University of Basel

Department of
Biomedical Engineering

University of Basel, Department of Biomedical Engineering, Hegenheimermattweg 167c, 4123 Allschwil

Master of Science – Biomedical Engineering
Thesis Proposal

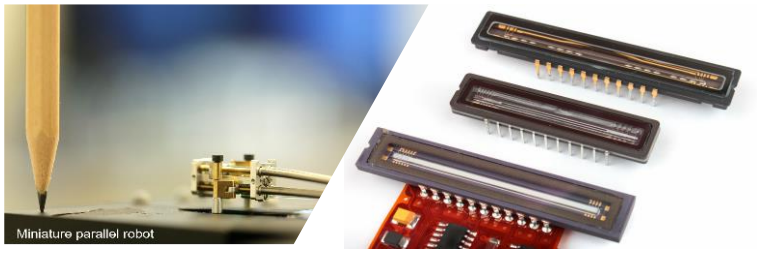
Miniature absolute position sensor for a miniature robot

You will be part of the team for the project Miniature Intraoral Robot (MIR) Performing Minimal-invasive, Personalized and Precision Dentistry at the BIROMED-Lab under the lead of Prof. Dr. Georg Rauter. In the MIR project, we are developing a miniature robotic device for tooth preparation enabling a fully digital treatment workflow. This project will be co-supervised by Prof. Dr. Manuela Eugster at the University of Bern and in close collaboration with clinicians and industrial partners.
Your main task will be the first realization and evaluation of our patent-filed absolute position sensing concept using a linear image sensor. The sensor will be used to measure the motion of a prismatic actuator on the miniature robot. The main challenge will be to design this sensing unit to fit into the small space of the miniature robot and provide sufficient accuracy.

Your tasks will include:

- Analysing the requirements for the miniature absolute position sensing unit
- Conducting literature research required for designing the first sensing unit
- Designing the sensing unit and a measurement setup
- Production and commissioning of the prototype
- Evaluation the performance of the developed prototype according to the specified requirements

Nature of the Thesis
Experimental: 40%
Hardware Design and Programming: 45%
Documentation: 15%



Specific Requirements
You like to work with hardware
Basic knowledge in electronics, mechanics and control

Group Leader / Supervisor
Supervisor: Dr. Murali Krishna Karnam
Group Leader: Prof. Dr. Georg Rauter, University of Basel
BIROMED-Lab: https://dbe.unibas.ch/en/research/laser-and-robotics/bio-inspired-robots-for-medicine-lab/

Co-supervisor: Prof. Dr. Manuela Eugster, University of Bern
Neuro Robotics Group: https://www.artorg.unibe.ch/research/nrg/index_eng.html

Collaborators
Clinic of Reconstructive Dentistry, Center of Dental Medicine, University of Zürich
Camlog Biotechnologies GmbH, Basel

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