

BIOENGINEERING

PRESENTS

Bio Inspired Near-Infrared Fluorescence Sensors: From the Ocean to the Operating Room



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12:00 – 1:00 PM

2101 ENGINEERING V

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ABSTRACT:

Nature has served as an inspiration for novel and elegant designs in architecture, engineering, and science in general. In this talk, I will describe a bio-inspired imaging system based on the visual system of the mantis shrimp for image-guided surgery (IGS). This near-infrared fluorescence (NIRF) imaging device can provide real-time feedback to physicians in the operating room with high fluorophore sensitivity without hampering the surgical workflow. This system employs pixelated tapetal spectral filters, i.e., miniaturized optical interference films, with an array of vertically stacked CMOS detectors to simultaneously sense color, multiple NIRF channels, and 3D shapes of the surgical wound site. I will highlight the technical advantages of our technology compared to state-of-the-art FDA-approved imaging systems for IGS. This bio-inspired sensor has been integrated with wearable devices and used for tracking sentinel lymph nodes in patients with breast cancer. I will also present pre-clinical and clinical results showing the exciting potential of this new technology.

BIOGRAPHY:

Missael Garcia is a postdoctoral research assistant in the Department of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign. Prior to joining UIUC, he was a graduate student in the Department of Computer Science and Engineering at Washington University in St. Louis where he received his Ph.D. He received his M.S. in Electrical Engineering from the Southern Illinois University and his B.S. in Mechatronics Engineering from the Monterrey Institute of Technology and Higher Education. He has received numerous best paper awards for his research on imaging sensors and their applications in the medical field. His current research focuses on developing bio-inspired sensory technology to address medical needs in resource-limited hospitals.