

## **RESEARCH INTERNSHIP: FACILITATING REMOTE ACCESS TO MEDICAL CARE AND HEALTH COMMUNICATION IN RURAL AND URBAN AREAS. [01/21]**

### **Project Description**

There is an inadequate number of health professionals in Ghana available to consistently interact with patients and give advice on health habits. It has been reported that 7 of the top 10 diseases can be partly prevented, alleviated or managed better in the presence of consistent communication with a medical professional.

The focus of this project is to create a virtual platform for interaction between patients and doctors. This remote mode of communication aims at decreasing the urgency of visiting a hospital or clinic, as well as provide access to some form of healthcare for people in remote areas.

The project will leverage on the ubiquity of mobile devices in the country and the advancements in Artificial Intelligence for implementation. Specifically, work will be done on developing an AI/NLP powered recommender system that can make preliminary health recommendations.

### **Required Skills**

1. Good programming skills – Python (for ML/AI/Data Analysis Applications)
2. Cloud computing
3. Telcos API programming
4. Data Collection (Research Methods)

Interns should have at least one of the above skill-set and be willing to learn others quickly

Applications are welcome from students in any of the following disciplines- Biomedical Engineering, Computer Engineering, Telecommunication Engineering, Computer Science and Mathematics.

APPLICATION DEADLINE: 26<sup>th</sup> APRIL 2021

### **Contact Person**

For further information, contact [Prince Ebenezer Adjei](#). Click [here](#) to apply for this position.

**RESEARCH INTERNSHIP: ELECTRICAL STIMULATION/TISSUE ENGINEERING  
TO BYPASS LESIONS, AND RESTORE LOST FUNCTIONS IN SPINAL CORD  
INJURY [02/21]**

### **Project Description**

A spinal cord injury (SCI) is damage to the spinal cord that results in a loss of function, such as mobility and/or sensation. Frequent causes of spinal cord injuries are trauma (car accident, gunshot, falls) or disease (polio, spina bifida, Friedreich's ataxia). When a spinal cord injury occurs, the patient loses function below the point of injury. i.e., if the injury occurs in the cervical area of the spinal cord, all functions below the cervical area of the spinal cord will be lost. Process to localize SCI is ongoing and novel devices are being introduced to help patients with SCI. Many patients with SCIs are undergoing rehabilitation or using assistive devices in order to live productive, normal lives.

Studies have shown that innervating peripheral nerves to neural stumps innervating body parts that have lost functionality, have helped some patients regain mobility. Another paper has shown that, after a painful facet injury in the spine of the rat there are 50% more excitatory synapses in the dorsal horn and these synapses increase spontaneous firing along the spinal cord.

This focus of this project is to explore the hypothesis that localizing and bypassing the site of injury using electrical neuromodulation and tissue regeneration procedures will help restore lost functions. Specifically, several reviews and theories will be examined. At the end, the goal is to propose possible experiments to evaluate the hypothesis.

### **Required Skills**

1. Good foundations in anatomy and physiology
2. Good reading and analytical skills
3. Interns may be required to travel \*
4. Exhibit Strong interest and motivation for the project

Interns should have at least one of the above skill-set and be willing to learn others quickly

Applications are welcome from students in any of the following disciplines- Biomedical Engineering, Human Biology, Biological Science

APPLICATION DEADLINE: 26<sup>th</sup> APRIL 2021

### **Contact Person**

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## **RESEARCH INTERNSHIP: NEURAL DECODING/DATA ANALYSIS [03/21]**

### **Project Description**

This project involves the use of machine-learning based algorithms for information extraction and decoding using real-life neural data. First, interns will be exposed to the field of neural engineering, starting with an introduction to major topics and techniques related to the analysis of neural data. Afterwards, interns will work on integrating skills learned to test algorithms for extracting information of interest from real-life data. Topics to be covered include – introduction to neural engineering, electrophysiology, time-frequency signal processing, machine learning and neural decoding.

### **Required Skills**

1. Programming Skills (MATLAB)
2. Sufficient understanding of fundamental concepts in signal processing and machine learning
3. Experience in programming microcontrollers will be an advantage
4. Fabrication / design skills is an advantage

Applications are welcome from students in any of the following disciplines- Biomedical Engineering, Computer Engineering, Computer Science, Electrical Engineering, Mechanical Engineering and Mathematics.

APPLICATION DEADLINE: 26<sup>th</sup> APRIL 2021

### **Contact Person**

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## **RESEARCH INTERNSHIP: OPD VITALS MONITOR [04/21]**

## **Project Description**

The OutPatients Department (OPD) is the first point of care for any regular hospital visit where bio-signals such as temperature, height and weight are all recorded at this stage by a nurse.

A 2019 study showed that the average waiting time at the OPD can be well over 2 hours. This is due to several factors including lack of logistics and high workload.

As such, this project plans to design and build a biomedical device to automate the process of collecting bio-signals thereby reducing waiting time and staff workload at the OPD.

To begin, the project will focus on measuring and recording height, weight, BMI and temperature in the shortest time possible (<5 minutes). These records will be digitally recorded and logged in patients' files to eliminate the need for nurses to manually measure and log the data.

To achieve the project goal, the following tasks will be performed:

- Learn about sensors for measuring the vital signs
- Learn about current measuring systems (and how to incorporate them into a new design to eliminate cost)
- Investigate build materials, schematics, circuits that will be useful
- Simulations
- Prototyping

Testing (this will be in two phases: laboratory tests and partnering with a local clinic for tests).

## **Required Skills**

1. Programming (Arduino, MATLAB, Python)
2. Knowledge in biomedical instrumentation and biosensors
3. Medical Device Design
4. Simulation (SolidWorks, Proteus, etc)

Interns who do have these skills but have expressed a strong interest in the project should be willing to learn quickly.

Applications are welcome from students in any of the following disciplines- Biomedical Engineering, Computer Engineering, Computer Science, Electrical Engineering, Mechanical Engineering, Nursing, Biological Sciences and the School of Medicine and Dentistry.

APPLICATION DEADLINE: 26<sup>th</sup> APRIL 2021

## **Contact Person**

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