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M A S T E R ' S T H E S I S
for
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Advanced Myocontrol for Hand and Wrist Prostheses

Problem description:

In the context of prosthetic control (myocontrol), the aim is to practically let the user (amputee) control a multi-DOF prosthetic hand/wrist. This requires a certain calibration/training process, which need to be shortened as much as possible to ease the daily use of the prosthesis.
Therefore, surface electromyography (sEMG) as well as force myography (FMG) sensors are applied and a strategy called LET (Linearly Enhanced Training) [1] is used. LET works by creating artificial data on top of the data gathered using the aforementioned sensors. This artificial data represents an approximation of combined DOF data based on single DOF data. The goal of this process is to shorten the training time and, at the same time, give the user a better control experience.
So far, multimodal sensing and LET only have worked to a certain extent. The main task is to try and enforce optimizations, techniques and tricks to improve the situation and finally have a working system, at least on intact subjects. If this works well, the system could be tested on amputees, too.

Tasks:

- literature analysis: machine learning, multimodal sensing for myocontrol, LET, user studies, statistical analysis
- getting confident with HW and SW and with the experimental procedure
- studying one or more strategies to improve the current system
- enforcing multimodal learning and optimized LET
- comparing the systems
- online experiment on intact subjects / on amputees

Bibliography:

[1] Markus Nowak and Claudio Castellini. The let procedure for prosthetic myocontrol: Towards multi-dof control using single-dof activations. *PloS one*, 11(9):e0161678, 2016.

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