University of Basel
Department of Biomedical Engineering

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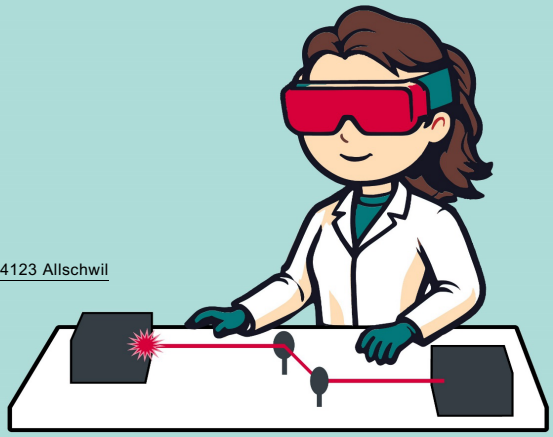

Master of Science – Biomedical Engineering
Thesis Proposal

Optical Tweezers Approach for Particle Sorting:

Optical tweezers are instruments that use a tightly focused laser beam for trapping micro particles. This method enables precise and contactless manipulation over micro particles, making it ideal for biomedical and microfluidic applications. When integrated with a scanning galvo mirror and a microfluidic system, optical tweezers can be used to sort particles based on their apparent properties and intrinsic properties.

This thesis aims to develop a microfluidic-based particle sorting system utilizing optical tweezers and a scanning galvo mirror. The system will enable controlled manipulation and separation of microscopic particles in a microfluidic environment, providing a scalable approach for applications in biomedical engineering, diagnostics, and lab-on-a-chip technologies. The following steps describe the thesis:

- Conducting a literature review on optical tweezers and microfluidics in particle sorting.
- Developing a real-time control system for the galvo mirror to enable precise movement and sorting of particles.
- Performing experimental validation using various particle types to assess sorting efficiency.
- Documenting the results and analyzing system performance for future optimization.

Nature of the Thesis
Experimental: 50%
Programming: 30%
Documentation: 20%

Specific Requirements

Background in Physics and Optics. Experience in working with optical systems. Familiarity with MATLAB or Python for data processing and automation. Knowledge of microfluidic systems is advantageous.

Supervisor
Dr. Ferda Canbaz (Head of Center for Intelligent Optics)

https://dbe.unibas.ch/en/research/center-for-intelligent-optics/

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