University of Basel
Department of
Biomedical Engineering

BIROMED-Lab
Medical Robotics and Mechatronics

Master Thesis:
Plug & p...erform surgery – design of a mechanical interface to safely detach a tendon-driven robotic endoscope

Context: In recent years, surgeries have been performed with a trend towards minimally invasive procedures, where the size and number of skin incisions are kept to a minimum. Advantages of minimally invasive surgeries include the reduction of tissue stress, postoperative pain and a faster healing process. However, for the surgeon, manual handling of instruments through a small incision is difficult and robots can help to perform these interventions faster and with greater precision. Within the MIRACLE project, we are working on equipping a surgical robot with a dexterous, snake-like tool called an articulated endoscope, which allows the automation of certain surgical tasks inside the body. The movement of this articulated endoscope is transmitted via tendons from externally placed motors. For reasons of safety and sterilizability, the endoscope needs to be detachable from the motors.
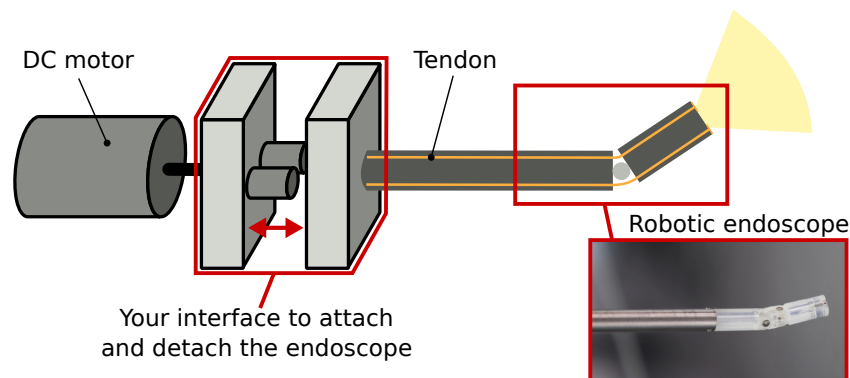
Task description: In this project, you will develop a "plug & play" interface that allows the surgeon to safely attach and detach the endoscope from the motors. This includes the following work packages:

- Basic Research: Literature research is conducted on existing interface principles. In discussions with clinicians, requirements are identified with a special regard to safety.

- Concept development and implementation: Based on the literature research and own ideas, different concepts of such an interface are developed. The most promising concept is designed and manufactured.

- Testing, evaluation and characterization of the system with respect to the requirements.

Student: Philipp Butschle
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Duration: 6 months

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