



Master Thesis:

Development of a watchOS app for measuring surgical skills during training

Description:

The outcome of surgical procedures depends on eye-hand coordination and confidence acquired through skilled training. However, objective assessment of surgeons' dexterity and training level is difficult to quantify. A key factor during surgical procedures is dexterity and smooth movements. With recent advances in wearable sensors, new possibilities for measuring movement during surgical procedures have emerged.

This project aims to develop a watchOS app for the Apple Watch that can measure dexterity during surgical procedures using accelerometer data from the Apple Watch and an algorithm that has already been developed. The app should ultimately offer surgeons the opportunity to provide direct feedback on their dexterity so that they can train independently and improve their dexterity. An existing prototype of the app is to be further developed. Parts of the backend and a large part of the frontend will be the focus of the work. The work will be carried out at the Center for Medical Physics and Biomedical Engineering at the Medical University of Vienna.

Relevant knowledge/experience:

- Very good programming skills
- Experience in the development of watchOS apps (preferably in the course of internships)
- Knowledge of signal processing of IMUs (accelerometer, gyroscope, magnetometer) and the implementation of algorithms
- Independent and precise way of working

How to apply:

Interested candidates are requested to send their CV, certificates and a short description of themselves to **Assoc. Prof. Francesco Moscato** (francesco.moscato@meduniwien.ac.at) and **DI Laurenz Berger** (laurenz.berger@meduniwien.ac.at)

Start date:

August 2024

Suggested literature:

Dodier et al (2024) An evaluation of physical and augmented patient-specific intracranial aneurysm simulators on microsurgical clipping performance and skills: a randomized controlled study. *Neurosurg Focus* 56:1–11. <https://doi.org/10.3171/2023.10.FOCUS23640>

Gauthier-Lafreniere et al (2022) A standardized accelerometry method for characterizing tremor: Application and validation in an ageing population with postural and action tremor. *Front Neuroinform* 16:1–14. <https://doi.org/10.3389/fninf.2022.878279>