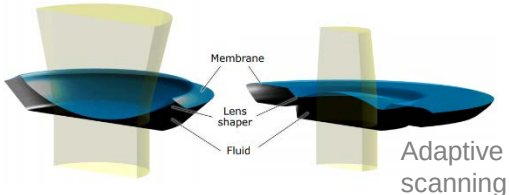
Studienarbeit / Diploma- / Master thesis

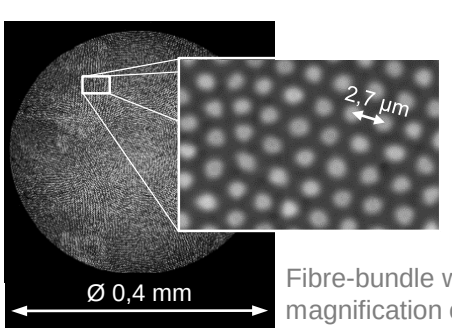
Adaptive endoscopes: fast axial scanning employing an adaptive lens

Motivation

Endoskopes are a well-established and crucial tool for inventions in the human body in medicine and research, as they allow for minimally invasive operations. At the chair of measurement and sensor system technique, we target our research towards the next generation of endoscopes on the basis of coherent fibre bundles: A lens-less approach is a key requirement for these endoscopes, because the diameter of the endoscope is currently the main limiting factor.
In the scope of this thesis, an adaptive lens should be included in an existing endoscope for axial scanning. Lateral scanning is already implemented on the basis of Galvo-scanners.



Adaptive lens for axial scanning (optotune)



Fibre-bundle with magnification of fibre cores,

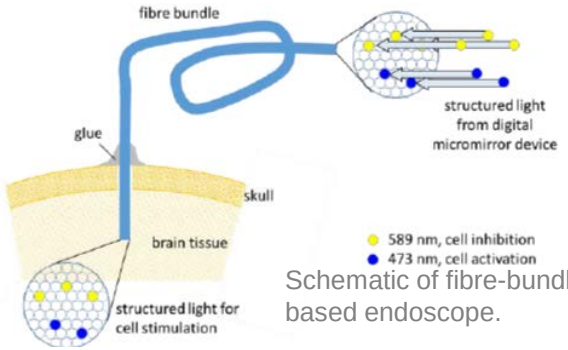
Possible Tasks

- Fluorescence measurements
- Three-dimensional scanning employing an adaptive lens
- Signal processing and control of adaptive Lens using MATLAB

The tasks can be adapted to your specific skills and interests.

Keywords

- Fibre bundle, adaptive lenses, computational optics, MATLAB



Schematic of fibre-bundle-based endoscope.

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