

Master Thesis - Job Description- Virtual reality System

Integration and validation of virtual reality workflow with a mixed-reality training simulator

This project is part of a larger ongoing project, collaborating with the ARTORG Image Guided Therapy Group, University Bern, and SurgeonsLab AG. The project aims to develop accurate pre-operative patient brain pathologies to aid neurosurgeons and neuro-interventionists in accurately planning therapies.

The mixed-reality models from the patients are part of the commercially existing neurosurgical simulator. The simulation tool requires integration with a value-added virtual reality device to visualize meager pathologies in the physical world. The proposed thesis will focus on establishing hardware and software integration of the state-of-the-art virtual reality systems with the existing patient image dataset. In addition, the thesis will focus on creating object interactions and deriving clinical significance working with surgeons. The results of the thesis will be finally validated by clinicians and shall be seamlessly integrated into the existing patient-specific case planning simulator that can impact actual patients.

Thesis goals:

- Literature Review, generate, and design VR environment for the proposed microsurgical use case.
- Coupling software architectures with existing workflow-GUI, system implementation, and communication
- Develop suitable task-specific tools required for the particular neurosurgical and interventional procedures: touch-based and virtual buttons
- User-based evaluation of the tool, conducting experiments, implementing real patient datasets, and validating the developed tool with clinicians.

Skillsets:

- Past experiences in OpenCV, virtual reality headsets and libraries, 3D modeling design, navigation control, and validation of precision tools
- Any image segmentation software and CAD tools
- Good programming skills.

Minimum Requirements to Apply:

- Field of Study: Electrical, Biomedical, Computer, Mechanical Engineering, or other related

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1. Letter of Motivation (1-page, font size 10) [Format- About me, Past and Motivation, How I fit for this thesis, and what interests me?]
2. CV (Academic Track Record, Professional Experience)

Start Period: At the earliest possible

Learn More about the simulator: <https://www.surgeonslab.com/product-surgrain/>

Research Group Page: <https://www.artorg.unibe.ch/research/igt>