Master de Sciences et Technologies
Mention Biologie Intégrative et Physiologie
Parcours : Neurosciences
Responsable : Professeur Régis Lambert

Internship Proposal
Academic Year 2018-2019

1. Host team:

Research Unit (e.g. Department or Institute): Department of Optics and Microwaves, ICAT-UNAM

Research Unit Director: Dr. Rufino Díaz Uribe
Research Team Director: Dra. Martha Rosete Aguilar
Team name: Optical Systems

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Supervisor of the Research Intern for this project: Dr. Manuel Campos García
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2. Internship project title: *Corneal Topography with null-screens*

3.Internship Description : It is proposed to apply the null-screen method [1] for corneal surface evaluation [2]. The design of the null-screens will have a conical shape, which allows us to evaluate a larger area of the corneal surface. Various point patterns (targets) will be used to improve the accuracy of measurements. For this it is proposed:

A. Design of the corneal topographer
1 Selection of the best cone and distance to the test surface.
2 Selecting the right lighting for the prototype.
3 Selection of the lens and CCD to be used in the prototype to make the captures of the images.
4 Design of an arrangement of points (targets) that allows to evaluate a large area of the corneal surface.
5 Design of null-screens for a spherical surface
6 Design of null-screens for an aspherical surface
B. Evaluation of surface topography of the human cornea.
1 Measurement of the radii of curvature of spherical surfaces and aspherical surfaces with diameters similar to the diameter of the cornea.
2 Recovery of the shape of surfaces.
3 Obtaining curvature maps.
C. Characterization of the corneal topographer.
1 Determination of precision and uncertainty in measurements.
2 Evaluation of errors in measurements: systematic and random.
3 Determination of the sensitivity of the corneal topographer.
4 Comparison of results with a commercial corneal topographer.

1. R. Díaz-Uribe, M. Campos-García, “Null Screen Testing of Fast Convex Aspheric Surfaces”, Appl. Opt. 39, 2670-2677 (2000).
http://dx.doi.org/10.1364/AO.39.002670
2. M. Campos-García, C. Cossio-Guerrero, V.I. Moreno-Oliva, O. Huerta-Carranza, “Surface shape evaluation with a corneal topographer based on a conical null-screen with a novel radial point distribution”, Appl. Opt. 54, 5411-5419 (2015).
http://dx.doi.org/10.1364/AO.54.005411. ISSN: 1559-128X
Virtual Journal for Biomedical Optics, 4 August 2015, Volume 10, Issue 6.
https://www.osapublishing.org/vjbo/virtual_issue.cfm?vid=295