

Real-time volumetric optical coherence tomography to enhance visualization of microsurgery

Value Proposition

Ophthalmic surgery is typically performed with a stereoscopic surgical microscope that provides a wide field en face view of the surgical field and limited depth perception. Surgeons often rely on indirect cues for depth information, which may be insufficient for precise depth localization of tissue-tool interfaces. Many ophthalmic surgical procedures, such as corneal dissections and external limiting membrane peeling, necessitate precise axial manipulation of tissue. Therefore, direct three-dimensional (3D) visualization of dynamic surgical maneuvers can be very useful in ophthalmic surgery. Optical coherence tomography (OCT) enables micron-scale tomographic imaging of posterior and anterior segments of the human eye and can provide direct axial visualization of ophthalmic surgery. Current intrasurgical imaging with spectral domain OCT is capable of enhancing visualization of surgery but is limited to 2D real-time imaging. There is a continuing need for improved systems and techniques for improving the display of images of the surgical field to surgeons and other healthcare professionals.

Technology

A 4D microscope integrated OCT (MIOCT) has been developed for live micron scale volumetric visualization of microsurgery. The imaging is demonstrated in one example implementation at up to 10 volumes/second, but may be achievable at many times that rate with modifications to the OCT scanning system and “engine”. A stereoscopic heads-up display (HUD) with surgeon control of scanning and display via the surgical microscope oculars has also been developed.

Publications

- [Novel microscope-integrated stereoscopic heads-up display for intrasurgical optical coherence tomography \(Biomed. Opt. Express, 2016\)](#)

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Inventor(s)

- Carrasco-Zevallos, Oscar
- Izatt, Joseph
- Keller, Brenton
- Shen, Liangbo
- Toth, Cynthia
- Viehland, Christian B.

Links

- [From the lab of Dr. Joseph Izatt](#)
- [From the lab of Dr. Cynthia Toth](#)

College

Pratt School of Engineering

For more information please contact

Koi, Bethany
919-681-7552
bethany.koi@duke.edu

Patents

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Title: SYSTEMS AND METHODS OF OPTICAL COHERENCE
TOMOGRAPHY STEREOSCOPIC IMAGING FOR IMPROVED
MICROSURGERY VISUALIZATION

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