BSc/MSc-project for students in Biomedical Engineering, DTU/KU

Title: Pulse wave velocity estimation of blood flow in the carotid artery

Description: Atherosclerosis is a leading cause of vascular disease worldwide. Its major clinical manifestations include ischemic heart disease, ischemic stroke, and peripheral arterial disease. Atherosclerosis is the built up of fatty streaks into the arterial wall, which eventually can develop in to plaques occluding the arterial flow and causing thromboembolic events. As atherosclerosis progresses, the vessel wall becomes stiffened with increasing pulse velocity of the systolic flow pulse.

The purpose of this project is to investigate how the pulse wave velocity of the systolic flow can be estimated with ultrasound techniques such as plane wave imaging or synthetic aperture imaging. The data contain ten volunteers who have been scanned over the carotid artery. By estimating the pulse wave velocity from data sets of these volunteers, the method can be established, and normal values of the pulse wave velocity can be assessed. So, the core task in the project is to develop the estimation algorithm for the pulse wave velocity in the carotid artery and apply it on ten healthy volunteers. The outcome of this project will a stepping stone for a larger clinical trial to correlate atherosclerosis and pulse wave velocity. The project can also pave the way for the development of a new clinical method to detect and assess atherosclerosis.

Required qualifications: This project includes elements of signal processing and medical imaging analysis. The student(s) should have experience with Matlab. The course 31545 Medical Imaging Systems can be an advantage.

Responsible institution: DTU Elektro and Dept. of Diagnostic Radiology, Rigshospitalet

Contact information: Marie Sand Traberg, Assoc. Professor, mesne@dtu.dk

Allowed no of students per report: 1-2

KU supervisor: MD Kristoffer Lindskov Hansen (Dept. of Diagnostic Radiology, Rigshospitalet)

DTU supervisor: Marie Sand Traberg, Matthias Bo Stuart