

ECSE Faculty Candidate Seminar

11:30 AM to 12:30 PM
Tuesday, February 1, 2022
In-person: White 411 and Virtual

Zoom Webinar ID: 940 7438 8634
Passcode: 357363

Autonomous Medical Robots Guided by Real-Time 3D Imaging

Abstract: Modern surgical procedures require delicate tissue interactions and thus benefit greatly from the precise manipulations offered by medical robots. Similarly, live 3D imaging modalities (e.g., optical coherence tomography, ultrasound) offer rich clinical data streams useful for guiding surgical instruments. Patients see few advances, however, that leverage both domains to deliver medical robots guided in real-time by live intraprocedural imaging. In this seminar, I report on my translational work with optical coherence tomography and ophthalmic applications to bridge medical robotics and live imaging. This work spans autonomous eye imaging of freestanding subjects, image-guided needle insertions for superficial cornea transplantation, and a robotic surgery framework for maximizing surgeon efficiency when using live volumetric imaging for guidance. In addition, I discuss early results in breaking the framerate-resolution barrier for scanned imaging modalities with online algorithms for adaptive acquisition.



Mark Draelos, MD, PhD
Duke University Medical Center

Bio: Mark Draelos, MD, PhD, is a surgically-trained physician and engineer who develops novel applications of medical robotics and imaging to improve patient care. After studying at North Carolina State University as a Park Scholar and earning an MS in electrical engineering, he entered Duke University's Medical Scientist Training Program to study biomedical engineering under Prof. Joseph Izatt. There, he developed image-guided robotic techniques for surgical navigation with intraoperative 3D imaging, corneal transplantation, and autonomous eye examination. His work received recognition with a National Institutes of Health F30 pre-doctoral fellowship and as a finalist in the KUKA Innovation Award. He is published in Nature Biomedical Engineering, IEEE Transactions on Biomedical Engineering, and Biomedical Optics Express. Mark is a licensed physician in the state of North Carolina, having completed an internship in general surgery at Duke University Medical Center. He is currently a postdoctoral associate in Duke University's Entrepreneurial Postdoctoral Program.

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