MONASH
ENGINEERING

MONASH University

Faculty of Engineering
Summer Research Program 2023-2024

Project Title: CerebrOx: A Smart Device for Improving CPR

Supervisor(s): A/Prof Shaun Gregory, Dr Andrew Stephens

Department: Mechanical and Aerospace Engineering

Email: Shaun.Gregory@monash.edu, Andrew.Stephens@monash.edu

Website profile of project supervisor: https://www.monash.edu/engineering/shaungregory

---

Objective

This project aims to develop an interrogator for near-infrared sensors which will be used to non-invasively measure blood-oxygen in the brain.

Project Details

There are around 20,000 cardiac arrests in Australia each year. The chance of survival with cardiac arrest is currently very low, and is dependent on the quality of cardiopulmonary resuscitation (CPR) received during cardiac arrest. Near-infrared spectroscopy (NIRS) sensors can non-invasively measure blood-oxygen in the brain and would be ideal for measuring the quality of CPR of a person in cardiac arrest. In this project, the student will design the electronics required to measure and process the NIRS signals. The student will then evaluate the NIRS device on healthy volunteers, comparing readings against other non-invasive standards. The student will be responsible for the design, build and validation of the interrogator. The student will have the opportunity to continue this work as a part of their FYP in 2024.

Figure 1: A render of the non-invasive CPR

Prerequisites

The ideal candidate will have a background in Mechatronics, Electrical or Mechanical Engineering with a strong background in analogue circuits, PCB design, and microcontroller programming. The candidate will need to be highly practically competent (hands on). The candidate will benefit from having experience in benchtop testing and flexible electronics. The candidate should have a strong work ethic and integrate well into a team environment, but be self-motivated to complete tasks.

Additional Information

We are a cardiovascular and respiratory engineering laboratory located at the brand-new Victorian Heart Hospital (on Clayton Campus). We are offering new and exciting projects which will give researchers an ideal opportunity to interact directly with the end users of this technology (cardiologists, intensive care doctors, surgeons).