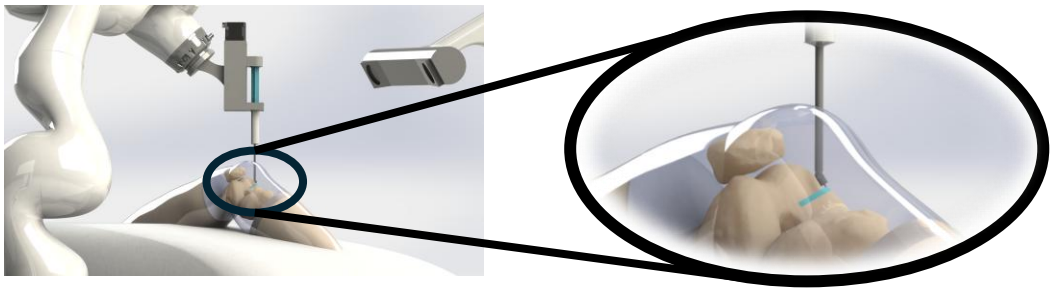
Master Thesis + Semester Project – Development of an endoscopic 3DP system

BIROMED-Lab and Swiss MAM Research group
Department of Biomedical Engineering

Join us for an exciting interdisciplinary project to revolutionize the way implants are created.



Project Background

In recent years, the concept of *in situ* (bio)printing has been proposed, comprising the fabrication of the implant directly on the patient. This approach promises improved implant integration, wound healing, and intraoperative adaptation to changes in the surgical planning and wound morphology. Multiple advantages arise from a minimally-invasive approach, such as reduced damage to surrounding tissues or lower risk of infection. However, the insertion of a tool inside the body limits the range of motion of the dispensing system, impacting the quality of the printed construct. Additional joints beyond the insertion point, i.e., inside the body, are envisioned as an effective mechanism to cope with these constraints.

Task Description

This project focuses on the development and validation of a two-degree-of-freedom endoscope to perform minimally-invasive 3D printing for knee surgery. During the semester project, you will build the robotic device; during the master thesis, you will evaluate the motional accuracy of the endoscope with the material transfer tube. Your tasks will include:

- Based on existing literature and existing technologies in the lab, design and build the endoscopic system with a material transfer tube
- Implement the kinematic control of the endoscopic system
- Evaluate the motion accuracy using optical tracking elements

Start date: flexible and upon agreement. You will work at the DBE located in the SIP Basel Area campus in Allschwil.

Your profile:

- You are pursuing a master's degree in biomedical engineering, mechanical engineering, or a related discipline
- You have fundamental knowledge of robotics and mechatronics
- Experience with Arduino, TwinCAT, or MATLAB and Simulink are advantageous
- You are curious, motivated and self-driven

Apply to this project by e-mail (ruben.martinrodriguez@unibas.ch) with the following materials:

- CV
- Diplomas and Course Transcripts

Want to know more about us? check out www.dbe.biromed.unibas.ch or plan a lab visit.

BIROMED-Lab

University of Basel Department of Biomedical Engineering