

Automation of Grasping and Holding Tasks in Laparoscopic Surgery

We are looking for an assistant in the Koala-Grasp project.

HiWi
Student Assistant

Context

The goal of the project is the development of a robotic assistance system by which grasping and holding tasks in minimally invasive soft tissue surgery - using the example of laparoscopic gallbladder removal - can be learned and autonomously performed in a force-adapted and context-sensitive manner. To achieve this goal, a mechatronic interface for the recording of different laparoscopic instruments (grasper, electric hook, etc.) will be developed, with which force and torque data of laparoscopic instruments will be collected locally during robot-assisted soft tissue surgery. Based on these data, the robotic assistant will learn the grasping, trajectory and manipulation planning to support during situation-adapted surgery.

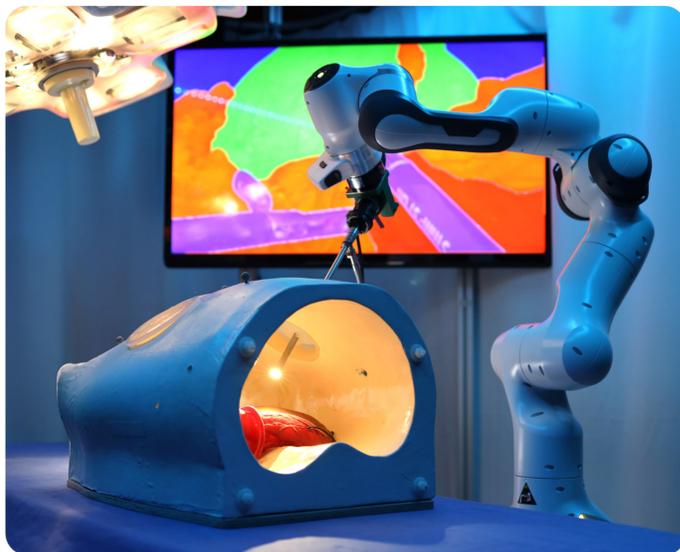


Figure source: Laparoscopic phantom with an endoscope attached to a Franka Emika Panda for robotic manipulation.

Objective

The goal of the project is to develop new approaches for the planning and execution of grasping and holding tasks during cholecystectomy using machine learning methods. The project aims at semantically segmenting the endoscope image to represent information on a higher level of abstraction. Based on this, the grasping task will be automated.

Task Summary

- Implementation of a framework for the integration of all methods within the project
- Integration of the mechatronic interface
- Implementation of a simulation environment of the cholecystectomy in SOFA or Unity 3D
- Support of experiments for the measurement of forces in ex-vivo porcine liver experiments

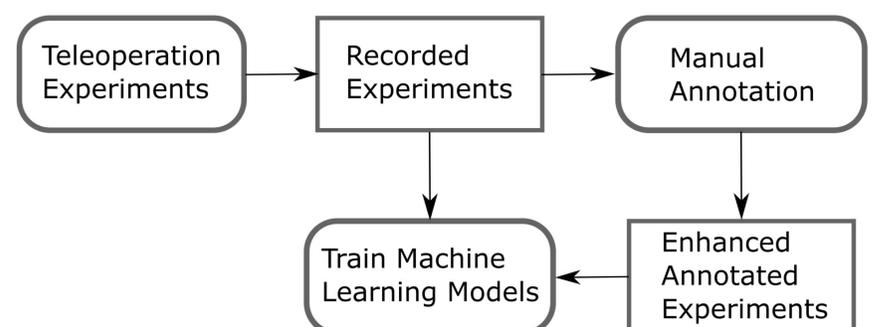


Figure source: Data acquisition for training of machine learning models.

Required Skills

- Very good programming skills (C++, C, Python)
- Autonomous way of working
- Very good English skills

Contact

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