Oculus Rift to test the sound sources (Bohil 2011, Nature Reviews Neuroscience).