



## Project Management and Software Development for Medical Applications

### General Info

Project Title: **Multi-Modal Quantification of Atherosclerosis in Coronary Artery**

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### Project Abstract

The goal in this project is to employ multi-modal non- and minimally-invasive intra-coronary imaging data and quantify the extend of atherosclerotic disease. To achieve this goal, classical registration, segmentation, visualization techniques will be used.

### Background and Motivation

Often non-invasive imaging modality such as CTA is performed pre-operatively on patients diagnosed with potential atherosclerotic disease. In case of severe stenoses, the patient goes under percutaneous coronary intervention (PCI) procedure and during catheterization, minimally-invasive intra-coronary imaging data (i.e. IVUS, OCT) could be collected supplemented with routine non-invasive X-ray angiogram.

The aim in this project is to optimally take advantage of available data and provide interventionalist with diagnostically informative imaging features. To this end, classical, if not novel, image processing techniques are employed for multi-modal registration, segmentation, fusion, and ultimately visualization under an integrated platform.

### Student's Tasks Description

The candidate shall familiarize himself with each imaging modality and acquisition specification. Subsequently, the primary task is to take use of and tailor already developed algorithms to perform multi-modal registration or fusion (i.e. CT/IVUS), segmentation (i.e. vessel tree from CT data), and visualization. The project(s) is defined for a team of 2-3 students and ultimately assigned based on interest and background of each candidate.

### Technical Prerequisites

Desired applicant must have backgrounds in signal processing as well as medical image analysis. He/She should capable of adopting developed algorithms to problem of interest. Perhaps, incremental development and novelty is encouraged. Knowledge of C++ is mandatory.

### Administrative Info

Working Time: total 300 hours

Project Location: Chair for Computer Aided Medical Procedures in Garching

Required Equipments: None

### Timeline and Milestones

Week 1: Collecting information regarding each imaging modality and data acquisition specification.

Week 2: Literature review

Week 3-5: Learning the existing algorithms and available codes.

Week 6-12: development of codes for the problems of interest

Week 13-16 Evaluation