

Master of Science – Biomedical Engineering

Thesis Proposal

Flow Measurements with Optical Coherence Tomography

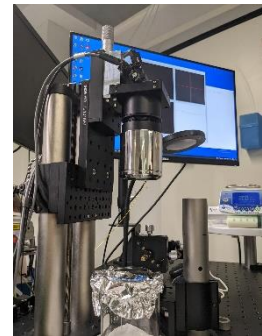
Context

Optical coherence tomography (OCT) has created unprecedented imaging possibilities for the retina during the last three decades. Within this period, the precision of OCT has been enhanced considerably, and its scope has extended with the development of OCT angiography, enabling not only the visualisation of retinal tissue but also the retinal vasculature. OCT angiography is currently used to evaluate retinal vascular diseases such as diabetic retinopathy or disorders of the optic nerve head. However, OCT angiography does not have the capability to measure the blood flow rate.

Task Description

The aim of this master's thesis is to perform and analyse flow measurements in a phantom flow model. A method to investigate flow speed of liquids shall be investigated on continuous acquisitions using the developed OCT system. The following steps describe the thesis:

- Conducting literature review on existing flow measurement using OCT
- Optimising the phantom for flow measurements
- Processing the acquired OCT images to measure the flow rate



Benefits

This master's thesis offers the opportunity to work on a translational project by working on the setup in an OCT research lab and evaluating the generated images. Further, insights into current clinical applications of OCT imaging can be gained. A laser speckle-based measurement of flow speed could generate novel opportunities to quantify blood flow in a clinical setting.

Nature of the Thesis

Experimental: 40%

Programming: 40%

Documentation: 20%

Specific Requirements

Experience with MATLAB, Python, and signal processing

Prior knowledge in working with optical setups is a plus but not strictly required

Supervision

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