

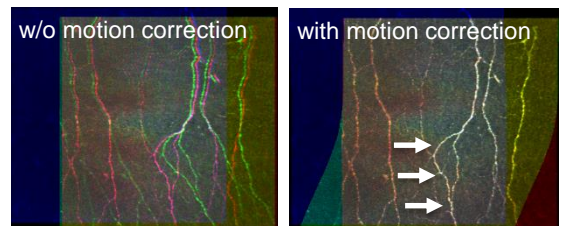
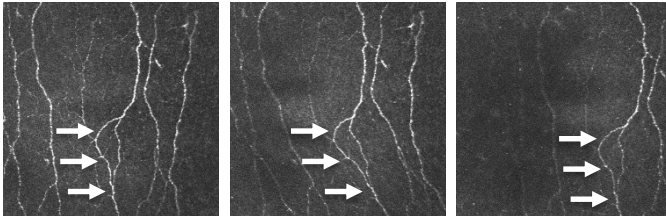


**Earliest start:  
09.01.2023**

## Bachelor's Thesis / Master's Thesis

# Development of software for the simulation of stochastic eye movements

In vivo confocal microscopy enables the imaging, visualization and morphological characterization of the cellular structures of the cornea and thus has enormous potential for the diagnosis of diseases of the ocular surface. However, unconscious, involuntary eye movements (microsaccades, drift, tremor) during the imaging process lead to motion artifacts in the image data and can impair their further processing and evaluation. For the evaluation of algorithms for the correction of these image artifacts, a phantom eye with computer-based motion control is to be set up, with which eye movements can be simulated experimentally. The task of this bachelor's or master's thesis is to develop and implement a method which generates realistic stochastic motion trajectories for the phantom eye.



### Tasks:

- Literature review on the state of research
- Analysis of stochastic movement patterns in existing image datasets
- Development of a concept for the generation of stochastic movement patterns
- Implementation of a software framework for the simulation of involuntary eye movements

### Education, Experience, and Skills:

- Motivation to familiarize yourself independently with a practical subject area
- Programming skills required (preferably in Python or Matlab)
- Knowledge in the field of machine learning methods desirable

**Die Abschlussarbeit kann auch in deutscher Sprache verfasst werden.**

Stephan Allgeier  
Machine Learning for Time Series and Images (ML4TIME)

E-mail: [stephan.allgeier@kit.edu](mailto:stephan.allgeier@kit.edu)

Institute for Automation und Applied Informatics (IAI)  
Karlsruhe Institute of Technology, Campus North  
Hermann-von-Helmholtz-Platz 1  
76344 Eggenstein-Leopoldshafen