

## PhD Research Project

### *Physiological control for mechanical circulatory and respiratory support*

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#### **The Opportunity**

This is an exciting opportunity for a PhD candidate to work on a major health issue within an interdisciplinary team. Cardiovascular and respiratory diseases are a major cause of death, while limited transplant availability means patients rely on mechanical circulatory and respiratory support (MCRS), which is often provided by extracorporeal membrane oxygenation (ECMO). ECMO typically consists of cannulas (tubing connecting the patient to the device), a pump (to provide blood flow), and an oxygenator (to oxygenate the blood in place of the lungs) among other components. Unlike the native heart, the pump typically operates at one continuous speed, set by a clinician. This can result in complications (such as cannula suction) or sub-optimal oxygenation. This project aims to develop a control system for ECMO that automatically alters pump speed (and thus circuit flow) based on sensor-derived feedback from the patient. The PhD candidate will work with a team of engineers and clinicians (intensive care, cardiac surgery, cardiology and more) to develop the control system and evaluate the system using state-of-the-art in-vitro and in-vivo facilities.

The candidate must have outstanding undergraduate results with a first class Honours degree or postgraduate degree in engineering (preferably electrical or mechatronics). The candidate must demonstrate a strong work ethic, excellent written and oral communication skills, and exceptional interpersonal skills to work in a team environment.

The candidate will be based within the Department of Mechanical and Aerospace Engineering at the Clayton Campus of Monash University while maintaining a close working relationship with partnering hospitals. The candidate will be supervised by Dr Shaun Gregory with co-supervision from Prof Ulrich Steinseifer and A/Prof Vincent Pellegrino (all Monash University). Monash University is in the top 100 universities worldwide, and the highest ranked engineering university in Australia.

Candidates who meet the academic requirements and entry requirements for a PhD at Monash and who would like further information can contact Dr Shaun Gregory using the email above.