Gisela and Erwin Sick Chair of Micro-Optics

Prof. Hans Zappe

Research Area
Optical Microsystems

Relevant Tasks
- ☒ Optical experiments
- ☒ Test setup development
- ☒ Device characterization
- ☐ Material characterization
- ☐ Optical simulations
- ☒ FEA simulations
- ☐ Clean room fabrication
- ☒ CAD/CAM
- ☐ Polymer fabrication
- ☐ Programming
- ☐ Analytical analysis / Theory
- ☒ Literature research
- ☐ Teaching

Eligible Departments
- ☒ Microsystems technology
- ☒ Mechanical engineering
- ☒ Process engineering
- ☐ Chemistry
- ☒ Physics
- ☐ Electronics and IT
- ☐ Computer science
- ☐ Industrial engineering

Requirements
Ability to work independently

Basic CAD/CAM skills
Basic FEA knowledge

Starting Date
Immediately

Contact Person
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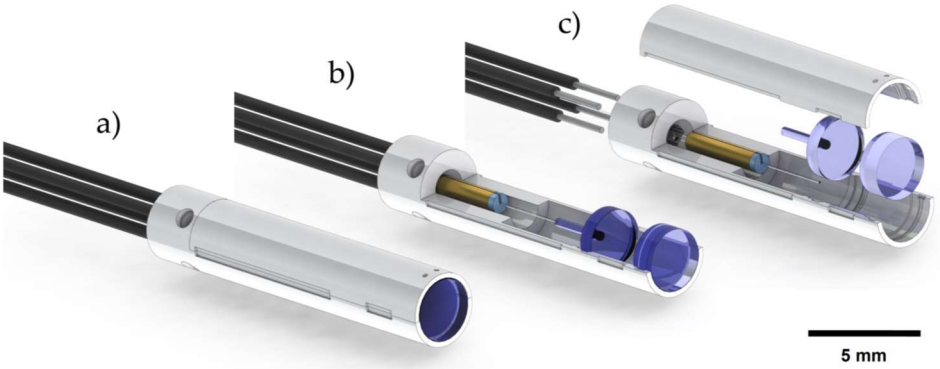
Master's Thesis

Integrated Fiber Scanner for Multimodal Endomicroscopy

Optical biopsy is a term encompassing a rich family of microscopy techniques that use various properties of light to enable *in situ* diagnosis during an endoscopy procedure, which is currently possible only through histological analysis. Since the inspection of internal organs rely almost exclusively on endoscopic instruments, ultra-miniaturized, robust, and accurate scanning methods delivering high-resolution and wide field-of-view are essential components for their endoscopic implementations. In this project, we aim to develop a completely new fiber scanning scheme that will be seamlessly integrated into our current endomicroscopy technology.



We currently use tubular piezoelectric actuators (depicted in yellow/gold above) for laser scanning in endoscopes, which are manually assembled into 3D micro-printed glass housings. In addition to the painstaking assembly process, their dynamic behaviour is also difficult to control. In this project, we aim to develop a new type of actuator that can be 3D printed alongside the glass housing (depicted in grey), which would drastically improve the scanning performance and the yield of our advanced endomicroscopy instruments.

Here is what is expected from the prospective student:

- FEA simulations to explore the performance of integrated magnetic actuators for two-dimensional laser scanning,
- Realization of a proof-of-principle demonstrator through 3D microstructuring of glass with the help of the endomicroscopy team of our chair,
- Documentation of the optomechanical performance of the demonstrator through extensive characterization.

If you are interested in further information, please contact Dr. Çağlar Ataman.

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