



# SUMMER INTERNSHIP - 2022

Applications are invited from **Third year ICE/CSE/ECE Students of NITT and other institute students** for undergoing internship in the Department of Instrumentation and Control Engineering to work in the following projects

## PROJECT- 1

### DEVELOPMENT OF HARDWARE TO ACQUIRE PPG SIGNAL TO ESTIMATE SPO<sub>2</sub>, HEART RATE & RESPIRATION RATE

The project work aims to design a finger probe using IR & NIR LEDs and a single silicon photo detector with an inbuilt trans-impedance amplifier to acquire the PPG signals through the finger using spectroscopy principle based on light absorption due to oxy and de-oxy levels in blood. Further estimate different vital parameters like SPO<sub>2</sub>, Heart Rate and Respiration Rate.

#### Roles and Responsibilities

1. To Design and develop an hardware to acquire accurate PPG signal
2. Transimpedance Amplifier Design
3. To implement Adaptive Noise Cancelling (ANC) technique to remove noise/motion artifacts from the signal
4. To Calculate R value for SPO<sub>2</sub> measurement
5. To detect Peak to peak Interval (PPint) and Pulse Transit Time (PTT) for Heart Rate algorithm.
6. Implementation of hardware to display the parameters like SPO<sub>2</sub>, Heart Rate and Respiration Rate.

## PROJECT- 2

### ESTIMATION OF BLOOD HAEMOGLOBIN USING PHOTOPHETHYSMOGRAPHY(PPG)

The main objectives of this project to design a finger probe with multiple LEDs with a photo detector, to implement signal-conditioning circuit to remove noise from the PPG signal, to develop an in-house algorithm to calculate total haemoglobin. Here the ultimate aim of the project is to measure total haemoglobin count with an error of less than 1 gm/dl

#### Roles and Responsibilities

1. To Design signal conditioning circuit to filter out the noise from the PPG signal.
2. To calculate absorbance of a particular blood component in particular wavelength using Beer-Lambert Law
3. To analyze two-component mixture (Oxy-hemoglobin and Deoxy-hemoglobin)
4. To analyze AC/DC component of PPG signal
5. Relevant Feature Extraction for Haemoglobin estimation
6. Develop a ML algorithm to measure total haemoglobin count

## PROJECT- 3

### ESTIMATION OF BLOOD GLUCOSE FROM PHOTPLETHYSMOGRAPH (PPG) SIGNAL USING MACHINE LEARNING MODEL

The project work aims to develop a fingertip PPG device and to use same for measuring Blood Glucose Level (BGL). To measure blood glucose from PPG signal, a few discriminative and related features need to be extracted from the obtained PPG signal and Machine Learning algorithm need to be employed to predict the actual value of BGL from the extracted features.

#### Roles and Responsibilities

1. To record and carry out in-depth study and analysis of the PPG signal.
2. Pre-processing of PPG signal for BGL estimation by extracting the appropriate features
3. Develop a ML algorithm to predict BGL
4. Implementation of algorithm in hardware

#### PRE-REQUISTE KNOWLEDGE:

- Bio-Signal Processing and Analysis , MATLAB, Python
- Machine Learning Algorithms and Implementation
- Sensor data Acquisition, Embedded Programming

**ONLY INCENTIVE**

- Selection will be based on Interview
- On completion of the assigned tasks, you will be paid appropriately, if not , only certificate will be issued

Duration : 3 Months

Number of Interns Required : 3

Interested Students can send their resume mentioning the project number to

[guma@nitt.edu](mailto:guma@nitt.edu) & [periyasamyr@nitt.edu](mailto:periyasamyr@nitt.edu)

## Important Dates

Last Date for resume submission  
**18th March,2022**

Start of Internship

**1st week of April 2022**