THE CHINESE UNIVERSITY OF HONG KONG
Department of Electronic Engineering
Seminar

Towards Intelligent Autonomous Surgical Robots: From Registration to Broader Research Frontiers

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Time: 9:30 a.m.
Place: Rm 418, Ho Sin Hang Engineering Building, CUHK

Abstract

With the rapid development of advanced artificial intelligence (AI) technologies such as large foundation models, enhancing the intelligence and autonomy levels of surgical robots have become a cutting-edge focus in current research. In this talk, I will first elaborate on the role of AI in surgical robots, covering research areas such as preoperative disease diagnosis, intraoperative surgical scene understanding, robot control, among others. Next, I will describe my team's recent research progress in the core algorithmic step for surgical robots—specifically the preoperative to intraoperative registration—including 3D/3D rigid, 3D/3D non-rigid, and 2D/3D rigid registration problems and associated proposed algorithms. Afterwards, by recapping recently published reviews on surgical autonomy, I will discuss the current research status and trends in developing autonomous surgical robots. Finally, I will summarize the research work and raise some open questions regarding autonomous surgical robotics.

Biography

Prof. Zhe Min received the B.Sc. degree from the School of Control Science and Engineering at Shandong University in 2014, and the Ph.D. degree in Electronic Engineering from The Chinese University of Hong Kong in 2019 under the supervision of Professor Max Q.-H. Meng, Member of the Canadian Academy of Engineering. From 2019 to 2023, he has been a postdoctoral research fellow at The Chinese University of Hong Kong and University College London. Currently he is a Full Professor and Doctoral Supervisor at Shandong University, a recipient of the National Natural Science Fund for Excellent Young Scientists Fund Program (Overseas), an Outstanding Young Scholar (Tier One) at Shandong University, and an Honorary Lecturer at University College London. His main research focuses on surgical robotics and artificial intelligence, with over 90 academic papers published. He currently leads several research projects including the National Overseas Excellent Young Scientists Fund and the National Natural Science Foundation of China (NSFC) Youth Program. Prof. Min has been very active in professional activities. Prof. Min now serves as an NSFC peer review expert, an Associate Editor for *IEEE Transactions on Automation Science and Engineering* and *IEEE Robotics and Automation Letters*, an Academic Editor for *Biomimetic Intelligence and Robotics*, and a Youth Editorial Board Member for journals such as *Robot*, *SmartBot*, and *Robot Learning*.

***** ALL ARE WELCOME *****

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