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OVERVIEW

- 
- 01** Research Problem
 - 02** Present Status
 - 03** Methodology & Goals
 - 04** Doing Good
 - 05** Q&A

Research Problem

What?

Enhancing conventional
prosthetics in an non-
intrusive way

How?

Leveraging BCI with real-
time data processing



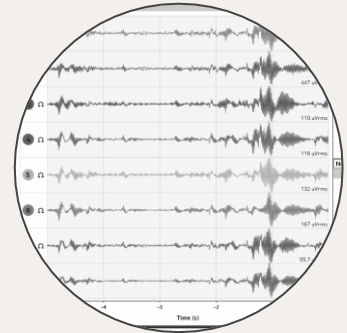
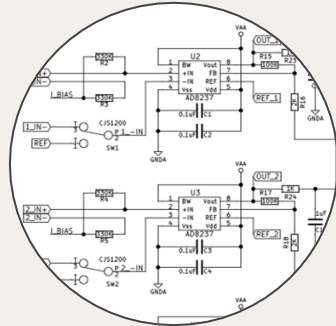
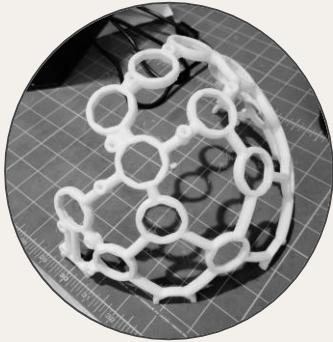
Present Status: EEG

3D Printing

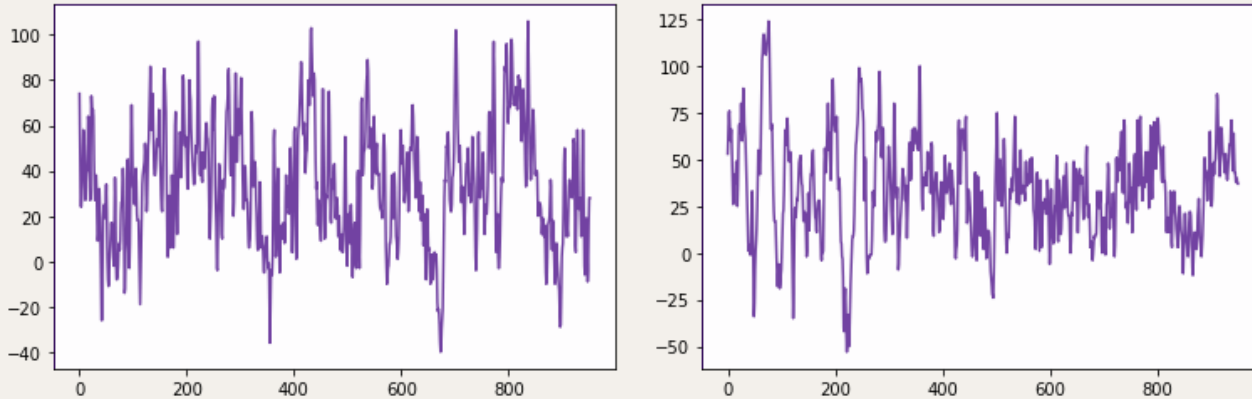
Electrical
Design

Assembly

EEG Data
Acquisition



Present Status: Test Data



We have collected EEG datasets so that we can experiment with different models before we are able to collect our own data^{[3],[4]}.



Present Status: IRB

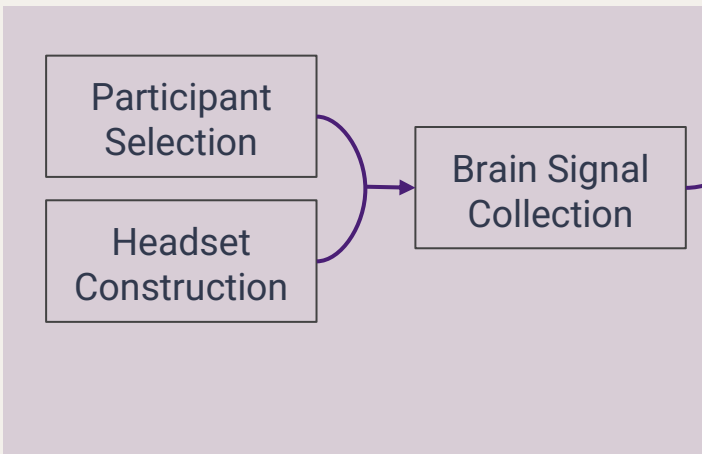
- *Submitted and pending approval!*
- Human Participants
- Have a detailed procedure for acquiring data, involving participants from UMD using the EEG headset.



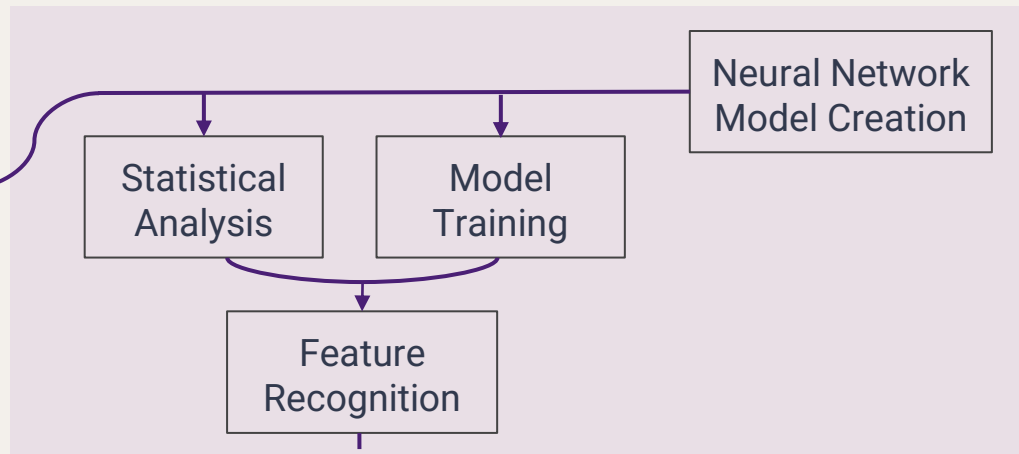
Methodology



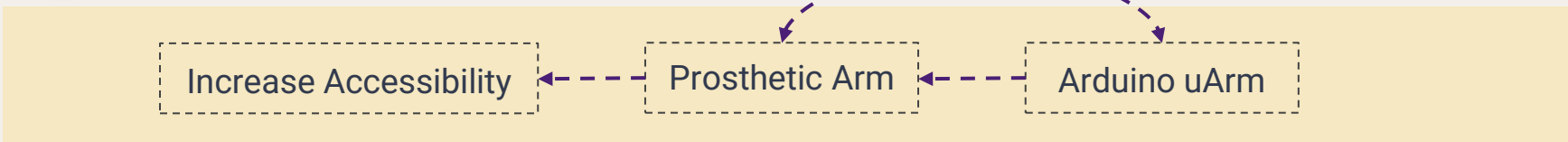
Acquisition



Analysis



Implementation



Goals for the Future

- Create an improved algorithm to read EEG data and classify as physical actions
- Affordable alternative to existing data acquisition devices
 - 3D printing the headset saves money
- Affordable alternative to prosthetic devices
 - Simulating prosthetic device controlled by algorithm signals
 - 3D printing prosthetic arm saves money



Doing Good: Need

Who needs prosthetics?^[5]

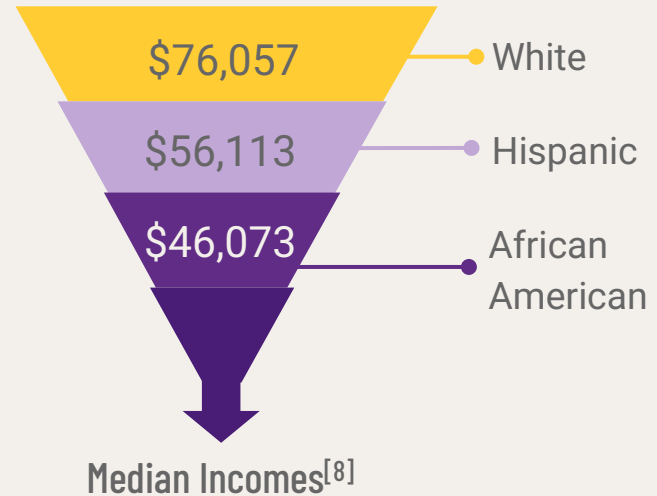
- **54%** vascular disease
- **African Americans** are **4x as likely** to need a prosthetic

Costs^[6]

- Cosmetic: **\$3,000 - \$5,000**
- Myoelectric: **~ \$30,000+**

Insurance coverage^[7]

- **African Americans** are **2x less likely**
- **Hispanics** are **3x less likely**



Doing Good: How

Main Sources of Costs:

- Reading and translating of brain signals
- Mechanical prosthetic itself

3D printing is *extremely accessible*

Breakdown:

- Physical headset: \$10 - \$30
- Electrodes: \$30 - \$50
- Board: \$50 - \$800

NO FDA approval to print prosthetic parts

- Biocompatible material



Decreasing the cost to replicate human motion effectively increases accessibility and restores quality of life to marginalized populations.



Thank You!

Dr. Anil Deane

Ms. Sharona Ginsberg

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Skendall, Dr. Vickie Hill,

and The Gemstone Staff

Dr. Ryan McKendrick,

Northrop Grumman



References



Questions?

