

High-resolution brain scanner

Type	Master's thesis
Workingtitle	Development of a high-resolution surface scanner for brains

Background:

In the context of high-resolution MRI imaging (approx. 300µm isotropic resolution) of the human and primate brain performed ex vivo post mortem, the prior acquisition of the three-dimensional overall structure of the brain (e.g., using photogrammetry or a 3D scanner) and the individual, tailored coronal slices (1–2 cm thick) is of central importance. This is the only way to ensure reliable re-registration of the tissue sections to the whole brain scan (MRI) after the high-resolution MRI scans and the subsequent histological analyses performed on the slices or sections thereof (e.g., myelin or cell staining on 30–300 µm thick sections).

Tasks

- Identification of suitable high-resolution reconstruction methods for three-dimensional object reconstruction from images (e.g., photogrammetry)
- Comparison of suitable methods in terms of submillimeter accuracy and calculation time
- Development and prototypical implementation of a scanner for the human and primate brain
- Storage of data in a standardized format, e.g., DICOM
- Registration of MRI and scan data, evaluation of registration quality

Requirements

- Degree in engineering, natural sciences, computer science, bioinformatics, or a comparable field of study
- Experience in the field of digital image processing
- Proficient knowledge of software development with a high-level language (C++, Python, or similar)

contac

University of Leipzig
Innovation Center Computer Assisted Surgery (iCCAS)
Sven Martin
E-Mail: sven.martin@medizin.uni-leipzig.de
Web: www.iccas.de