Research topics for graduate students for 2025

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Acceptable course(s)

- Master's Degree
- Doctoral Degree

Research Topics

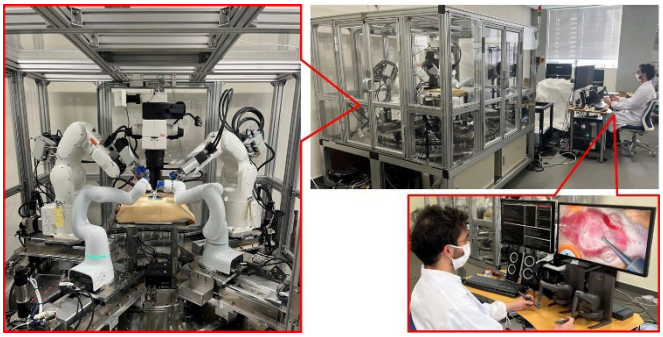
The research topics include medical robots for assisting with neurosurgery, pediatric surgery, eye surgery and pathological tasks, surgical skill assessment, VR simulators, and robots for autonomous scientific experiments.

1. Surgical robots

We have been developing a surgical robotic system that can be used for several applications. The figure shows a surgical robotic system named SmartArm that is demonstrating robotic endonasal suturing of a dura mater model [1]. The same robotic system is applicable to pediatric surgery [2] and eye surgery [3]. We have also been developing VR simulators and image processing technologies to partially automate robotic tasks.

2. Robot for autonomous scientific experiments

A new robotic platform is being developed to study the automation of scientific experiments. Automation of dexterous manipulation of samples that are small, deformable and fragile is a key technology for future robotic technology as well as future robotic surgery. The robotic system can be tele-operated, and human manipulation skills will be collected by tele-operational demonstrations and studied to extract manipulation skills.



Articles Related to Research Topics

[1] MM. Marinho, et al. " SmartArm: Integration and Validation of a Versatile Surgical Robotic System for Constrained Workspaces", IJMRCAS, 16:e2053, 2020. DOI: 10.1002/rcs.2053

[2] MM Marinho, et al. "SmartArm: Suturing Feasibility of a Surgical Robotic System on a Neonatal Chest Model", IEEE TMRB, 3(1):253–256, 2021. (Short paper) DOI: 10.1109/TMRB.2021.3049878

[3] Y. Koyama, et al, "Autonomous Coordinated Control of the Light Guide for Positioning in Vitreoretinal Surgery," IEEE TMRB, 4(1): 156-171, 2022. DOI: 10.1109/TMRB.2022.3147033.

Lab. Web page: https://sites.google.com/g.ecc.u-tokyo.ac.jp/cdbim-medical-devices