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

Thesis Project Form

Title (tentative): Gaze-contingent altered reality for functional recovery of amblyopia

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Description

Motivation and application domain

Eye vergence dysfunction is a common cause of amblyopia. Failure of binocular convergence on a single fixation point implies strabismus, which eventually prevents stereopsis. Adaptive capabilities of the visuomotor system can be exploited for designing visual therapies to reduce strabismus without surgery.

General objectives and main activities

The thesis aims to conceive, implement and assess the efficacy of a strategy to rehabilitate eye alignment by altering in real-time binocular images while executing specific fixation exercises. Gaze-contingent image alterations will be obtained by acting dichoptically on the left-eye and right-eye image content according to the binocular eye positions provided by a wearable eye-tracker. Gaze contingent visual stimulations can be provided either by a 3D monitor or through a head-mounted display.

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
â€¢ Stereoscopic rendering
â€¢ Psychophysics methodologies
â€¢ Task design and data collection with subjects
â€¢ Eye tracker calibration
â€¢ MATLAB for the analysis of data

Place(s) where the thesis work will be carried out:

Additional information

Maximum number of students: 2

Financial support/scholarship: None