



Thesis Project Form

Title (tentative): Systems for Assessment and Rehabilitation of Binocular Sensorimotor Disorders

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Description

Motivation and application domain

The proposed thesis is in connection with an International Project (started February 2022) financed by the National Institute of Health of U.S. in collaboration with: Northeastern University, Boston and UC Berkeley, San Francisco. The Department of Ophthalmology, Boston Children's Hospital is also involved.

General objectives and main activities

Binocular vision relies on a synergy between sensory and motor fusional mechanisms that jointly construct a single percept of the environment from the differing images formed on the two retinæ. A failure in either component of this system, especially during development, can lead to permanent binocular vision impairment.

Current limitations to treat amblyopia are at least partly due to a lack of practical methodologies for the assessment of sensory-motor function and partly due to a lack of co-ordinated sensory-motor therapies.

The overall goal is to demonstrate the theoretical foundation for combined sensory and motor therapeutic approaches to binocular visual dysfunction.

The thesis will develop and evaluate methods to measure sensory and motor deficits in persons with binocular vision impairment and to provide a quantitative framework for evidence-based assessment of sensory-motor therapy.

Training Objectives (technical/analytical tools, experimental methodologies)

- Apply knowledge of physiology and of computational models of active binocular vision to develop assessment methodology and visuomotor therapies

- Design of experimental environments for conditioning binocular vision experience and exercise oculomotor function in controlled ecological conditions

Place(s) where the thesis work will be carried out: DIBRIS Bioengineering Lab (Via Opera Pia 13)

Additional information

Maximum number of students: 2