University of Basel
Department of
Biomedical Engineering

University of Basel, Department of Biomedical Engineering, Gewerbestrasse 14, 4123 Allschwil

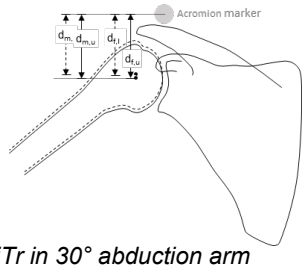
Master of Science – Biomedical Engineering
Thesis Proposal

Automatic registration of anatomical landmarks - Influence of additional weight on load-induced glenohumeral translation in patients with rotator cuff muscle tear

Rupture of the rotator cuff muscle are a common shoulder injury. The primary degree of freedom in the healthy shoulder is rotation. Although subtle translation in the shoulder is clinically observed especially with additional handheld weight, this has not been reported in the literature.
This Master thesis project is part of a larger study funded by the Swiss National Science Foundation, where a team of orthopaedic surgeons, movement scientists and engineers try to elucidate how shoulder motion is influenced by additional load. Patients with injury to shoulder muscles and healthy control persons are assessed with motion capture at the Functional Biomechanics Laboratory and using dynamic fluoroscopy at the Department of Radiology at the University Hospital Basel.
The goal of this master thesis is

- to develop an algorithm based on deep learning to automatically register specific anatomical landmark and track skeletal structures on sequences of fluoroscopy images obtained while the participant moves their arm without and with additional weight to assess rotation and translation of the humerus relative to the scapula and
- to assess the effect of load on glenohumeral translation in patients with rotator cuff muscle tear and in healthy control persons.

Nature of the Thesis
Experimental: 10%
Programming: 70%
Documentation: 20%



IiTr in 30° abduction arm

Specific Requirements
Programming skills and deep learning knowledge

Supervisor
Prof. Dr. Annegret Mündermann, University Hospital Basel, Functional Biomechanics Laboratory, www.unispital-basel.ch/biomechanics

Prof. Dr. Philippe Cattin, University of Basel, Center for medical Image Analysis and Navigation CIAN https://dbe.unibas.ch/en/research/imaging-modelling-diagnosis/center-for-medical-image-analysis-navigation/

Collaborators
Prof. Dr. med. Andreas Müller, Eleonora Croci M.Sc., PhD. Candidate, Dr. phil. Corina Nüesch, Balázs Faludi, M.Sc., PhD Candidate, Carlo Seppi, M.Sc., PhD Candidate

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