

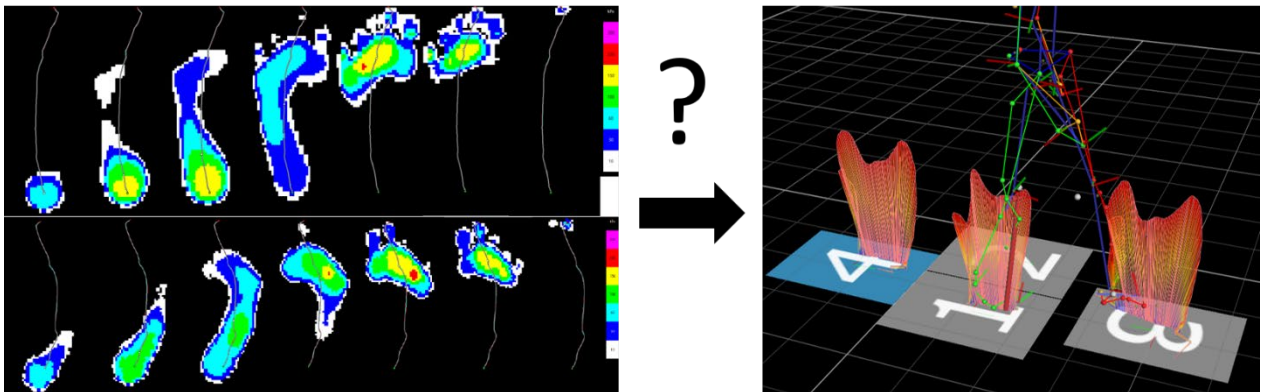
Master of Science – Biomedical Engineering  
Thesis Proposal

**Predicting the ground reaction force from pressure data**

At UKBB, gait analysis is utilised routinely to decide on performing complex surgical procedures. Gait analysis captures the movement of the human body and the force applied to the ground by the feet (the ground reaction force or GRF) during walking. This helps us determine the main musculoskeletal impairments that affect our patients' capacity to walk.

In the gait laboratory, measurement of the GRF is performed with force platforms embedded in the floor. However, we would like to measure the GRF outside of the gait laboratory, corresponding to the daily activities of the patients in a more natural environment. Unfortunately, this is difficult in practice and without this information there is limited clinical value for orthopaedic surgical decision making. It may be feasible to use insoles located inside the shoes to measure the distribution of contact pressure under the foot, and to predict the ground reaction force from the pressure distribution.

The objective of this master thesis is to investigate the feasibility and accuracy of predicting the GRF from pressure distribution.



**Nature of the Thesis**

Experimental: 30%; Programming: 50%; Documentation: 20%

**Specific Requirements**

Good programming skills with Matlab or Python, some experience with motion capture would be a bonus  
Experience with a deep learning framework is desirable, notably if the student wish to focus on this aspect

**Supervisor**

PD Dr. Morgan Sangeux, Scientific and technical leader of the Neuro-Orthopaedics group.  
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**Contact**

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