Wearable Devices at the Child Mind Institute
Wearable Device Development at Child Mind Institute
Prototype Progression
Reverse Engineering
Reverse Engineered Fitness Trackers as a Wearable Device Rapid Prototyping Platform

- Robust, professional looking enclosure and strap
- Robust, professional looking battery charger
- Display, sensors, vibration motor, buttons, battery
- Extreme low cost: $25-$35
STANDARD FEATURES

bluetooth  heart rate  OLED display

vibration  accelerometer  battery
POSSIBLE FORM FACTORS

wrist

ear

mouth

neck

stomach
Off the Shelf B20 ECG Fitness Tracker
Off the Shelf B20 ECG Fitness Tracker
Inside The B20 ECG Fitness Tracker
ADS1292 Bioimpedance Sensor

ECG and EEG frequency range overlaps so hardware filtering not an issue
Easy Access to ECG Leads and Programming
Determine GPIO Connections
Wiring Up the PCB
Re-route ADS1292 Contacts to Plugs
Modify Enclosure
Expose GPIO and SWD Programming
Mount on Glasses
Simple EMG
Simple EEG
Machine Learning and Neural Networks for Wearables
Example Neural Network
Gesture Recognition Neural Network

![Diagram of Gesture Recognition Neural Network](image-url)
Multi-Model Gesture Recognition Demo
TensorFlow and Future Developments