EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April 1st, 2016 – September 30th, 2016

Laboratory: Davalor Research Center – Universitat Politècnica de Catalunya
City, Country: Terrassa, Spain.

Title of the master thesis: Bidimensional analysis of peripheral depth cues in accommodation

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Summary of the subject (maximum 1 page):

The capability of the human eye to focus near targets is the so-called concept of Accommodation. This concept has been comprehensively studied since the last century, however, there are still many issues related to it that are not fully clear. Additionally, since the apparition of virtual reality (VR) technologies accommodation has been given an increasing relevance since it is thought to be one of the key points for the success in VR development and implementation. In other words, an appropriate representation of focus cues (i.e., accommodation and peripheral depth cues) in a virtual reality system is still a limitation in these displays.

To this sense, there is some evidence that peripheral depth cues can affect accommodation. In this study, we hypothesize that objects in the periphery, which can behave as depth cues, placed at different planes with respect the central fixation target might alter differently the accommodative response depending on the relative distance between them and the fixation target.

In order to test for this idea, we propose to measure the accommodative response at 2 D and at 5 D of AS (Accommodative Stimulation) in a field of view of 30º using a Badal system.

This Master Thesis aims to study the peripheral depth cues in different positions with respect the fixation target in two dimensions of the space (longitudinal and transverse planes). An example is shown in figure 1.

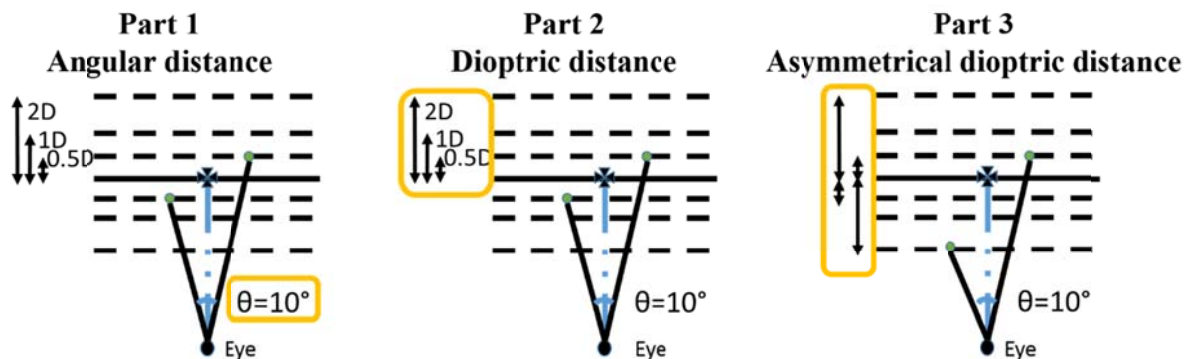The outcomes of this study will be discussed in terms of the potential effects on virtual reality systems.

Figure 1. The *first part* will test the effect of increasing the angular position of the peripheral depth cues with respect the fixation target. The *second part* will test the effect of increasing the relative distance of the peripheral depth cues in the longitudinal plane (i.e., along the visual axis) with respect the fixation target. The *third part* will test the effect of increasing the relative distance of the peripheral depth cues in the longitudinal plane (i.e., along the visual axis) with respect the fixation target, but contrary to the previous part, this time the symmetry between the back and the fore peripheral objects will be broken.

Keywords: eye's accommodation, depth cues, visual perception, virtual reality.

Additional information:
* Required skills: Self-motivated, objective-driven, capable of autonomous working within a multidisciplinary team. Basic concepts in Visual Optics, Statistics, SPSS, MATLAB or R will be very helpful, although are not essential.

* Miscellaneous: This thesis contents will be considered confidential due to its closeness to market. Multidisciplinary environment with optics and optometry workshops comprising specialists and technicians in visual optics, optometry, optical design, metrology and color science. Possibility of joining the centre for a PhD/Research career in case of common interest. Early incorporation is welcome.