

PhD Opportunity in Engineering / Vascular Surgery

This project will see the PhD student working with a team across both Engineering and Medicine. You will join Prof Tracie Barber (in Mechanical Engineering), Dr Shannon Thomas (Prince of Wales Hospital) and A/Prof Ramon Varcoe (Prince of Wales Hospital) to work on a project that has direct clinical impact.

A common treatment for people whose kidneys do not function properly is hemodialysis, where the blood is filtered extracorporeally. An access point for the filtration must be made using a surgical procedure, and this is usually achieved by connecting an artery and a vein to create an arteriovenous fistula (AVF). However, AVFs are associated with high failure rates, causing continued hospitalizations.

Understanding the complexity of the flow within the AVF is key to increasing the success of this lifeline. Our team of surgeons and engineers have been collaborating on this work for nearly ten years, with significant improvements now being seen in patient outcomes. By using engineering technologies to design the shape of AVFs, we can provide our surgical partners with the information needed to change surgical practice.

The student in this project will continue to collect patient data using our freehand ultrasound scanning system, at a weekly clinic held at the hospital. This data will be used, along with our new metric “Vascular Resistance” to develop a predictive model for AVF failure.

The project will involve working with our medical team to gain patient data, using our novel free-hand tracked ultrasound system and using analysis tools including machine learning to understand and predict blood flow characteristics. As well as excellent engineering analysis knowledge, you will need to have good hands-on skills and excellent communication as you will be working with hospital staff, medical students, and patients.

Contact Tracie for more information t.barber@unsw.edu.au