

Introduction

- Current myoelectric prosthetic training is dependent on the motivation to learn and time to train at the clinic under direct supervision of a clinician.
- LTI has developed the MyoElectric Game Interface (MEGI) (Figure 1). This device is to help train patients at home through video games.
- We have developed a logging device (Myologger) to ensure we can accurately measure the effectiveness of training over time.



Figure 1- Picture of armband MEGI

Setup

Logging Hardware

- Designed with two key factors (Figure 2):
 - Fit in a limited space
 - Little to no power during operation
- Five inputs were selected:
 - Two EMG sites
 - System and Wrist Current
 - Real time clock

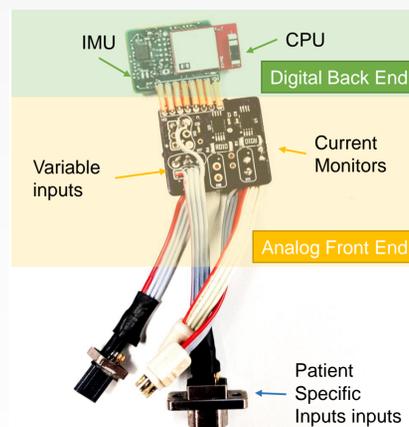


Figure 2 – The MyoLogger module

Logging Data

- The system logs the raw data to allow for data processing later, the five inputs allow us to deduce:
 - Wear time
 - Active use time
 - Number of actuation cycles
 - Distribution of EMG signal amplitude

Methods

- A highly active prosthesis user with transradial limb absence was selected for a six-day long pilot test with the logging device (Figures 3&4).
- Data was recorded throughout everyday wear and usage.
- After the trial the logging device was uninstalled and the data analyzed (Figure 5).



Figure 3 – Opening of the socket

Figure 4 – Scale of device and socket

Results

- The participant indicated no impact to their controls or wear time with the addition of the Myologger.
- The participant stayed mostly in the lower range of their control during active times (Figure 6).

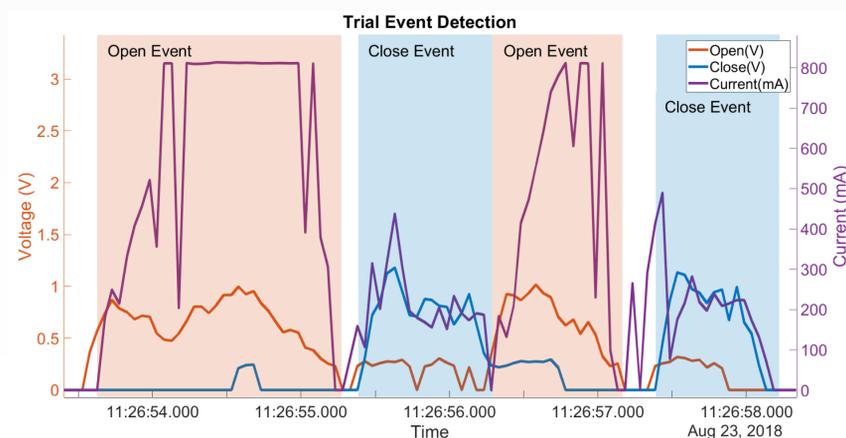


Figure 5 – Sample of activity detection

Results (cont.)

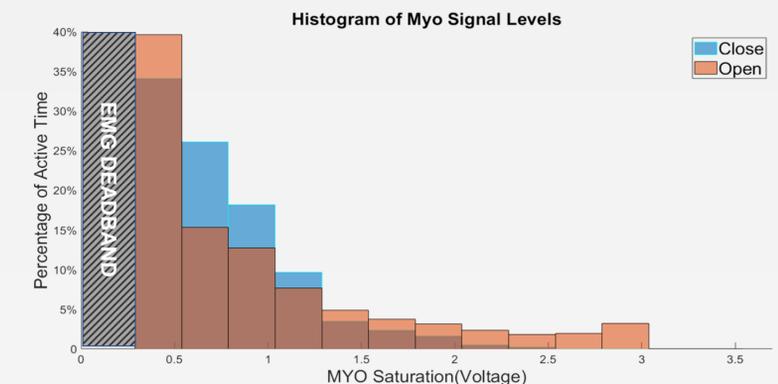


Figure 6 – Percent of time at active voltages

- The prosthesis was worn 48% of the time.
- EMG was active 1.43% of the total wear time.
- We found that the user utilized 67% of the full 0-4.5 V range of their signals.

Discussion

- We discovered the need to calibrate the system to extract control values of subject's device.
- This device can be especially helpful in projects that rely on observing real-world applications or changes.
- The Myologger can quantitatively track changes in EMG signal over time and prosthetic use.

Conclusions

- The logging device is able to be successfully installed and operate without substantial interference.
- The Myologger can be used to track long-term outcomes of prosthetic technologies.

References

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

Acknowledgements

This work is supported by the US Army Medical Research and Materiel Command under Contract Number W81XWH-18-C-0084. The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation. In the conduct of research where humans are the subjects, the investigator(s) adhered to the policies regarding the protection of human subjects as prescribed by Code of Federal Regulations (CFR) Title 45, Volume I, Part 46; Title 32, Chapter I, Part 219; and Title 21, Chapter I, Part 50 (Protection of Human Subjects).