
Measuring *in-Vivo* Spine Movement

Master Assignment in
Laboratory of Biomechanical Engineering, University of Twente

Starting date: Immediately

Introduction

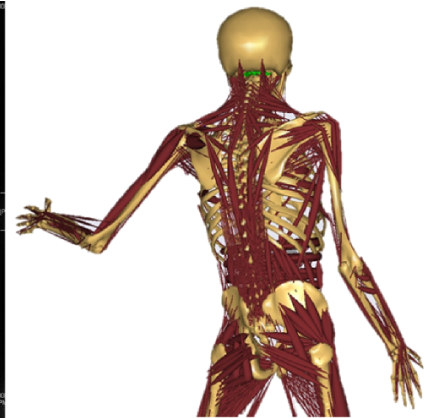
The forces that muscles exert on our bones can not be measured, but they can be estimated by using musculoskeletal models. Based on measured movements, these models can predict what forces the muscles and ligaments must have exerted. Currently, good musculoskeletal models are available for the shoulder, arm and legs. The existing models for the torso are however not nearly as well. The goal of the **Musculoskeletal Modeling of the Spine** project is thus the development of a complete and coherent musculoskeletal model of the human torso.

Assignment

Once the musculoskeletal model of the human torso is complete, it can estimate the forces exerted by muscles and ligaments based on the movements of the bones (vertebrae). The measurement of these movements is, however, not an easy task for the torso. We need to measure the movements of 20+ vertebrae and 20+ ribs. Currently, this is typically done by measuring the pelvis and the ribcage, and simply assuming a certain distribution of the movement over all the vertebrae between these two. In this assignment, therefore, the aim is to measure motions of individual vertebrae for some activities to provide *in-vivo* data for the musculoskeletal model.

Main Goal & Tasks

Evaluate and improve the currently used method of measuring spinal movement.



MRI of Spine and AnyBody Human Model

- i. Evaluate currently available methods of measuring *in-vivo* spine movement.
- ii. Measure true movements of the spine (MRI / x-ray /).
- iii. Improve the currently used method of estimating spinal movement.
- iv. Prepare a paper on the material.

Supervisors & Information

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