POSTER

12 | Design of a compact SS-OCT system for anterior and posterior segment imaging integrated in an instrument for autonomous evaluation of the visual function

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Early detection and objective assessment of ocular dysfunctions and pathologies impact greatly the success of the treatments. An instrument that performs an automatized binocular examination of the patient's visual function while he/she explores a virtual reality environment has been developed by our group in previous works. It reduces the tediousness and subjectivity introduced by both practitioner and patient in standard optometric exams, providing a complete diagnostic report of the patient's visual function that can be used as a base for subsequent clinical decisions. In this work we present the design of a whole-eye imaging module that can be integrated in the abovementioned instrument, improving its ophthalmic capabilities by providing combined morphological and functional clinical information.

The designed optical module consists of a compact swept-source optical coherence tomography (SS-OCT) system that features anterior segment and posterior segment imaging modalities, an eye-tracker and a display system for the generation of real 3D stimuli. The illumination source (Axsun Technologies) is a short- cavity tunable source centered at 1040 nm, 100 nm wide spectrum, 16 mm coherence length and 50 kHz tuning rate. The all-in-fiber interferometer is combined with a reference and a sample arm that consists of a dual path dual-focus configuration which allows fast switching from anterior to posterior segment modalities. The detected signal is digitized at 1 GS/s (Alazar Technologies). The system achieves an axial resolution of 5 µm in air and an imaging depth range of 16 mm, allowing for whole anterior segment imaging. In this later modality a region of 11x11 mm is scanned with a lateral resolution of about 70 µm and in the retinal modality an area of 6x6 mm is scanned with around 10 µm lateral resolution. The high-speed performance of the system is ideal for the study of dynamic ocular processes.