



Thesis Project Form

Title (tentative): Assessing the influence of natural images on human stereopsis

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Description

Motivation and application domain

Typically, visual functions are assessed under limited and simplified laboratory conditions, by using standard visual stimulation patterns, as well as stereotyped viewing conditions (e.g., eye and head positions). Although this represents a valid ground, several high-order influences, related to (1) the statistics of natural images and (2) how early vision channels attune themselves to comply such statistics, are inescapably disregarded.

General objectives and main activities

The thesis aims to design, implement and validate novel stereoacuity tests in natural conditions. To this end, the content of binocular images will be specifically designed to engage specific visual channels and test their possible interaction both in retinotopic and parametric spaces. Specifically, incremental values of binocular disparity will be rendered by different textures, obtained by systematic manipulation of local harmonic content (i.e., amplitude, orientation and phase) of natural images, even adapted with retinal eccentricity.

Expected results: A suite of novel visual tests for both collaborative and non-collaborative (e.g., pre-scholar children) subjects.

Materials and methods: Unity3D, MATLAB (for data analysis and visualization), 3D monitor/projector, eye-trackers.

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn to employ an array of methodologies and instrumentation, including:

• Graphic Engines and Shaders

• Stereoscopic rendering

• Psychophysics methodologies

• Task design and data collection with subjects

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

Additional information

Maximum number of students: 1