



# Low level EMG Bio signal Acquisition

High fidelity acquisition of Bio signals

ELECOMP Capstone Design Project 2022-2023

## Sponsoring Company:

**PISON TECHNOLOGY**

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<http://www.pisontechnology.com>

## Company Overview:

Pison is creating the next generation of neural interfaces that focus on gesture recognition and neurophysiological insights. Pison leverages our patented electroneurography (ENG) platform to translate data generated from our body's natural physiological electricity stemming at the brain into machine interpretable events in software. This allows for never-before-seen intuitive control of any experience in the IoT universe and discovery of neurological correlations drawn from our proprietary AI and data sets. Pison's government, Department of Defense and Fortune 100 customers have a deep pipeline of pending projects fueling our growth. Pison's long-term vision is to own the platform which translates human intention to machine-readable code.



## Technical Directors:

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## Project Motivation:

When collecting gesture-related bio signals for researching, developing, and training gesture classification models, one of the most critical capabilities is to acquire clean, accurate representative signals in the context of considerable background noise. This project focuses on the acquisition of this data.

## Anticipated Best Outcome:

The anticipated best outcome of this project is the development of a system which can, first represent differing incarnations of analog front ends. These versions will need to be fully characterized so that they can be used for further use. Such uses include taking the raw data, validating it, and allow it to be used in various ways representative to what would be seen in real world conditions. This can include, defect insertion such as additive noise, and motion artifacts.



## Project Details:

### Overall system concept and tasks

This is a complete end to end project. It encompasses most of the elements that an engineer would need to do in a job. Requirements of the system will be refined when the participants start.

- 1) It starts with the design and simulation of various analog front ends for EMG capture. (The
- 2) The next phase is to fully characterize the actual electronics to confirm the design meets the requirements.
- 3) The third phase is to devise a way to stimulate the inputs of the AFE to be able to produce outputs. The device should be capable of producing repeatable results!
- 4) The fourth phase is to build a test harness using python and any data acquisition devices to acquire the output and package it to be able to process/analyze the results.
- 5) Some parts of the project must allow divergence to resolve newly discovered issues.

\*Some phases can proceed in parallel

## Composition of Team:

2 Electrical Engineers, preferably with an interest in machine learning and bio signals



## Skills Required:

The project will require and stimulate the following skills.

- analog circuit design skills
- low level signal analysis
- low noise design skills
- analog simulation (spice)
- schematic capture
- pcb layout
- pcb assembly
- board bringup / debug
- board level characterization
- bench test development
- Data analysis using python
- Project management Background in Python programming
- Ability to interface with other teams
- Positive, constructive attitude; open to critical review exercises as a team

## Anticipated Best Outcome's Impact on Company's Business, and Economic Impact

The best outcome of this project would provide Pison with a baseline and framework providing trust in the acquisition of the low-level signals.