

Mechanical Engineering Department Seminar

3:30pm September 11, 2019
3-180 Keller Hall
200 Union Street SE, Minneapolis, MN 55455



To Err is Human – Surgical Skills and Robotics

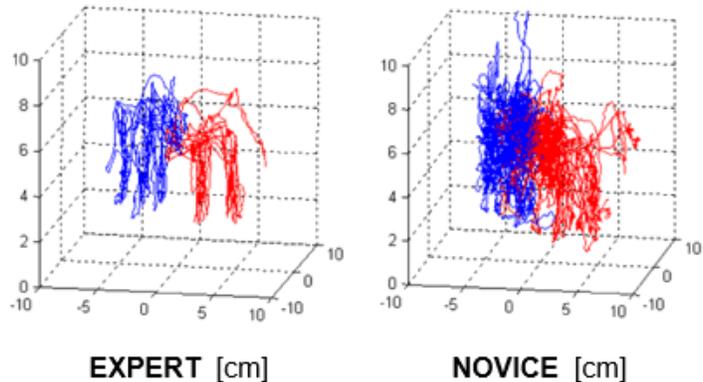
Tim Kowalewski

Richard & Barbara Nelson Assistant Professor; Mechanical Engineering –University of Minnesota

Surgical robots enjoy widespread adoption. This provides opportunities to fortify the art of surgery with engineering science to finally address long-standing challenges in healthcare like the prevalence of human error. This talk will focus on two related research problems. First, how do we quantify and improve the existing technical skills of a surgeon? This requires a method whose scores correlate with patient outcomes, that scales to cope with 51 million annual surgeries in the United States across a diversity surgical procedures or specialties. One solution comes from an unexpected source: crowds of non-expert raters. Second, how can robotic tools render surgical tasks fundamentally easier, perhaps making errors unlikely or impossible in the first place? This will briefly survey topics like policy-blended human-robot shared control to ensure safety in robotic tissue grasping; soft catheter robots that provide dexterity in currently inaccessible anatomy; and robotic 3D bioprinting directly onto moving human anatomy to explore new reconstructive procedures.



Surgical Tool Motion



Bio: Dr. Kowalewski completed his PhD in electrical engineering at the University of Washington's Biorobotics lab. This work in quantitative surgical skill evaluation was recognized with a best doctoral candidate award at the American College of Surgeons Consortium on Surgical Robotics and Simulation. He commercialized his PhD work (Simulab Corp., Seattle, WA) which won the Society of Laparoscopic Surgeons Innovation of the Year Award. While at the University of Minnesota he co-pioneered the use of crowdsourcing for high-volume assessment of surgical skills and robotics innovations to address longstanding challenges in surgery. This work was recently recognized by an NSF CAREER award. Based on his research, he co-founded CSATS Inc. which has impacted surgical practice throughout the United States (acquired by Johnson & Johnson in April 2018). He is currently an assistant professor in Mechanical Engineering at the University of Minnesota where he recently co-founded the Minnesota Neurobotics Consortium. This aims to create a research center around the topic of soft robotics in neurosurgery.

