



# Open Bachelor/Master Thesis Project

Miniature robot control for minimally invasive tooth preparation

BIROMED-Lab, DBE, University of Basel

IM<sup>2</sup>, Fachhochschule Nordwestschweiz

CAMLOG Biotechnologies GmbH

## Project background:

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. This project is interdisciplinary and organized in close collaboration with clinicians and industrial partners.

## Project description:

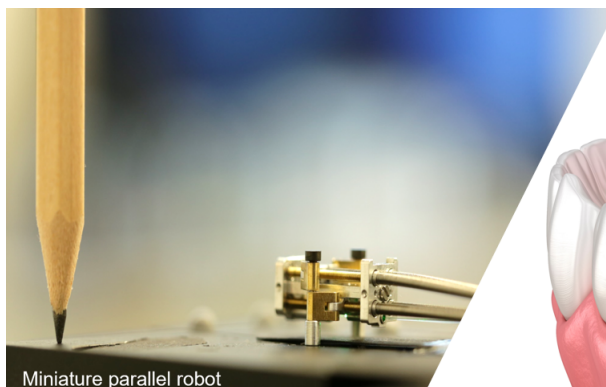
Your task would be **miniature robot milling trajectory planning and trajectory tracking control implementation** for tooth preparation. This thesis aims to actuate a miniature parallel robot that has four degrees of freedom (three translational and one rotational) to perform milling along defined paths for tooth preparation. One of the challenges is to plan smooth, feasible trajectories and desired robot poses that avoid singularities for the miniature robot with a parallel mechanism.

Your tasks will include:

- Analyzing the requirements for milling trajectories for tooth preparation and control strategies
- Conducting literature research on existing trajectories planning and control strategies
- Selection of the most promising trajectories planning and tracking control strategies
- Trajectories generation and implementation of miniature robot trajectory tracking control
- Evaluation of the performance according to the specified requirements

**Start date:** 2024 Summer 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.



Miniature parallel robot



**Ready to revolutionize dentistry? We are.**

Apply for this project by email sending us ([yukiko.tomooka@unibas.ch](mailto:yukiko.tomooka@unibas.ch)) your CV, diplomas, and course transcripts.

## Group Leaders

BIROMED-Lab, DBE, University of Basel: Georg Rauter

Fachhochschule Nordwestschweiz: Daniel Seiler

CAMLOG Biotechnologies GmbH: Raphael Mohler