



Schweizer
Paraplegiker
Forschung

Recherche
suisse pour
paraplégiques

Ricerca
svizzera per
paraplegici

Swiss
Paraplegic
Research

Swiss Paraplegic Research is an affiliate of the Swiss Paraplegic Foundation. The mission of this institute is sustainably improving the situation of people with spinal cord injury (SCI) through clinical and interdisciplinary research on a national and international level. Specific areas of its comprehensive research include functioning, movement and mobility, social integration, equality of opportunity, self-determination, quality of life, health services provision as well as morbidity and mortality. The Shoulder Health Mobility group focusses at Shoulder Health and aims at improvement of Mobility for persons with a SCI, from a biomechanical perspective. For a Master Thesis project, we are currently looking for master students with the following background:

Data science / Biomedical Engineering / Human Movement Science

The project: Development of machine learning methodology for the "Open-Set" classification of shoulder loading activities in wheelchair users, from real life sensor data.

Around 40% of persons with SCI in Switzerland report shoulder pain, and even higher proportions suffer from shoulder pathologies, limiting them in their mobility and participation. Shoulder overuse is seen as a major contributor to such shoulder complaints, however, little is known on the requirements of daily life with respect to shoulder load, and risk factors to overuse. Currently, a proof of concept methodology has been developed for the classification of wheelchair related activities, based on wearable sensor data (www.mdpi.com/1424-8220/22/19/7404).

However, the challenge now is to further develop this approach so it can be applied to real life data. This means the algorithm should be able to classify the list of relevant activities we are interested in, and identify any other activity as "Not of Interest". The most likely solution here is the combination of unsupervised clustering of continuous sensor data, and supervised classification of a subset thereof. But it is up to the master student to find and develop a working solution!!!

Several datasets, collected over the past years, can be used for such validation; the methodology to do so has to be collected, adapted or developed. You will also have the opportunity to participate/support in ongoing measurement at the motion laboratory, and in real life settings. This project will be co-supervised by Dr.-Eng. Diego Paez, Head of Spinal Cord Injury & Artificial Intelligence (SCAI Lab, ETH Zurich) and group leader at Digital Health Care and Rehabilitation, SPF.

Requirements:

- Ready for a master internship in Human Movement Science, Biomedical Engineering or Data science.
- Data science background (machine learning)
- Background in mathematics and signal processing
- Computational skills in Matlab/Python
- Experience or interest in innovative technology (wearable sensors)
- Interest in patient-oriented & applied research
- Proficiency in English, German is a plus
- Independent working attitude as well as ability to work in a team

The successful student candidate will be affiliated to SPF's Shoulder Health and Mobility Group, for a master thesis of 6 months (or meeting your institutional requirements), starting at earliest convenience, or upon agreement.

We offer:

- excellent conditions for innovative and vital research in the context of SCI
- a well equipped biomechanics lab
- stimulating support in a productive working atmosphere
- the opportunity to build up working experience in collaboration with a highly professional team

For further information please contact Dr. Wiebe de Vries at the Shoulder Health & Mobility group, SPF.

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