Development of Robotic Hand Controlled via Surface Electromyography Data

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Interfacing of Robotic hand

SEMG Sensor → Bluetooth Adapter → Computer

- Machine Learning
- Myo-Python API
- Keras
- Python Requests

Wi-Fi

Robotic Hand

- Servo Driver
- Micro Controller

I2C
Modern prostheses are usually complex and built with rigid materials.

Should it be that way?
Hybrid Material Prosthetic Hand

- 18 Degrees of Freedom (DOF) Capable
- 13 DOF Underactuated Hand (Lower number of Actuators vs DOF)
- Fingers made using Elastic 50A Resin (Soft and Capable of bending)
- Hard material for the rest
Performance of various SEMG Sensors

SEES EMG Sensor
- 2x 9V batteries as power source
- Analog Output (0-5V)
- Single Channel

Thalmic Myo Armband
- Battery Powered
- Raw EMG Output
- 8 Channels
- Bluetooth Enabled
Performance of various SEMG Sensors

**SEES EMG Sensor**
- Lower Frequency (slower data)
- Less Sensitive (Poor resolution)

**Thalmic Myo Armband**
- 200Hz Frequency
- More sensitive (Higher Resolution)
Techniques for Machine Learning

- Using Tensorflow Keras
- Model: Vanilla Neural Network
- Input: 8 Channels SEMG Data (Values: -128 to 128)
- 12 Gestures
Thanks!

ANY QUESTIONS?

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