Myoelectric Videogame Training Functional Outcomes

5.079

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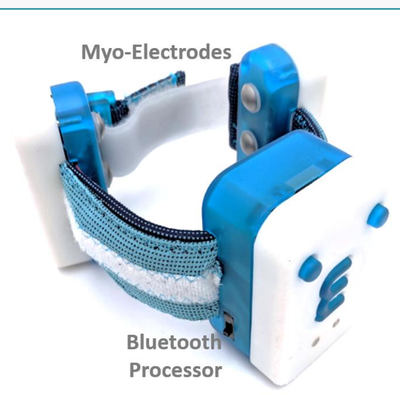
Introduction

- Prosthetic training impacts long-term use and acceptance of the prosthesis [1]. Modern tools for independent training are limited.
- Myo-Electric Gaming Interface (MEGI) was developed to map two-site myo-signals to video games for training.
- Two form-factors: MEGI-Band and MEGI-QD.
- MEGI leverages existing video games by connecting as Bluetooth controller on PC.
- Myo-signals are mapped to curated games for training upper-limb transradial control of hand-wrist prostheses.
- Focus on inducing clinically relevant exercises.



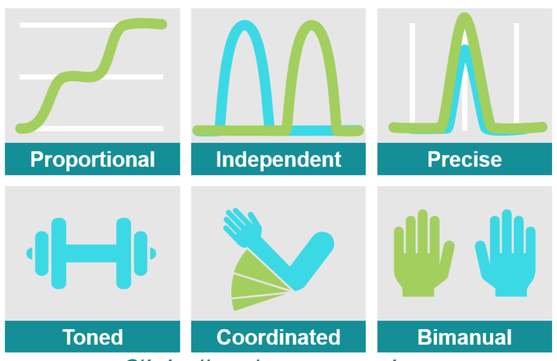
MEGI -Band

MEGI -QD

Myo-Electric Gaming Interface

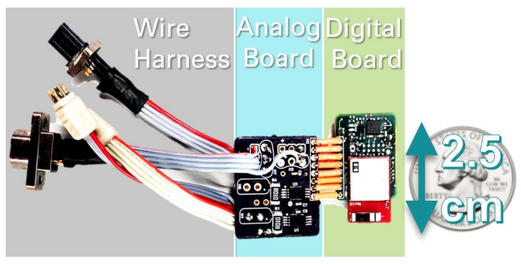
Methodology

- This study measures the functional effects of video game training on myoelectric control signal properties over time.
- Training with racing game which maps wrist flexion and extension signals to proportional steering and co-contraction to speed boost.
- Track levels chosen with even distribution of left/right turns and increasing level of difficulty over time.



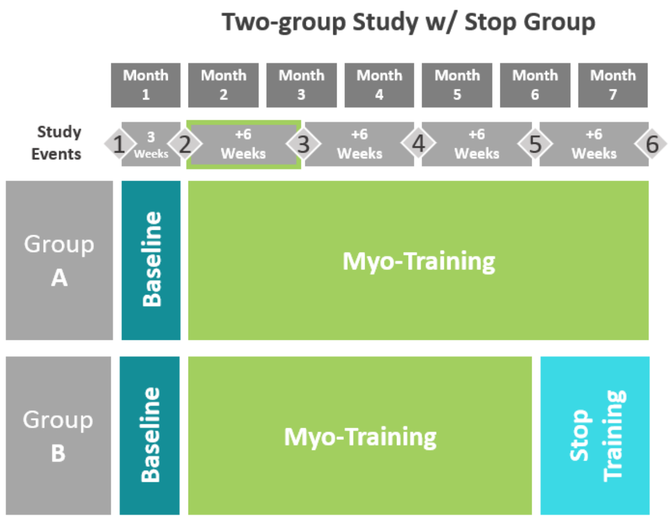
Clinically relevant exercises.

- Baseline measurements in subject (n=1) prosthetic socket with MyoLogger
  - Wear Time
  - On Time
  - Actuation Cycles
  - Myo Signal Amplitude Distribution



MyoLogger Device.

- After a baseline measurement period, training is introduced and tracked in 6-week periods.



#	Study Events
1	• Site Visit • Install MyoLogger • Functional Test Learning Effects
2	• Site Visit • Offload Baseline Data • Introduce Training • Functional Testing + COPM Survey
3-5	• Site Visit • Offload Training Data • Functional Testing + COPM Survey • Group B: Stop Training
6	• Site Visit • Offload Training Data • Functional Testing + COPM Survey • Uninstall MyoLogger

Logged Data
- Prosthesis On-Time
- Prosthesis Use Cycles (per Device)
- Myo Signals Distribution of Speeds

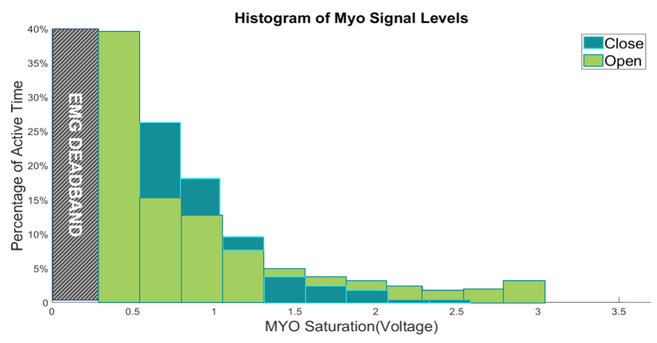
Study design.

- Pilot version of myo-training being conducted with 3 able-bodied subjects.
  - 3 Tracks per Day
  - 3 Days per Week
  - 6 Week Initial Training Period

Results

n = 1

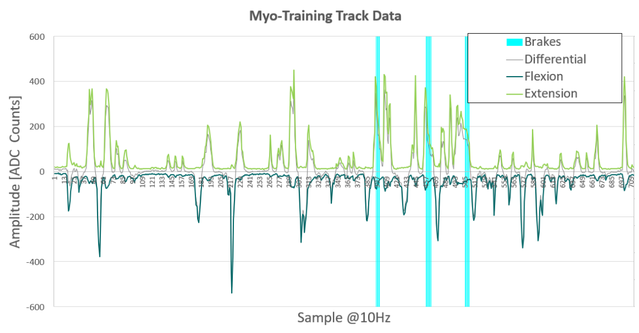
- Baseline prosthesis data shows active transradial prosthesis wearer utilized 67% of the full 0-4.5 V range.



Baseline myo signal usage data. (n=1)

n = 3

- Myo signal characteristics being tracked through an initial 6 week period.
- Signal amplitude measured per track over time.
- Game performance, measured by track time.



Myo-signals during racing course exercise.

Discussion

- Distribution of myo-signal range correlates to the range of speeds the prosthesis is used.
- Initial pilot demonstrates the potential for myo-training to improve signal amplitude distribution from bimodal to more even across the range.
- Conventional outcome metrics will be used to evaluate transference of training to prosthetic use.
  - SHAP
  - COPM
- Study is ongoing with measuring the long-term effect of training on myo signals.

Acknowledgements

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[1] Dawson M, Functional Restoration of Adults and Children w. Upper Extremity Amputation, 2004 p207