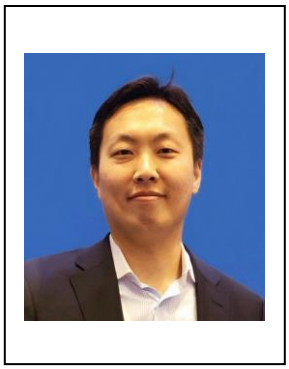

Name: Richard Jaepyeong Cha

Position: Assistant Professor & Principal Investigator

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Presentation Title: Multimodal optical imaging technique and its application to surgical guidance in real-time

Abstract: The current surgical vision paradigm remains passive and anatomic, and limited to human vision spectrum because the current manual approach to surgery based solely on human factors with the recent aid of fluorescent agents. In this talk, we introduce a novel surgical vision system that utilizes fundamental principles of optics and combines multiple optical imaging technologies to enhance navigation of surgical procedures. We apply the optical techniques for clinical translation by displaying critical, yet unseen or unrecognized vasculature, tissue integrity or nerves while providing guidance to potentially optimal surgical decisions for 'best' execution of a surgical task by the 'surgeon'. Our proposed technology is the first time that physiologic and subsurface tissue information has been intelligently and optimally incorporated in real-time guidance of surgical tasks such as bowel anastomosis and thyroid surgery. Future medical imaging based on optical techniques has just begun in the field of surgery. We believe that more surgical visual aid hardware and diagnostic software program will become surgeons' indispensable tools for surgical and oncologic applications in the near future.

Brief Biosketch: Richard Jaepyeong Cha, Ph.D., is an optical engineer with expertise in optical system design and image processing. Dr. Cha joined the CNH and GWU-SMHS in July 2016 as an assistant professor to work on the VISION program (Vision and Intelligence for Surgical Innovation, Optimization and Navigation), leading a team of engineers and clinicians in the development of superhuman vision, machine learning and intelligent surgical guidance. Dr. Cha received his Ph.D. degree from Department of Electrical and Computer Engineering at Johns Hopkins University (2016), while he completed his bachelor and master degrees from Seoul National University in South Korea. His doctoral work has provided him the necessary background and expertise in optical imaging of cellular/tissue level architecture and physiological function, specifically in the use of fluorescence imaging (FI), multispectral/hyperspectral imaging (MSI/HSI) and laser speckle contrast imaging (LSCI). During his graduate program, he was a Howard Hughes Medical Institute Predoctoral Fellow and he initiated multiple projects on development of endoscopic fluorescence imaging tool for brain activity mapping in live animals, multispectral imaging platform for optimizing anastomosis placements and real-time blood flow assessment for intraoperative use in clinical neurosurgery. His current research interests include biomedical imaging guided surgical intervention and anatomical/physiological imaging both in live animals and humans.