

Project Description:

The goal of this project is to build an EEG (electroencephalogram) signal acquisition pipeline for the "Fixed Challenge" portion of the NeurotechX Student competition taking place at the end of 2017. The pipeline will consist of a homemade biosignals board that is capable of picking up EEG signals (in the range of 10-100 microvolts), perform analog to digital conversion, signal processing, and transmit the signal to a distant computer for real-time visualization and other applications.

Role: Embedded Software / Firmware Engineer

Number of open positions: 2

Description: Work with one other programmer to design and program the ADS1299 -Raspberry Pi interface. Responsible for coding the main loop on a Raspberry Pi to control and acquire data from an ADS1299 ADC chip through SPI and send it to a GUI for visualization.

Preferred Year: 3rd year or higher ECE or EngSci-ECE

Required skills:

- Proficient in C/C++
- Experience developing in a Linux environment
- Experience programming low-level computer hardware and/or embedded systems
 - If in ECE, must have taken ECE342 Computer Hardware
- Knowledgeable in operating systems
 - If upper year ECE, must have taken or is taking ECE344 Operating Systems

How to stand out::

- If you are more software-oriented:
 - Experience with multithreaded programming, interfacing different programming languages (Python - C)
 - If you are more hardware-oriented
 - Experience with scripting (perl, bash, make)
 - Previous experience working with Arduino's or Raspberry Pi's
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Role: DSP Software Engineer

Number of open positions: 2

Description: Responsible for programming digital signal processing (DSP) (noise filtering, high/low-pass filters, etc.) functions to process the acquired data and send it to the GUI. This role will encompass the data processing section of the pipeline.

Preferred Year: 2nd year or higher ECE, EngSci-ECE, or CS

Required skills:

- Proficient in C/C++
- Experience developing in a Linux environment
- Taken courses in signal processing or signals and systems

How to stand out:

- Previous experience working with Raspberry Pi
 - Previous DSP programming experience
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Role: PCB Designer

Number of open positions: 2

Description: Work with two other designers to create the hardware schematics and layout for the PCB used to interface the ADS1299 chip with electrodes and connections to the Raspberry Pi. Responsible for housing the ADS1299 chip for low noise embedded applications and testing for signal filtering.

Preferred Year: 3rd year or higher ECE or Eng (can be flexible on this if person is exceptional)

Required skills:

- Past experience with PCB design software
 - Altium, DesignSpark, EAGLE, AutoDesk
- Knowledgeable with PCB manufacturing techniques
- Past experience soldering and testing low noise embedded circuits
- Taken or is taking courses for analog and digital electronics

How to stand out:

- Previous experience working with Arduino's or Raspberry Pi's
 - Taken signal analysis courses and familiar with filtering
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Role: GUI Software Developer

Number of open positions: 2

Description: Responsible for developing GUI end of pipeline. Competition requirements for the GUI include being able to graph acquired data in time or frequency domains in real-time. Must have some knowledge of computer hardware and operating systems to work with embedded programmers.

Preferred Years: 2nd year and higher, engineering or CS

Required Skills:

- Proficient in either C++ or Python
- Understanding of good software practices, design patterns, OS memory model

How to stand out:

- Previous experience designing and programming GUIs, preferable Qt-based