

Development of a Laparoscopic Phantom and Test Bench Support

HiWi
Student Assistant

Context

In order to enhance the possibilities of researching robotic laparoscopic surgery a medical phantom shall be developed. The phantom will be used in the Project RomEo - Robotik mit Emotionsbasiertem Reinforcement Learning - to perform laparoscopic surgery tasks while the brain activity of the operator is measured. The goal is to measure task performance by interpreting the operators subjective feelings visible in the brain activity (frustration, anger, happiness, ...).

The phantom shall give feedback about the task performance. The feedback will be used to compare objective measurements to brain activity measurements and to induce brain activity by giving feedback to the operator.

Objective

For this purpose, HERA is evolving a test bench which simulates the torso of a human body. The basic design will be similar to Fig. 1. The phantom will have touch sensors as inputs and led lights as feedback. The sensors and lights will be controlled with a Raspberry Pi.

The test bench will be used for trials in the RomEo Project. A laparoscopic instrument will be manipulated to touch the sensors. In the beginning the instrument will be manipulated by hand. Later the instrument shall be manipulated by telemanipulation utilizing a Franka Emika Panda.

The Task of this HiWi Placement is to implement the sensor and light system for the phantom and the utilization of the test bench. The utilization includes creating video material and supervising the test bench during trials.

In a later stage the HiWi Placement can be enhanced to include the Franka Emika Panda in the testbench.

Task Summary

- Implementation of sensors and led lights in the phantom utilizing a raspberry pi.
- Creation of video material for early evaluation.
- Support of the test bench during trials.
- Optional: Integration of the Franke Emika Panda in the testbench.

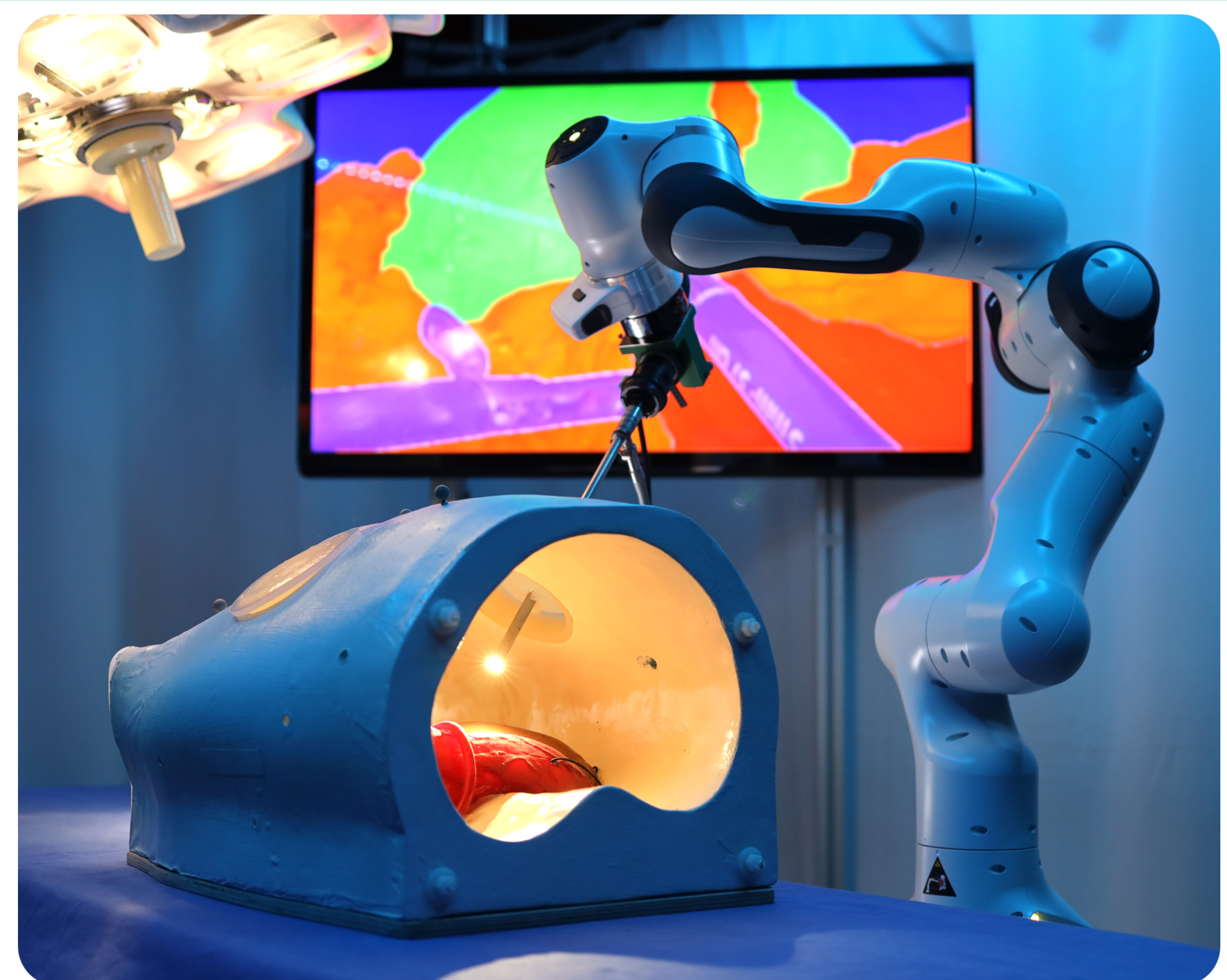


Figure 1: Laparoscopic phantom with an endoscope attached to a Franka Emika Panda for robotic manipulation.

Required Skills

- Knowledge in the use of a Raspberry Pi and its interfaces.
- Optional: Knowledge in the use of ROS.
- Autonomous way of working.

Contact

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