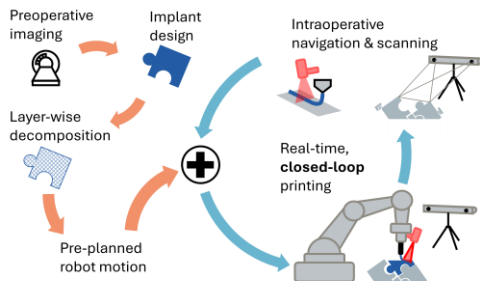# Master Thesis Project –
Patient motion compensation for *in situ* printing

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

Join us for an exciting international project to <u>revolutionize the way implants are created</u>.

Project Background

In recent years, the concept of *in situ* (bio)printing, comprising the fabrication of the implant directly on the patient, has been proposed. This approach promises improved implant integration, wound healing, and intraoperative adaptation to changes in the surgical planning and wound morphology. While performing the implant fabrication, however, small movements of the patient can occur due to tremors or breathing, which can impact the quality of the implant, or even cause damage to the patient.

Start date: flexible and upon agreement. During the first half of the project, you will work at the DBE located in the <u>SIP Basel Area</u> campus in Allschwil. Then, you have the opportunity to further develop and test your solution at the Leibniz Institute for Interactive Materials of <u>RWTH-Aachen</u> as part of a collaboration with the <u>TriggerInk</u> project.

Task Description

This master thesis project focuses on the development of algorithms to compensate for the motion of the patient while performing the material extrusion process. The main objective is to obtain a constant linear velocity onto the wound using a robotic arm, while accounting for the motions of the printing substrate. Your tasks will include:
*   Based on existing literature, defining the characteristics of the motions to be compensated
*   Implement different state estimation and motion prediction strategies and integrate them in the control of the printing robot
*   Evaluate the performance of the proposed approach(es)

Your profile:

*   You are pursuing a master's degree in biomedical engineering, mechanical engineering, or a related discipline
*   You have fundamental knowledge of state estimation and prediction, as well as robot control
*   You are curious, motivated and self-driven
*   Experience with Matlab & Simulink is advantageous

Apply to this project by e-mail (<u>ruben.martinrodriguez@unibas.ch</u>) with the following materials:
*   CV
*   Diplomas and Course Transcripts

🤖 **Want to know more about us?** check out <u>www.dbe.biromed.unibas.ch</u> or <u>plan a lab visit</u>.

BIROMED-Lab

University of Basel   Department of Biomedical Engineering