EMG-based human joint torque estimation for improved ergonomics assessment

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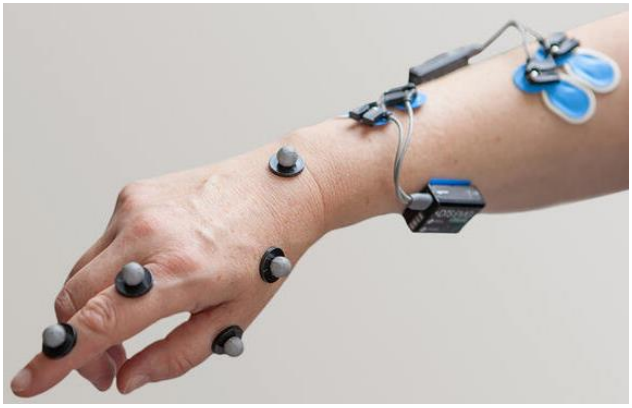
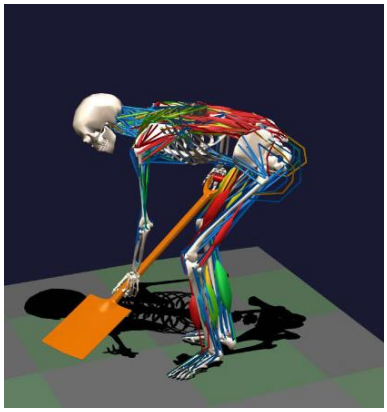
Repetitive heavy manufacturing tasks such as lifting, pushing and pulling parts have an important impact on the human health. These can create high loading in the body joints, especially during non ergonomic posture, and lead to occupational injuries and body pain. Previous methods to identify occupational risks were using periodic interviews of the operator and surveys. The limitations of these approaches are that they are discrete, subjective and/or time consuming.

Realtime monitoring of the human's state at the workplace is, nowadays, possible thanks to the use of various sensors such as IMUs, depth cameras, force plates, EMGs, etc that capture both the human kinematic and dynamic data. This allows to automate the ergonomics assessment and perform a continuous evaluation of the operator's working conditions.





Description MA2 thesis work:

In this project, you will develop in an iterative manner a model of the human body that determines the muscle forces based on the measured EMG signals. The goal is to estimate the body joint torques during load carrying tasks and identify highly loaded body parts. The final objective of this project is to integrate the latter measurements into an ergonomics assessment procedure to better evaluate the risk of injury during specific tasks.

The student will gain experience in:

- Modeling;
- Human experiments;

Requirements:

- Basic programming skills (Matlab, Python or C++)

Number of students: 2
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