



# Open Master Thesis Project

Miniature milling mechanism for an intraoral robot

BIROMED-Lab

Department of Biomedical Engineering

The Bio-Inspired RObots for MEDicine-Laboratory (BIROMED-Lab) at the Department of Biomedical Engineering (DBE) at the University of Basel offers an exciting, multidisciplinary, and applied learning- and research environment. Our research is interdisciplinary and organized in close collaboration with clinicians and industrial partners.

## Project background:

You will join the BIROMED-Lab performing medical robotics and mechatronics research under the lead of Prof. Dr. Georg Rauter. You will be part of the team for the project **Miniature Intraoral Robot (MIR) Performing Minimal-invasive, Personalized and Precision Dentistry**. In this project we aim to develop a robotic device for tooth preparation enabling a fully digital treatment workflow based on an innovative technology previously developed at the BIROMED-Lab.

## Project description:

You will develop a **miniature milling mechanism** that allows high-speed revolution (200K-450K rpm) of a milling tool. The main challenge will be to design this mechanism respecting the size restrictions while achieving a high milling torque. To ensure that the mechanism you develop will fit into the overall robotic device being developed, you will collaborate closely with the other project members and be part of a bigger team working on this robotic device. Your tasks will include:

- Analyzing the requirements for this milling mechanism
- Conduct research to identify feasible mechanisms and actuation principles
- Select the most promising principles and design a prototype of the milling mechanism
- Production and commissioning of the prototype
- Evaluate the performance of the developed prototype according to the specified requirements

Start date: November 2023 or upon agreement. You will work at the DBE located in the new SIP Basel Area main campus, an exciting and modern working environment in which various research groups of the DBE are located.

## Your profile:

- You are pursuing a master's degree in mechanical engineering or a closely related discipline
- You have solid basics in mechanics
- You have experience in mechatronics
- You are a hands-on person who likes to work with hardware
- You are curious, motivated and self-driven
- You want to work in and contribute to an interdisciplinary and applied research environment

## Ready to revolutionize dentistry? We are.

Apply for this project by email sending us ([yukiko.tomooka@unibas.ch](mailto:yukiko.tomooka@unibas.ch)) the following materials:

- CV
- diplomas and course transcripts

 **Want to know more about us?** check out [www.dbe.biromed.unibas.ch](http://www.dbe.biromed.unibas.ch) and contact us for a lab visit.



Department of  
Biomedical Engineering