# W.W.E.S
## (Wireless Wearable EMG System)

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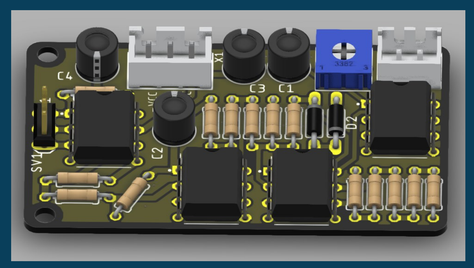
## Abstract

The team's goal is to create a efficient and affordable EMG sensor. That will allow individuals to have the opportunity to use a reliable sensor without needing to settle for low efficiency sensor or go the route of a high end sensor prices. The team also developed a wireless feature for our sponsor that can deliver clean and reliable signals wirelessly from a MCU to a bionic hand.

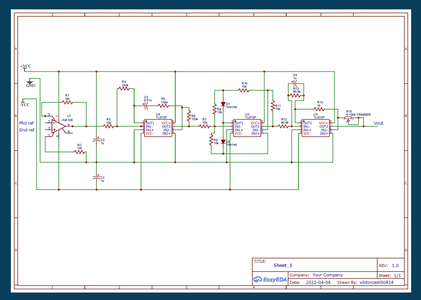
## Need

In 2017, more than 237,000 lives across the world have been claimed by a motor neuron disease. In addition more than 10 million individuals that are currently suffering from Parkinson's disease across the world. One solution that can help these individuals is by using a EMG sensors. However as it stands the market does not offer many options to choose from. One could either go with a cheap and non efficient EMG or pay a arm and a leg for high end efficient EMG, which can cost upwards of $20,000.

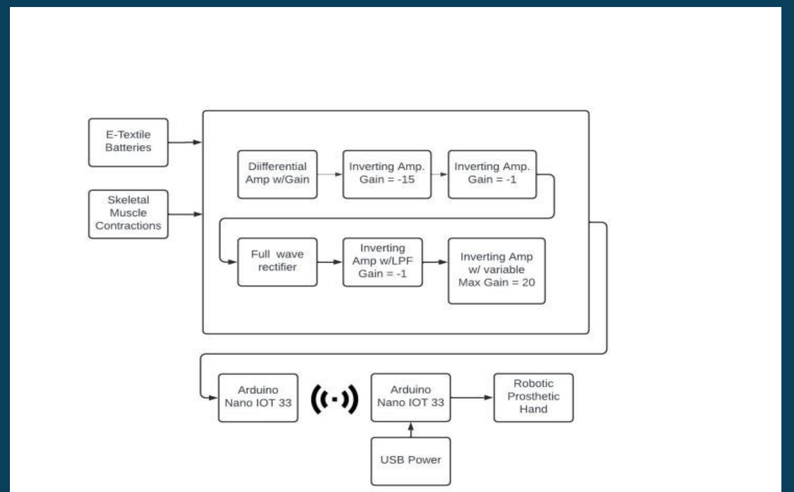


## Design Concept

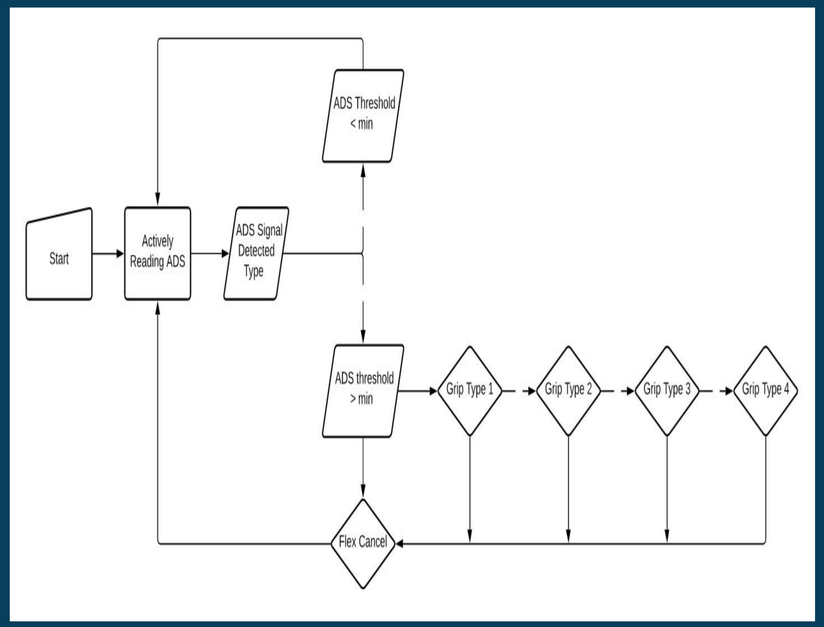
Our team's design for the sensor is by having the signals from our skeletal muscles go through a differential amplifier then two inverting amplifier and sequentially a full wave rectifier. The signal will then be sent trough an inverting amplifier with a low pass filter and another inverting amplifier that will output analog signals that can be read and transferred to an MCU.



## Hardware Diagram




## Software Diagram




## Components

- INA106 IC Chip
- TL072 IC Chip
- Capacitors
- Resistors
- 1N4148 Diode
- Trimmer
- Arduino nano 33 iot
- Bionic Hand

## Summary

Our EMG sensor will fill the void for a middle market senor in the current EMG market. Which can potentially help millions of individuals who are currently suffering with a neuron issue. In addition our sensor could also be implemented in a wireless system such as the one we created for our sponsor's bionic hand.

## Glossary

- Transradial Amputee – *Amputee with flex and extension of the wrist.*
- *EMG (Electromyography) - measures the muscle response or electrical activity to a nerve's simulation of the muscle.*
- *MCU (Microcontroller) - small computer on a single metal-oxide-semiconductor integrated circuit chip.*

## Acknowledgments

*Dream Team would like to give a special thanks to Alt-Bionics and Ryan Saavedra for the technical and financial support of our project.*

*We Would also like to recognize the UTSA Makerspace. Student Success Center and UTSA ECE department faculty and staff for providing the resources, instructions and support related to this project.*

## Mentors

- Dr. Paul Morton (mentor) – *Professor at UTSA*
- Dr. Johnathan Votion - *Professor at UTSA*
- Dr. Emadeldin Elgamal (mentor) – *Professor at Tarelton State University*