



# 3D Printed Robotic Arm

controlled by Brain Waves



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Incidence of amputation **1.5 per 1000**

World population of amputees **10 million**

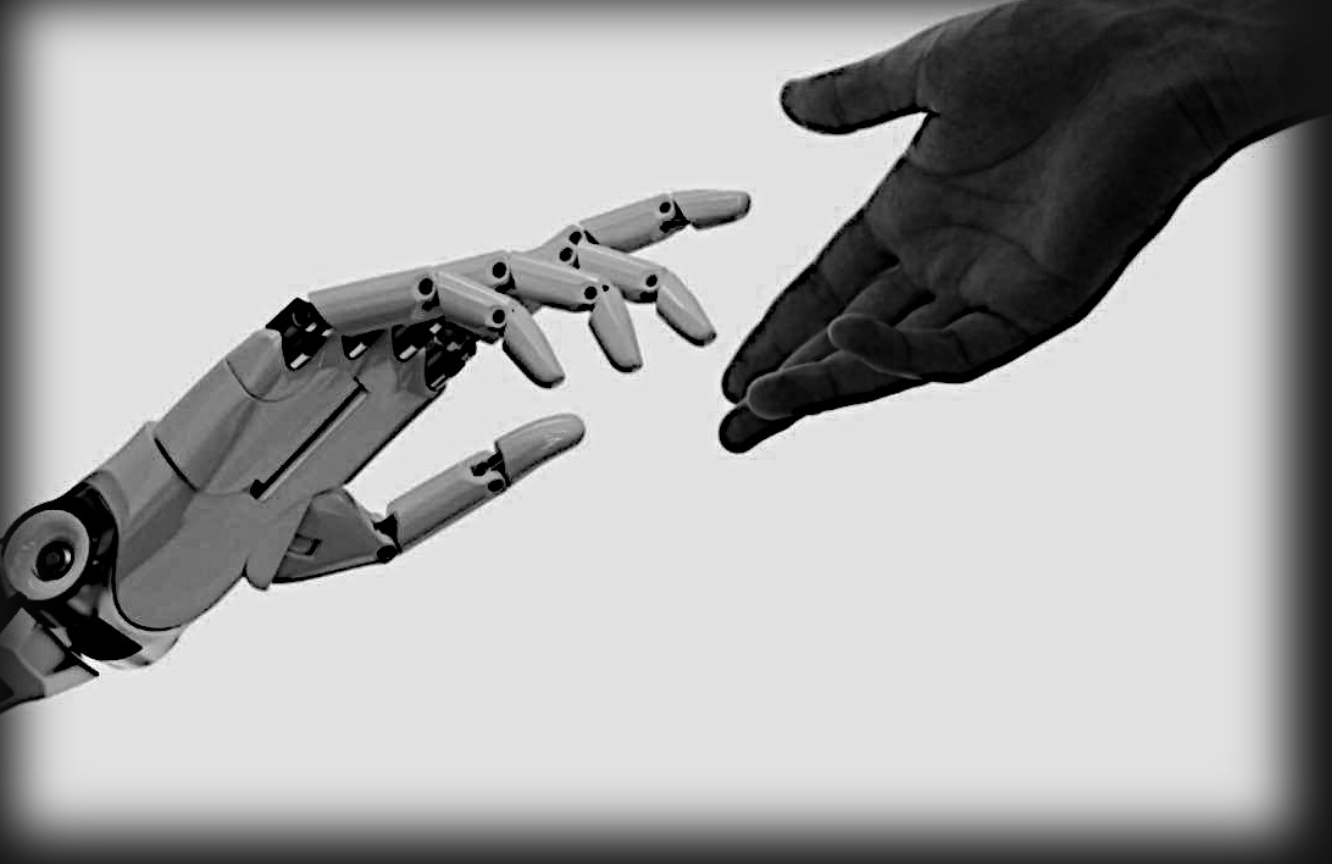
Percentage of arm amputees **30%**



Ancient Egypt



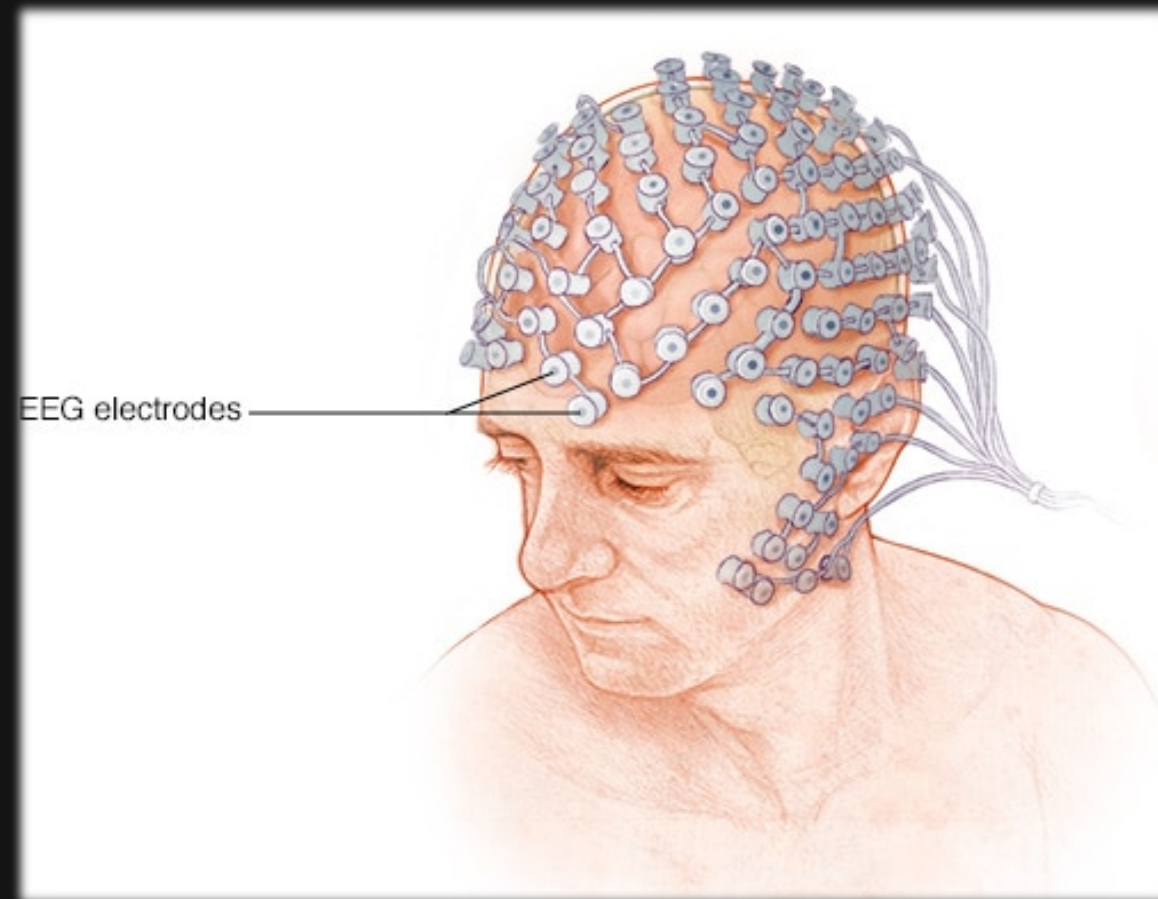
1580 - German



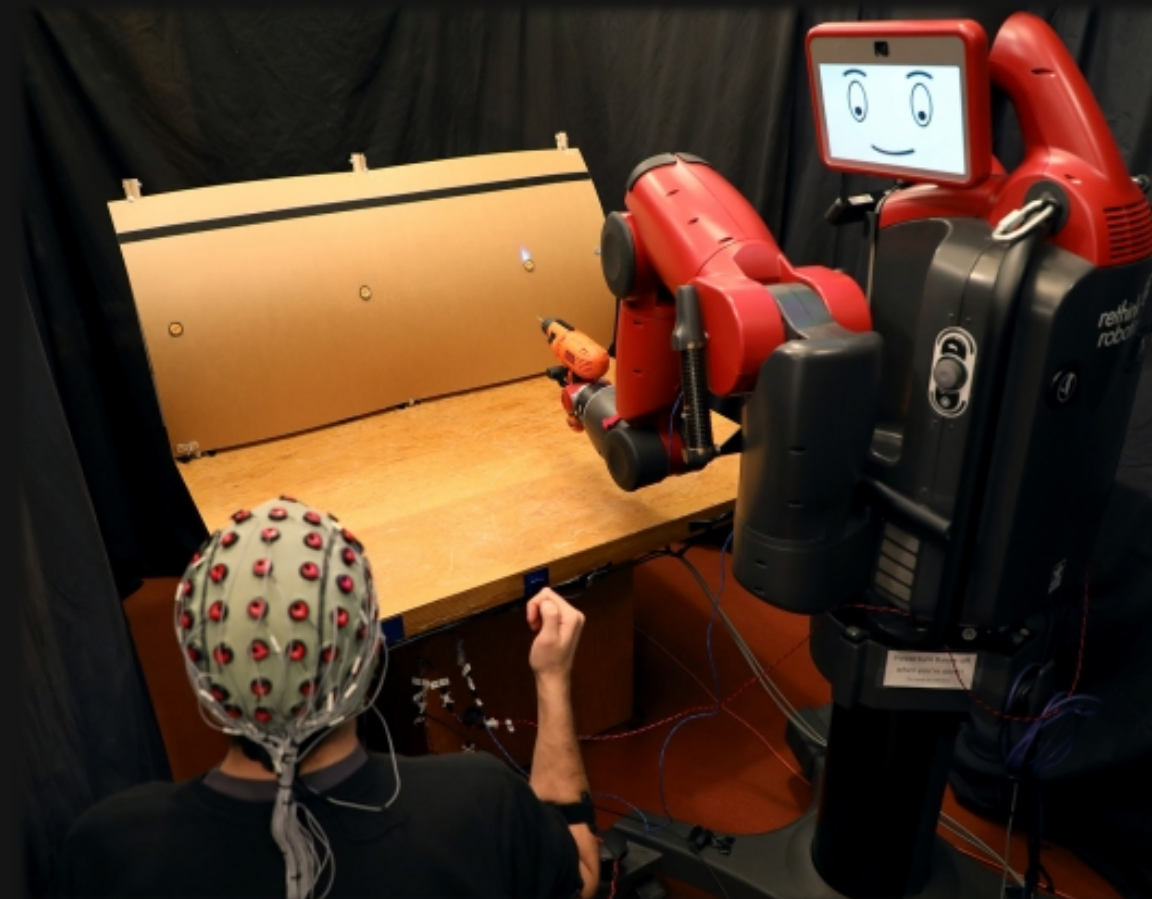
21th Century

# Research Stage

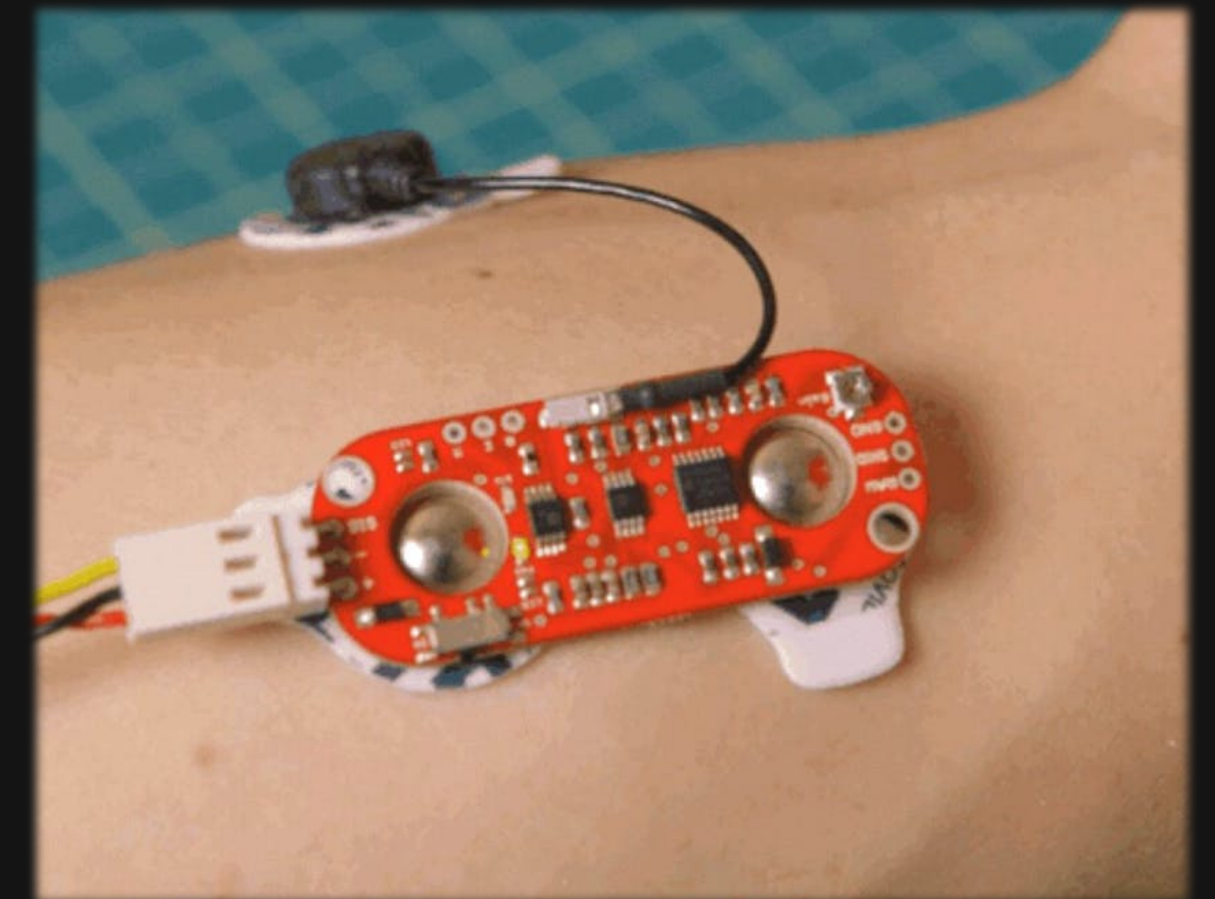
Detectable Signals



EEG Signals



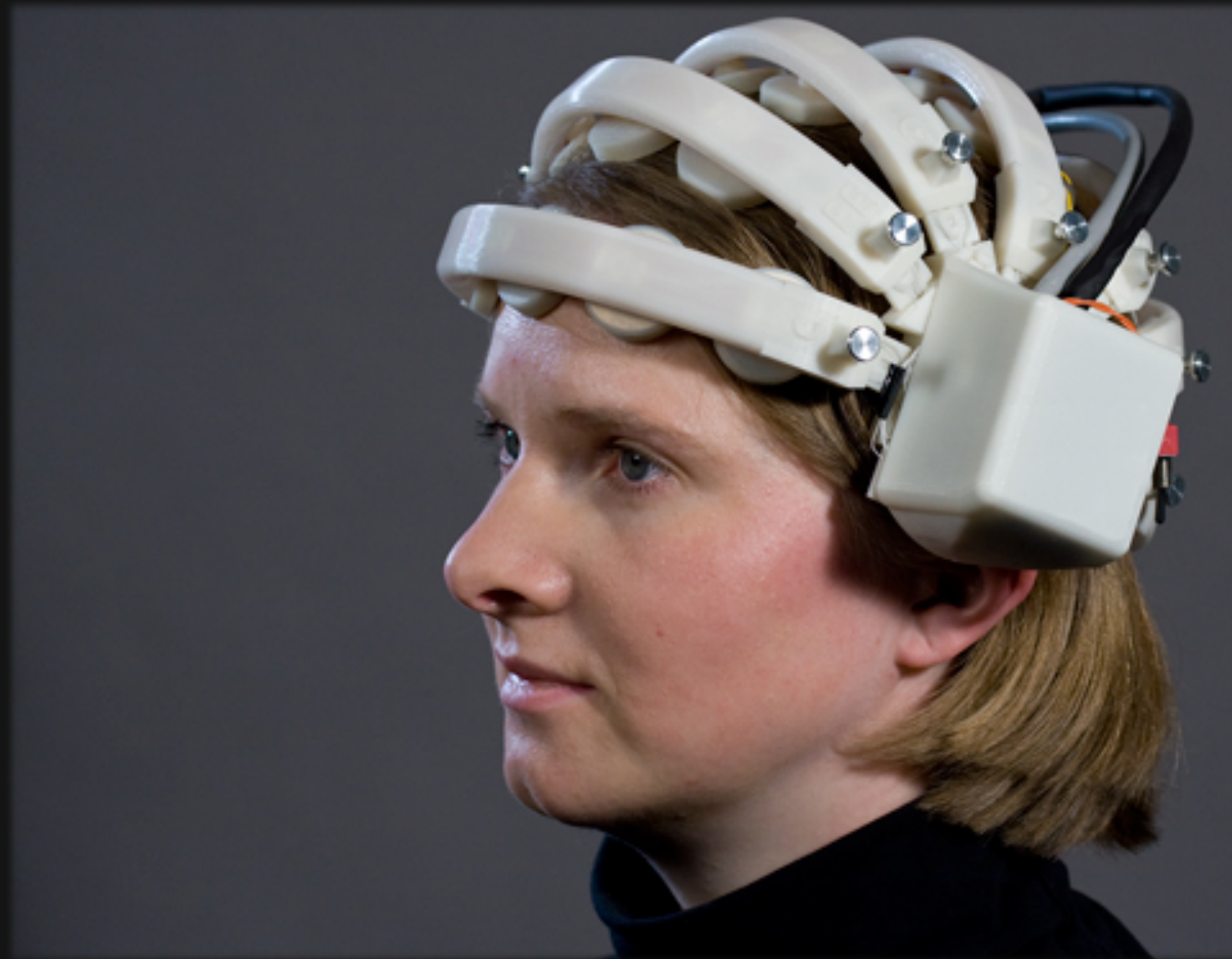
MEG Signals



EMG & ECG Signals

# Research Stage

## Constraints



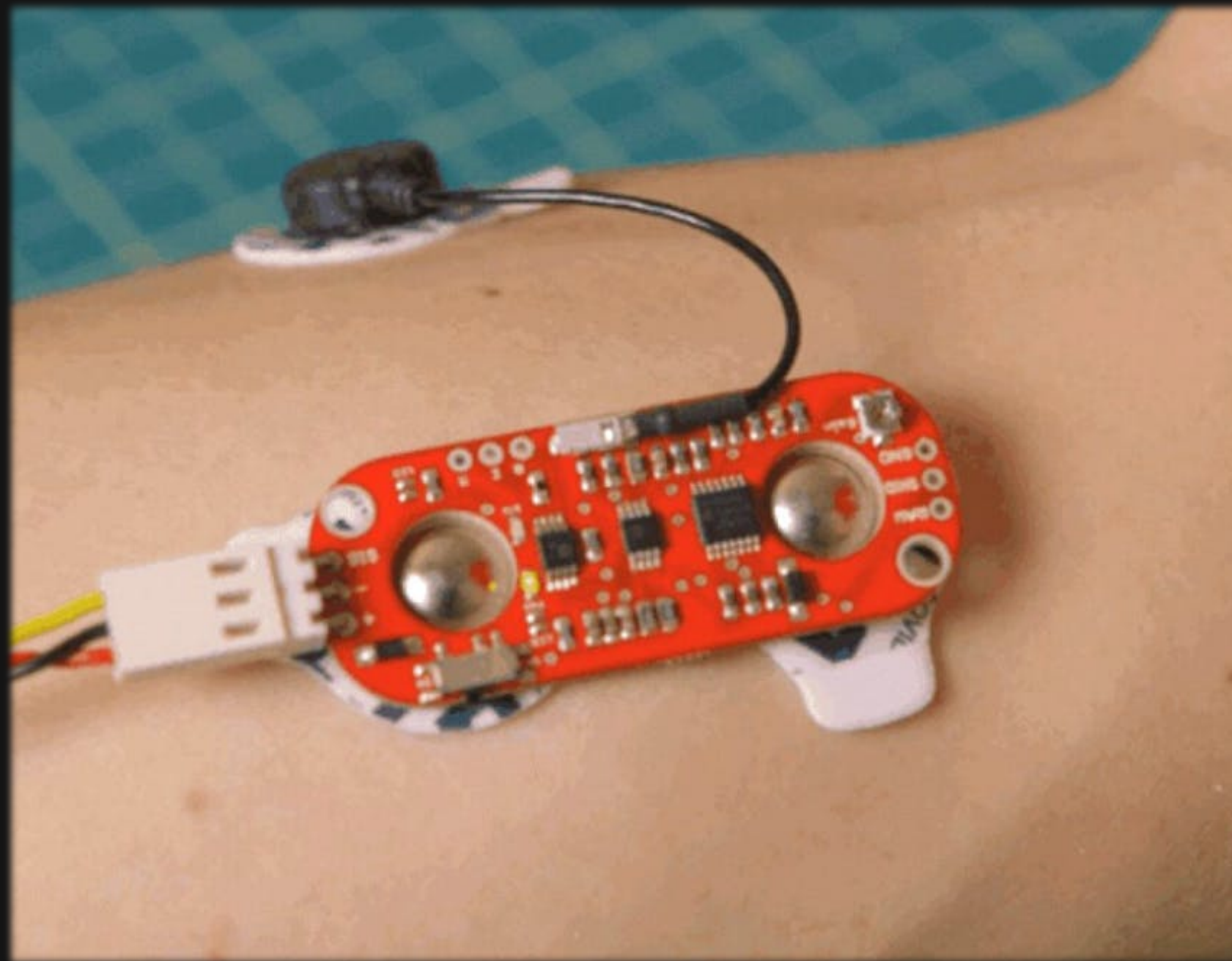
EEG Detector



Cost, Delivery Time, Legal Issues

# Research Stage

New Approach

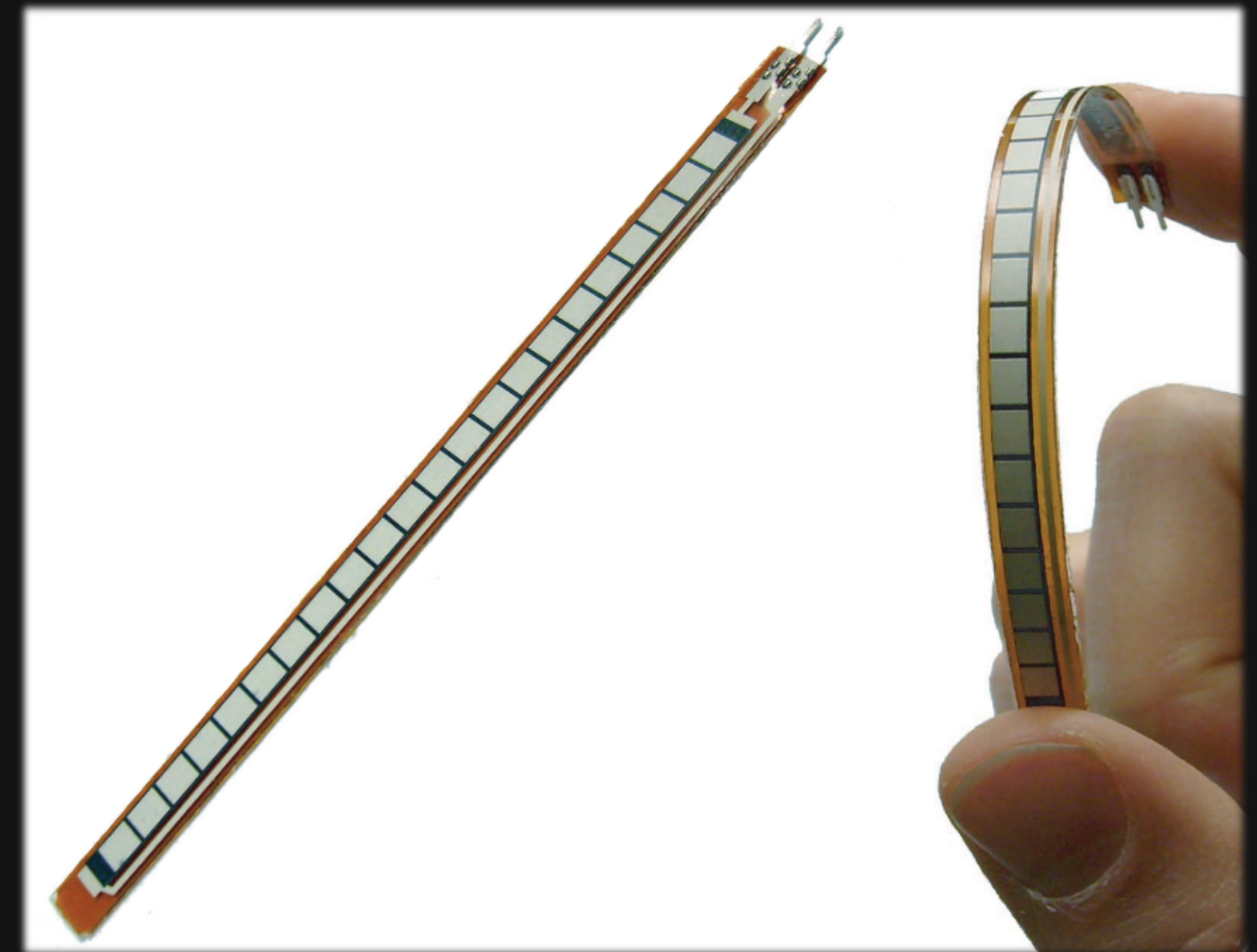


## EMG & ECG Signals

Reading from a forearm muscle group

*(Extensor carpi radialis)*

&

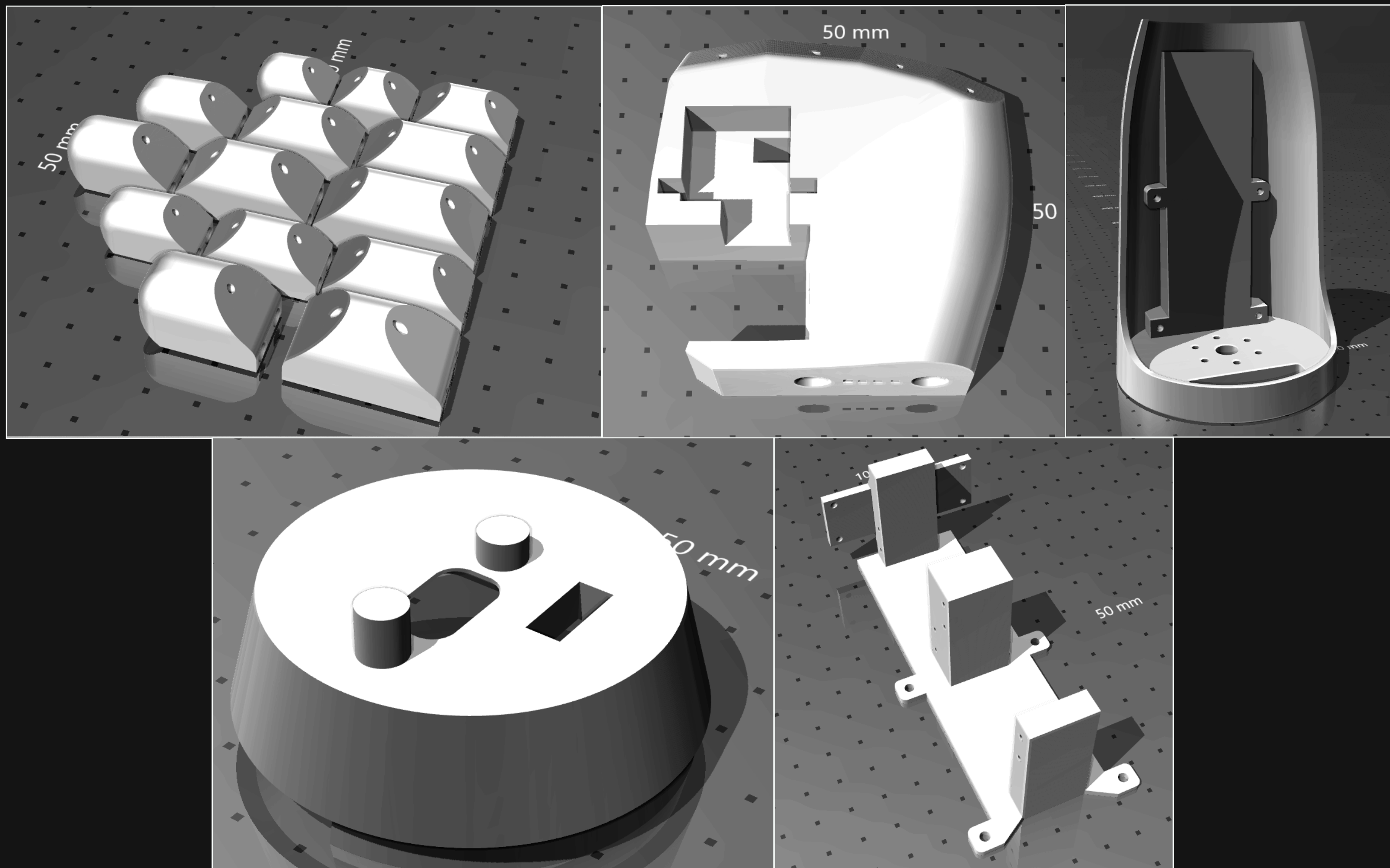


## Flex-Resistor Sensors

Controlling fingers through a glove

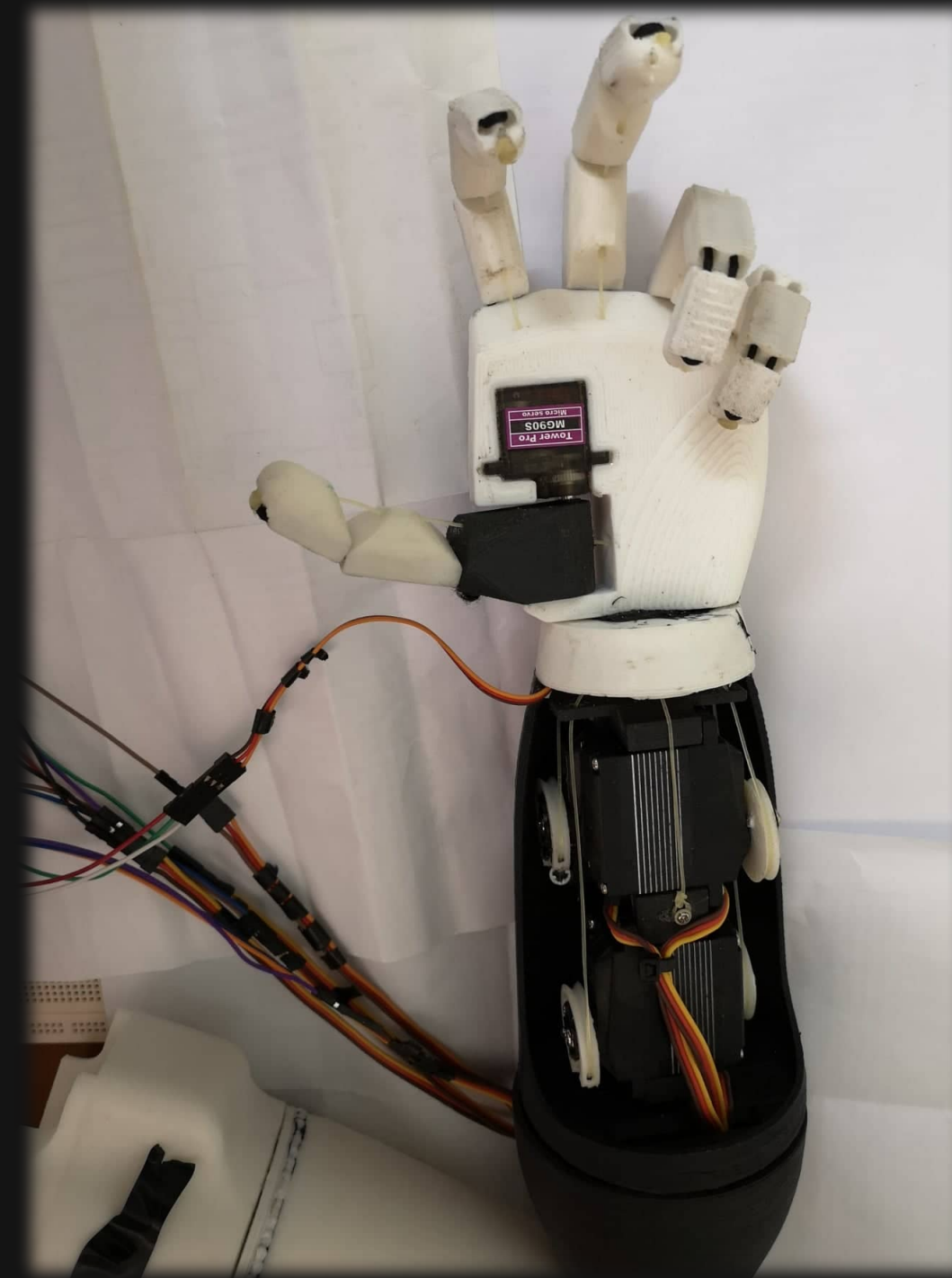
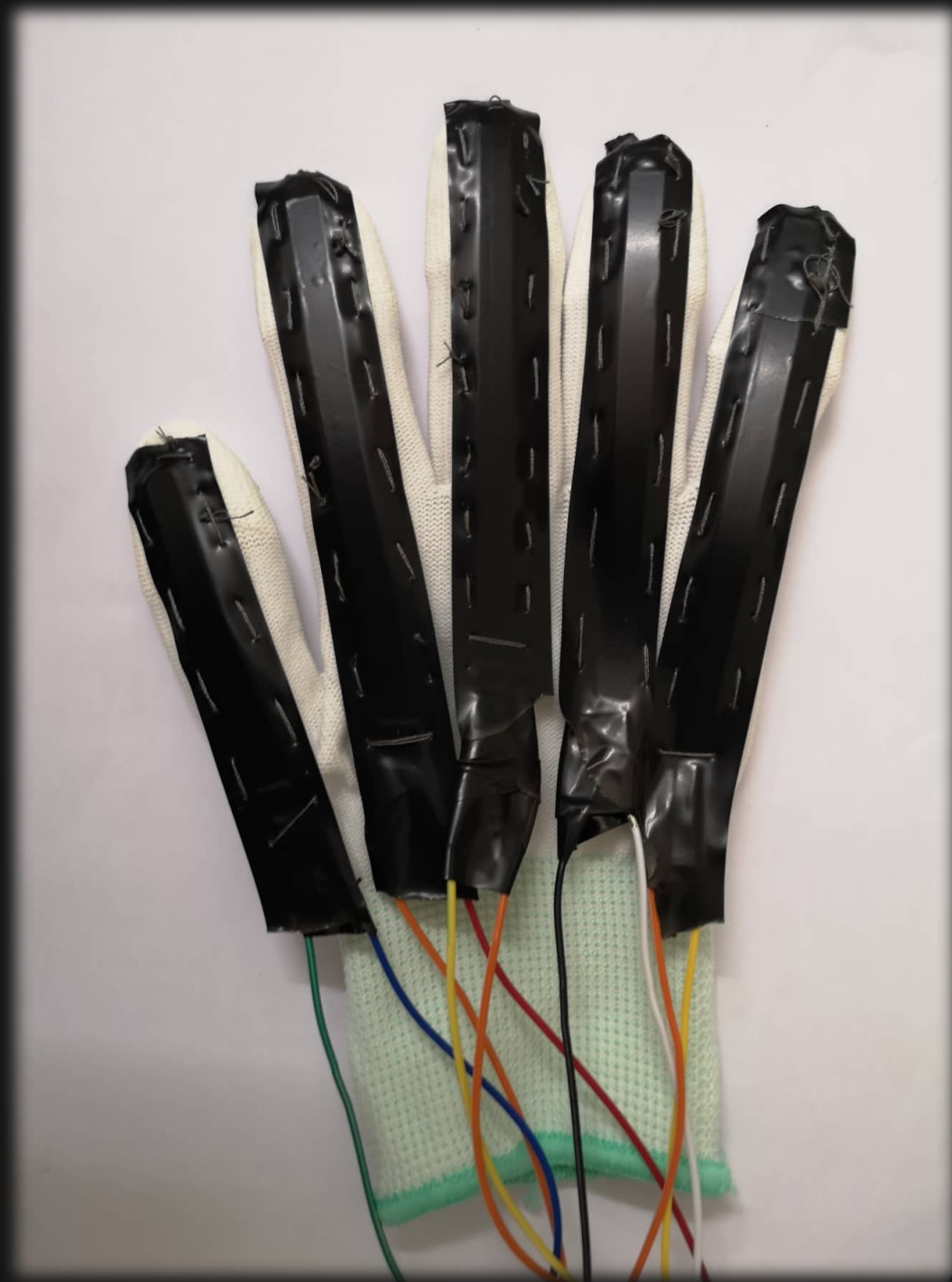
# Robotic Arm Design

3D printed Design



# Robotic Arm Design

Final Design



# Robotic Arm

## Hardware Parts



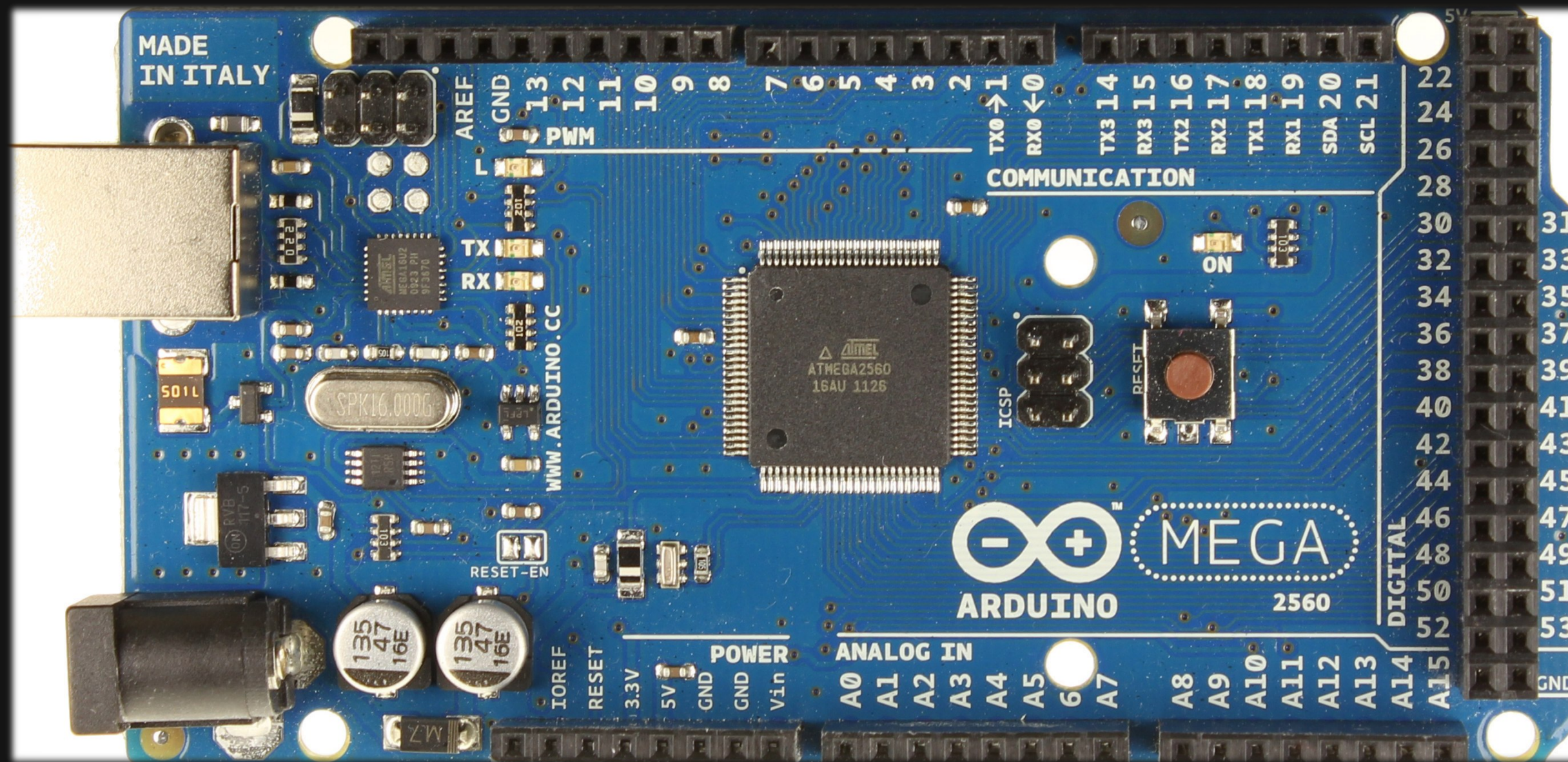
**MG958**  
**5 Servo Motors**  
(4 fingers & the forearm)



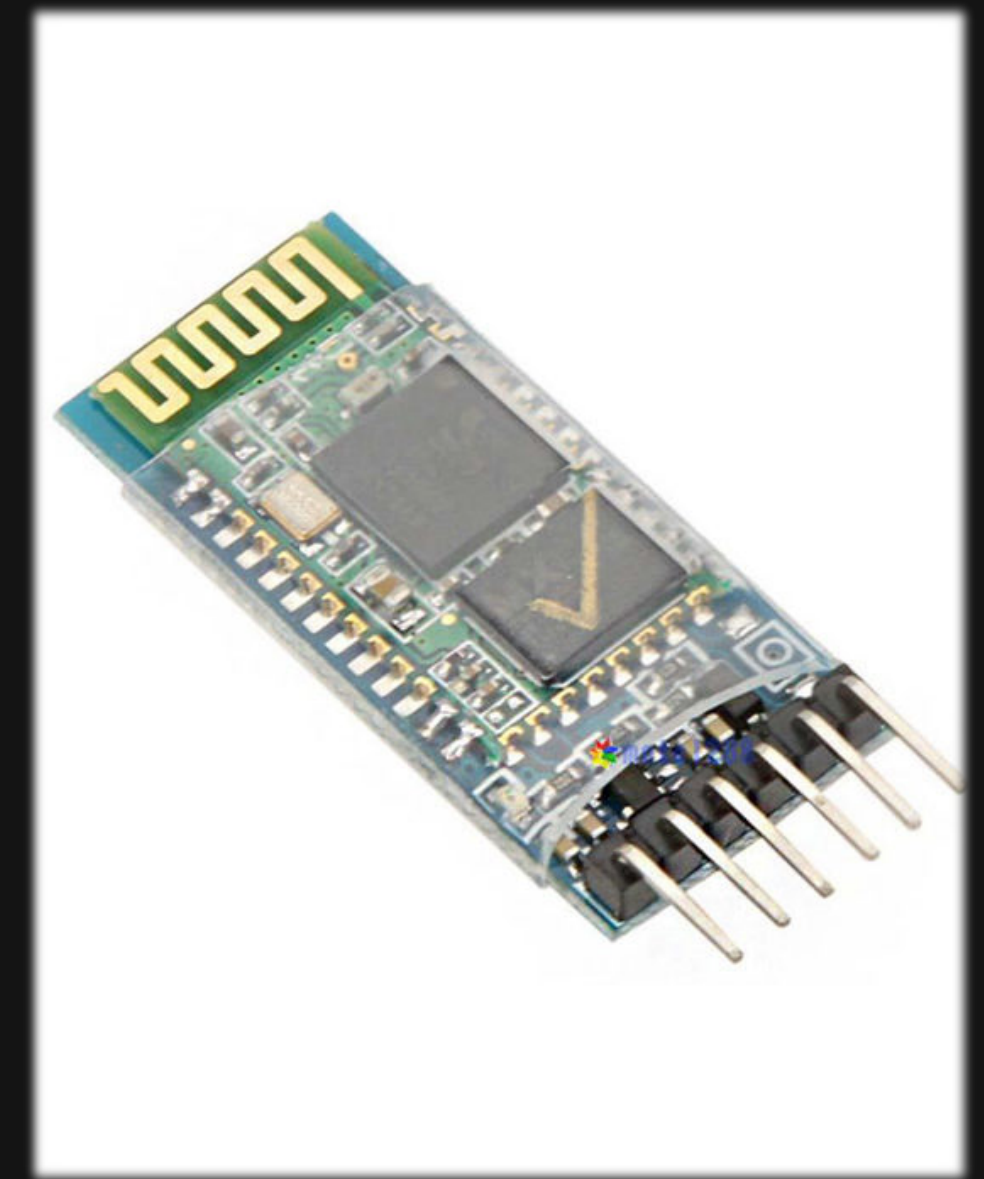
**MG90**  
**Thumb's Servo Motor**

# Robotic Arm

## Hardware Parts



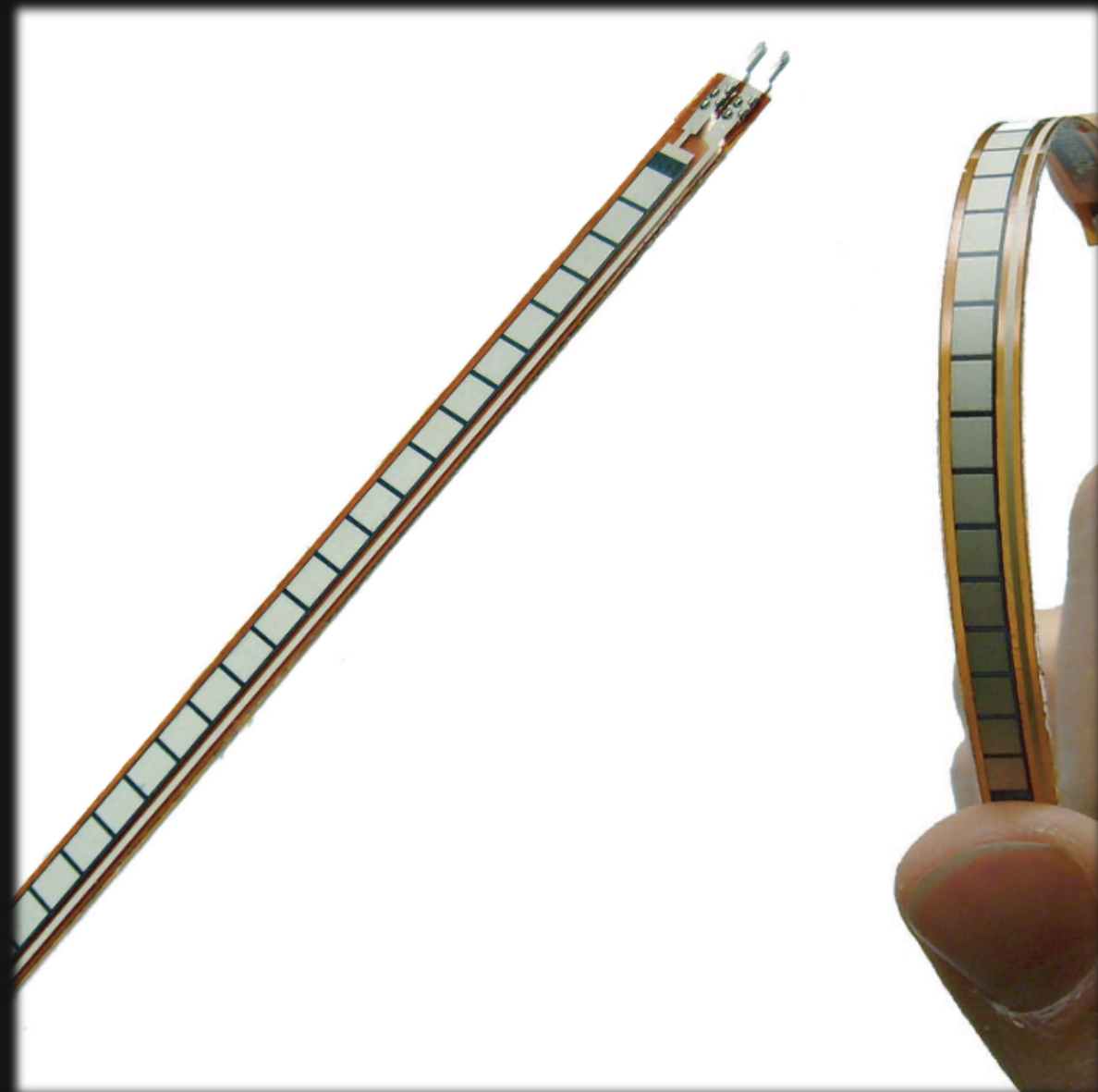
**Arduino Mega 2560**



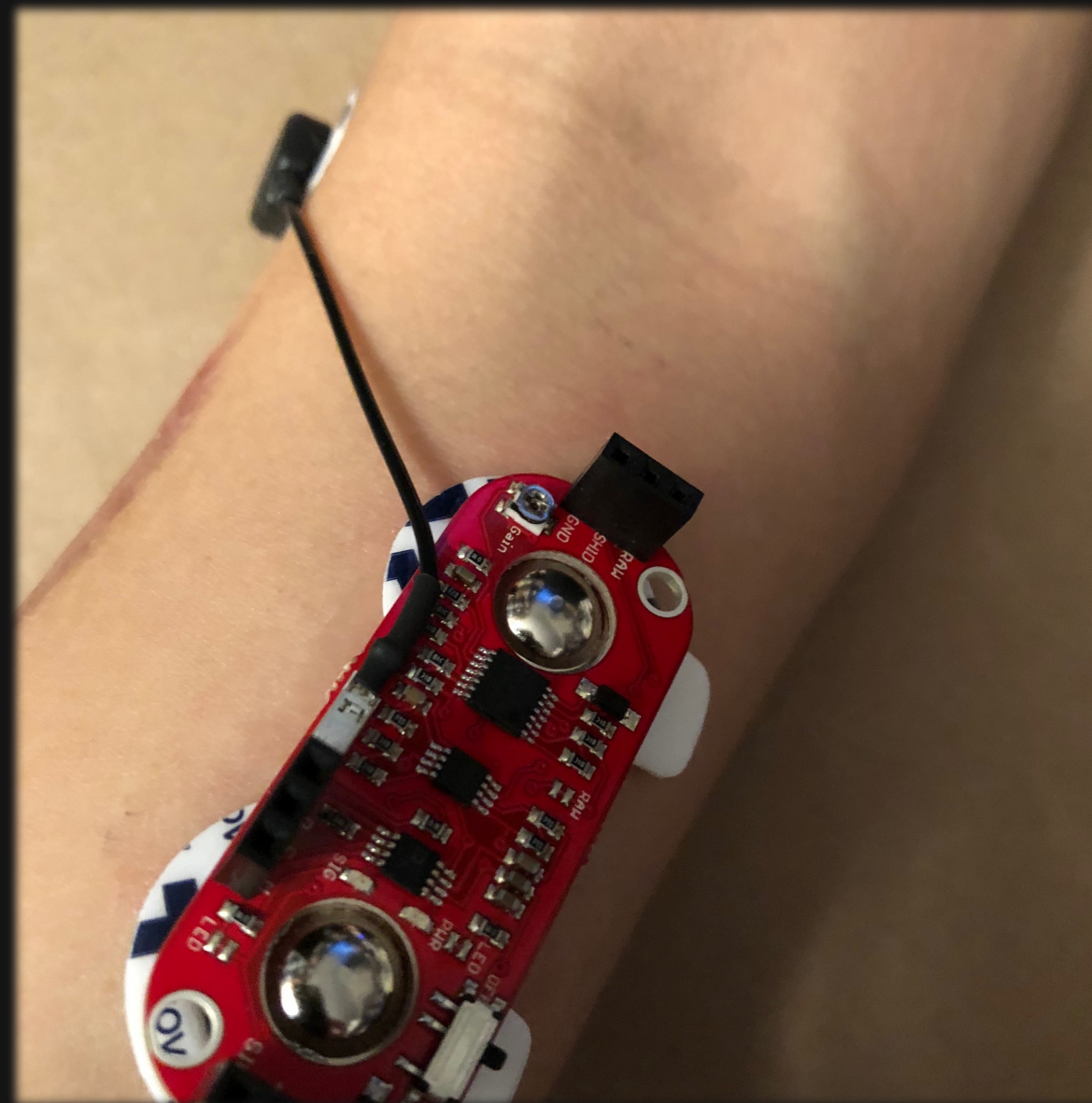
**Bluetooth Module HC-05**

# Controlling Glove

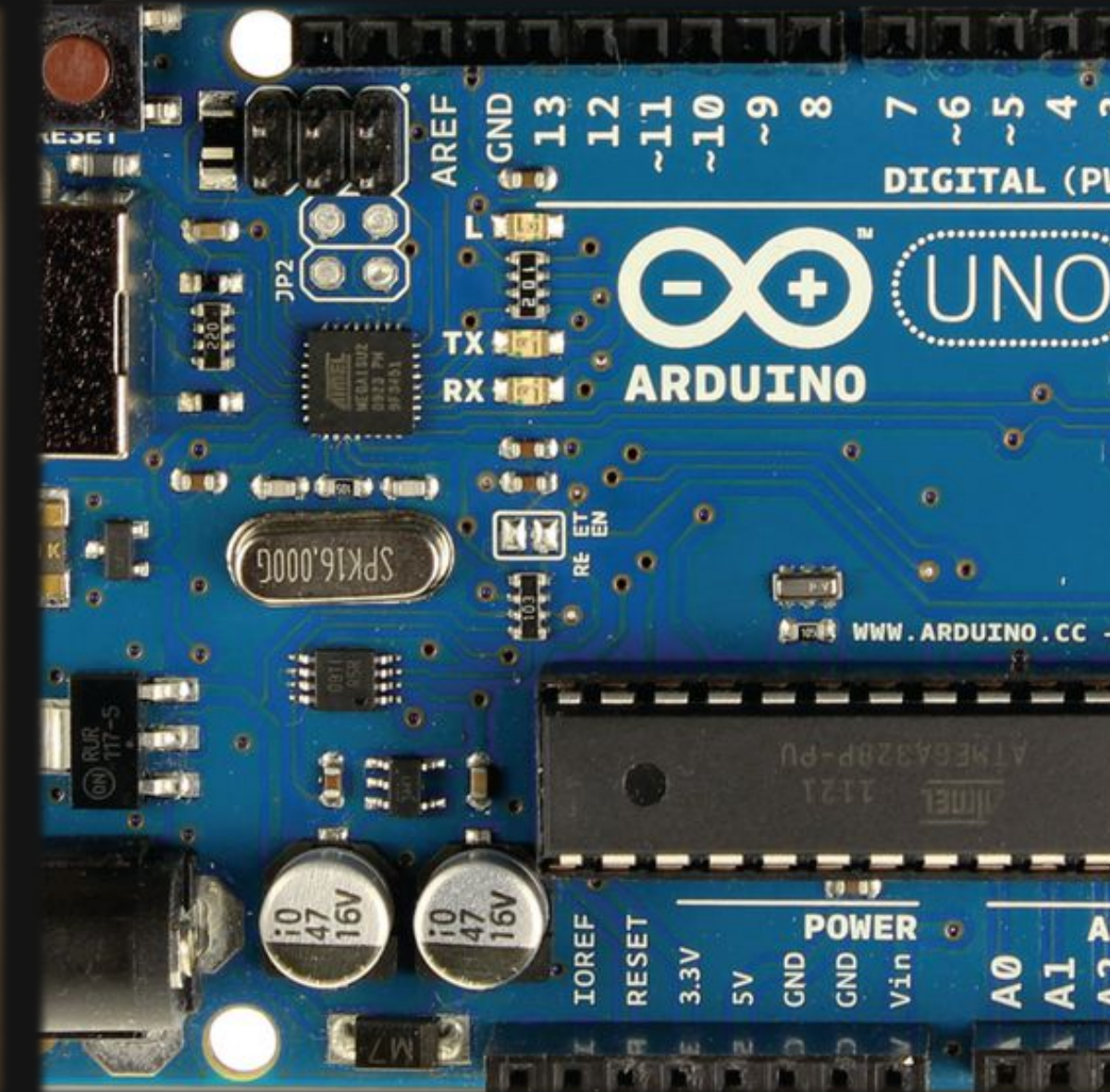
## Hardware Parts



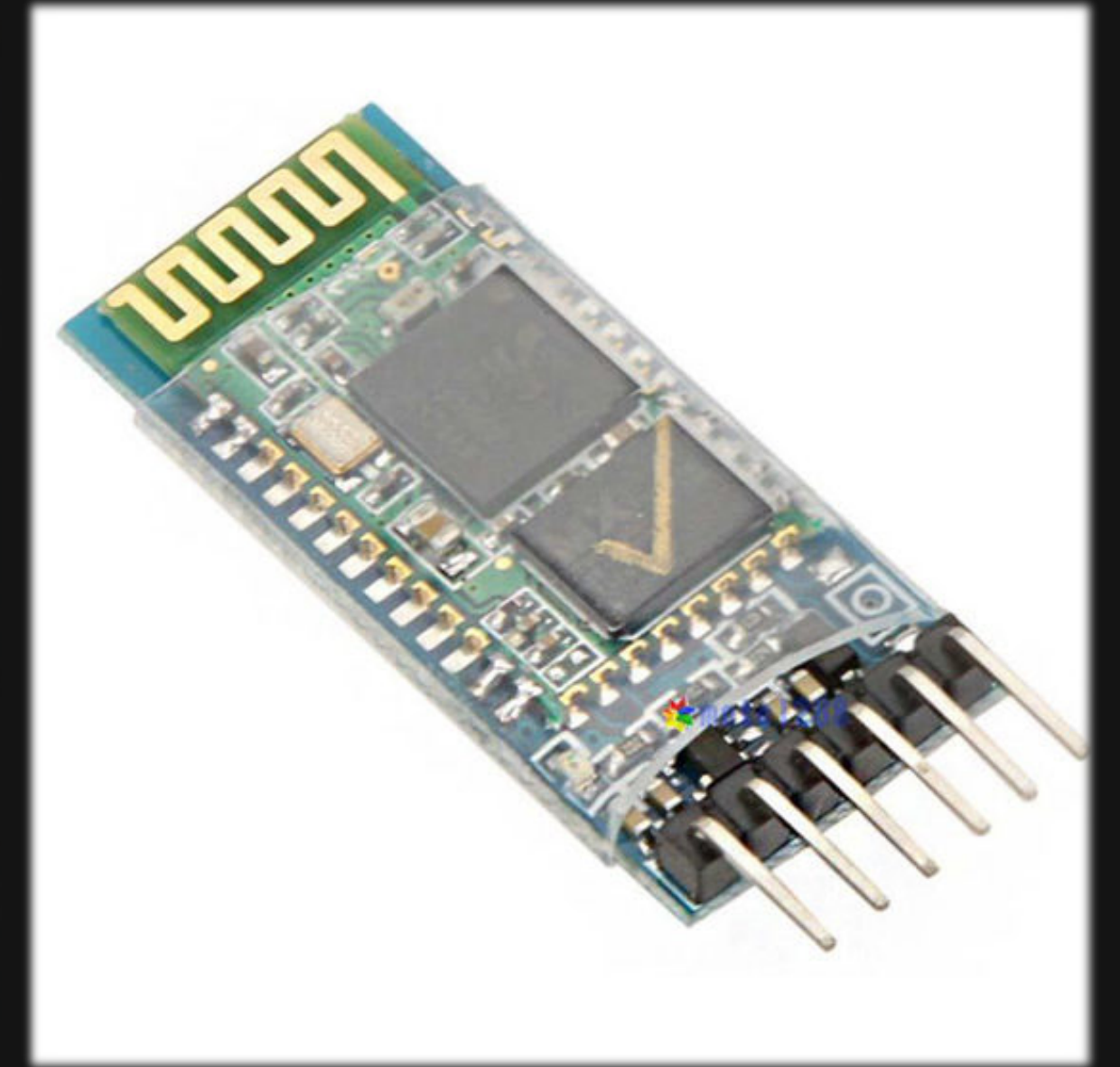
**Flex-Resistors**



**MyoWare Muscle  
Sensor**



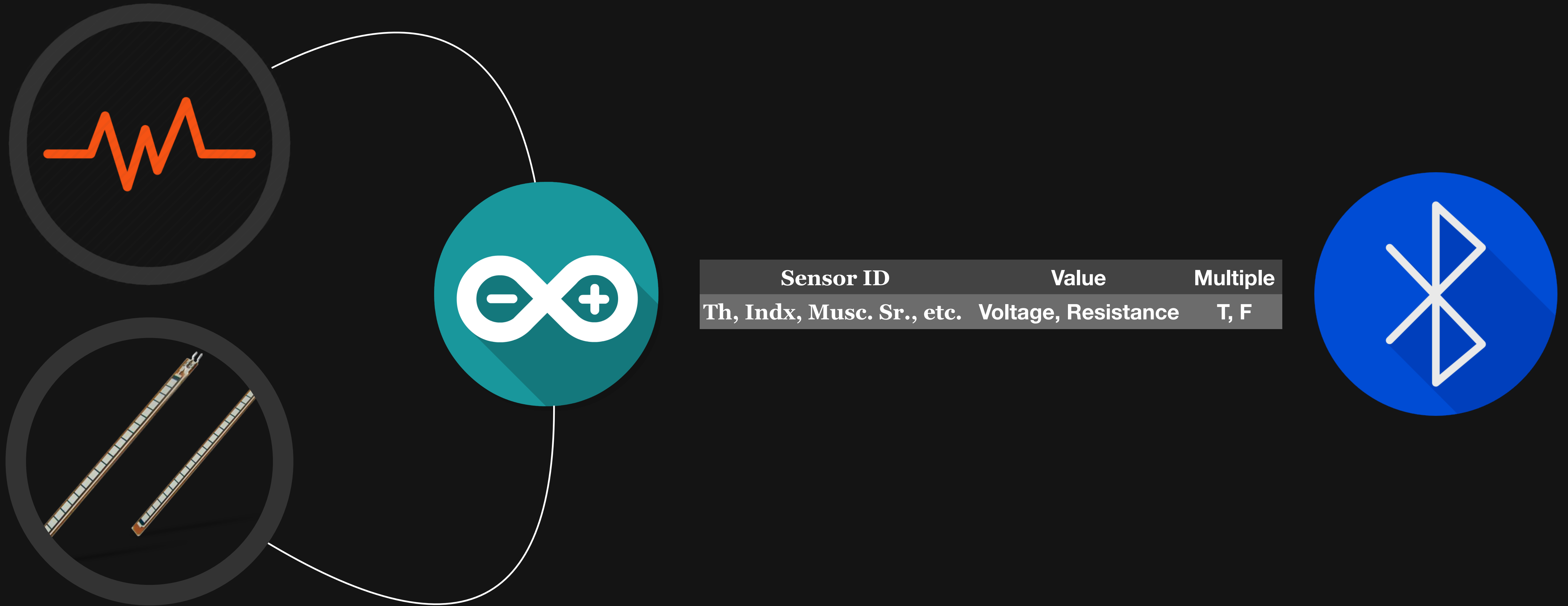
**Arduino Uno**



**Bluetooth Module  
HC-05**

# Data & Signals Transmission

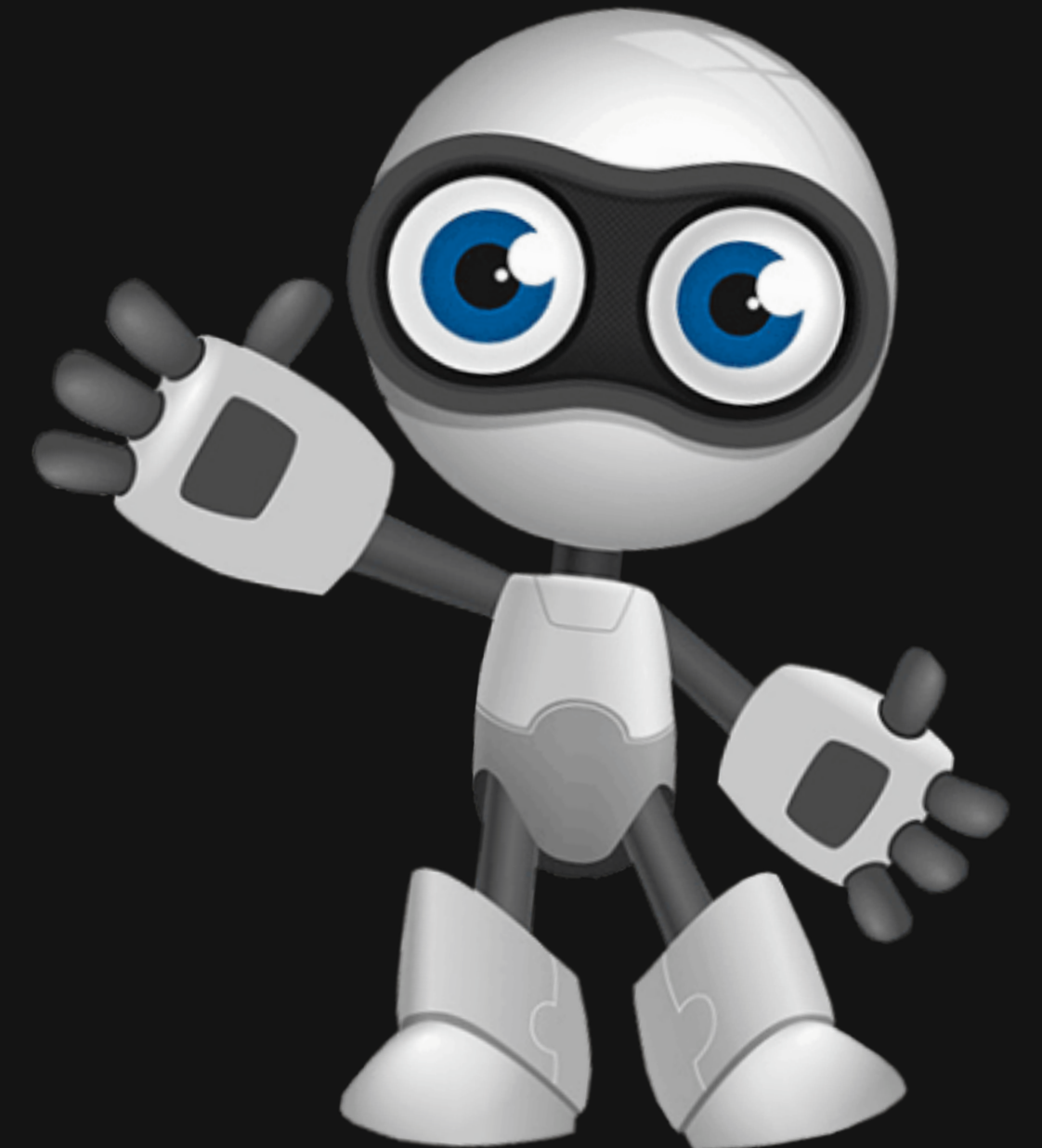
Action Command



Sensor ID	Value	Multiple
Th, Indx, Musc. Sr., etc.	Voltage, Resistance	T, F

Demo

# Thank You!



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