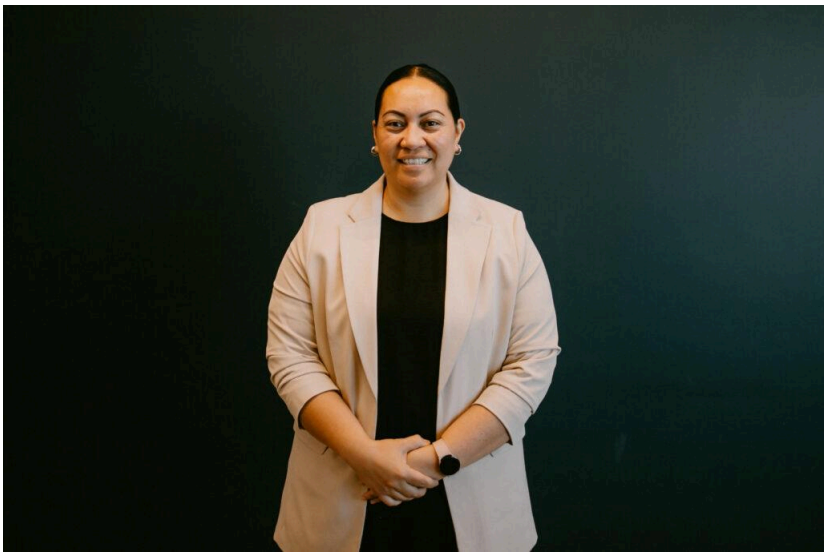
2025-2026 ABI & Te Tītoki Mataora Summer Studentship Projects

Please choose your first, second and third choice from the list of 19 projects below.

Project #1
Supervisor: Dr Amio Matenga Ikihele, University of Auckland and Moana Connect

Student to be hosted in: Mangere, Auckland
Project Title: The role of digital health tools and improving Pacific health and wellbeing

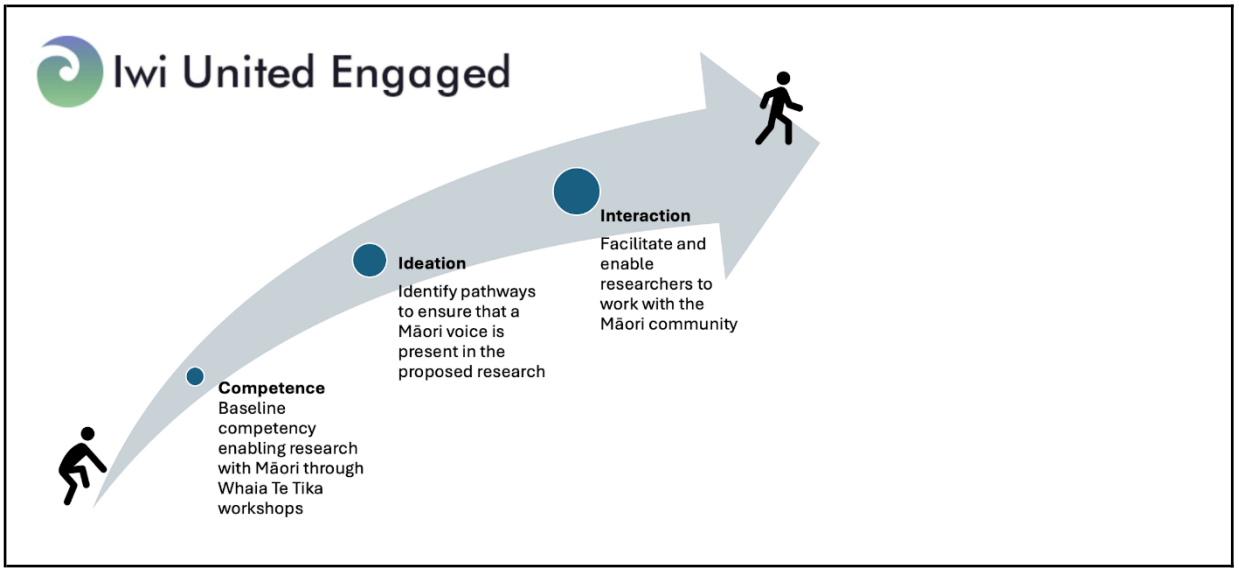
This project will explore how digital health tools that can be used to improve the health and wellbeing of Pacific communities, particularly when using artificial intelligence. There is an opportunity to work on an AI tool to respond to a health topic for Pacific communities.

Ideal candidates will be knowledgeable with computer science or building software or has developed AI tools would be handy. It is also open to med students or 3rd year health science students. Please bring your own laptop.

Project #2
Supervisor: MISTY EDMONDS, IUE
Student to be hosted in: AUCKLAND
Project Title: From Researcher to Kairangahau for Tangata Tiriti in Aotearoa

The aim of this project is to provide evidence to support our Māori-led approach as a means to influence Kairangahau practice. The research will provide evidence to support our innovative community-based model of health research engagement.

The model of work we have developed is Māori-led and conceived by Māori as a mechanism for non-Māori to engage with us (Tangata Whenua) as Tangata Tiriti. Our model is intended to provide a way for Māori in the community to work with non-Māori. There has been clear interest in this approach expressed from the Health research community, and support for our work expressed from the local Māori community.

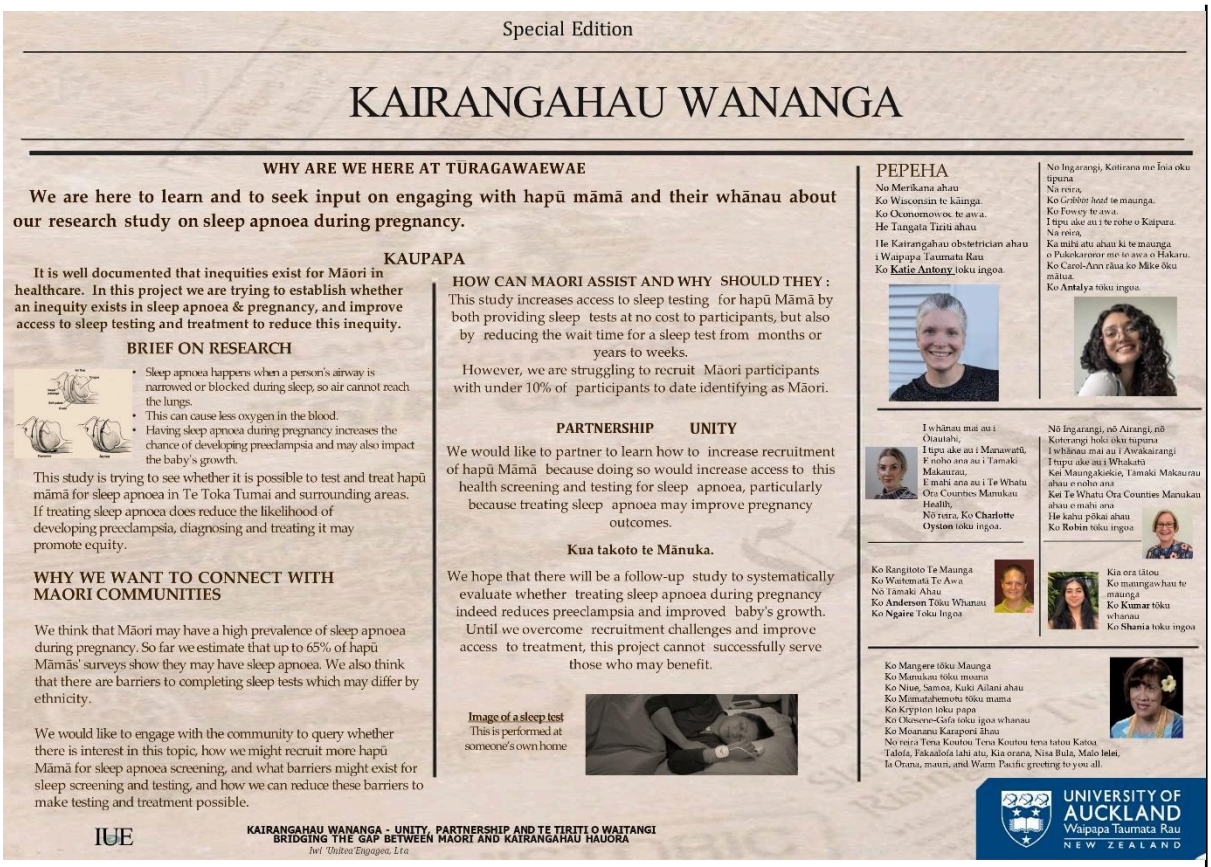


Proposed activity

We propose research that will provide evidence to support our innovative community-based model of health research engagement. During the project we will use Whakawhanaungatanga, Kotahitanga, and Manaakitanga to deliver proposed activities that address the research question.

Ideal candidates will have working or engaging with Maori-health background. Maori-non Maori is no problem.

Project #3
Supervisor: Dr Kathleen Antony, University of Auckland, Department of Obstetrics, Gynaecology, and Reproductive Sciences, Obstetrician/ Maternal-Fetal Medicine



Special Edition

KAIRANGAHAU WĀNANGA

WHY ARE WE HERE AT TŪRAGAWAEWAE

We are here to learn and to seek input on engaging with hapū māmā and their whānau about our research study on sleep apnoea during pregnancy.

KAUPAPA

It is well documented that inequities exist for Māori in healthcare. In this project we are trying to establish whether an inequity exists in sleep apnoea & pregnancy, and improve access to sleep testing and treatment to reduce this inequity.

BRIEF ON RESEARCH

- Sleep apnoea happens when a person's airway is narrowed or blocked during sleep, so air cannot reach the lungs.
- This can cause less oxygen in the blood.
- Having sleep apnoea during pregnancy increases the chance of developing preeclampsia and may also impact the baby's growth.

This study is trying to see whether it is possible to test and treat hapū māmā for sleep apnoea in Te Toka Tumai and surrounding areas. If treating sleep apnoea does reduce the likelihood of developing preeclampsia, diagnosing and treating it may promote equity.

WHY WE WANT TO CONNECT WITH MAORI COMMUNITIES

We think that Māori may have a high prevalence of sleep apnoea during pregnancy. So far we estimate that up to 65% of hapū Māmās' surveys show they may have sleep apnoea. We also think that there are barriers to completing sleep tests which may differ by ethnicity.

We would like to engage with the community to query whether there is interest in this topic, how we might recruit more hapū Māmā for sleep apnoea screening, and what barriers might exist for sleep screening and testing, and how we can reduce these barriers to make testing and treatment possible.

HOW CAN MAORI ASSIST AND WHY SHOULD THEY :

This study increases access to sleep testing for hapū Māmā by both providing sleep tests at no cost to participants, but also by reducing the wait time for a sleep test from months or years to weeks.

However, we are struggling to recruit Māori participants with under 10% of participants to date identifying as Māori.

PARTNERSHIP UNITY

We would like to partner to learn how to increase recruitment of hapū Māmā because doing so would increase access to this health screening and testing for sleep apnoea, particularly because treating sleep apnoea may improve pregnancy outcomes.

Kua takoto te Mānuka.

We hope that there will be a follow-up study to systematically evaluate whether treating sleep apnoea during pregnancy indeed reduces preeclampsia and improved baby's growth. Until we overcome recruitment challenges and improve access to treatment, this project cannot successfully serve those who may benefit.

Image of a sleep test
This is performed at someone's own home

PEPEHA

Nō Merīkana ahau
Ko Wisconsin te kāinga
Ko Oconomowoc te awa.
He Tangata Tiriti ahau

He Kairangahau obstetrician ahau i Waipapa Taumata Rau
Ko **Katie Antony** tōku ingoa.

Nō Ingarangi, Kotirana me Īnia oku tipuna
Na reira,
Ko Gribbin hezd te maunga.
Ko Fowey te awa.
I tipu ake au i te rohe o Kaipara.
Na reira,
Ka mihi atu ahau ki te maunga
o Pukekaroro me te awa o Hakaru.
Ko Carol-Ann rāua ko Mike ōku mātua.
Ko **Antalya** tōku ingoa.

I whānau mai au i Otautahi,
I tipu ake au i Manawatū,
E noho ana au i Tamaki Makaurau,
E mahi ana au i Te Whatu Ora Counties Manukau Health;
Nō reira, Ko **Charlotte Oyston** tōku ingoa.

Nō Ingarangi, nō Airangi, nō Koterangi hoki oku tupuna
I whānau mai au i Awakairangi
I tipu ake au i Whakatū
Kei Maungakiekie, Tāmaki Makaurau ahau e noho ana
Kei Te Whatu Ora Counties Manukau ahau e mahi ana
He kahu pōkai ahau
Ko **Robin** tōku ingoa

Ko Rangitoto Te Maunga
Ko Waitematā Te Awa
Nō Tāmaki Ahau
Ko **Anderson** Tōku Whanau
Ko **Ngaire** Toku Ingoa

Kia ora tātou
Ko maungawhau te maunga
Ko **Kumar** tōku whanau
Ko **Shania** toku ingoa

Ko Mangere tōku Maunga
Ko Manukau tōku moana
Ko Niue, Sāmoa, Kuki Āilani ahau
Ko Māmatahemotu tōku mama
Ko Krypton tōku papa
Ko Okosene-Gafa toku igoa whanau
Ko Moanana Karaporā ahau
Nō reira Tena Koutou Tena Koutou tena tatou Katoa
Talofa, Fakaalofa lahi atu, Kia orana, Nisa Bula, Malo lelei,
Ia Orana, mauri, and Warm Pacific greeting to you all.

IUE

KAIRANGAHAU WANANGA - UNITY, PARTNERSHIP AND TE TIRITI O WAITANGI
BRIDGING THE GAP BETWEEN MAORI AND KAIRANGAHAU HAUORA
Iwi Whitea Engagea, Ltd

UNIVERSITY OF AUCKLAND Waipapa Taumata Rau NEW ZEALAND

Student to be hosted in: University of Auckland, Grafton Campus
Project Title: Mate hoto hau and hapūtanga/ sleep apnoea & pregnancy
This project would likely be of greatest interest to a medical student or a student interested in health, specifically wāhine health. Any needed skills can be taught. We would like the student to be able to build whakawhanaungatanga with hapū Māmā and be comfortable discussing sleep, pregnancy, and our study, which we will teach them about. Information about our study (for potential participants) is available at sleeppregnancy.auckland.ac.nz
We will meet daily at the start of the project and weekly or more frequently thereafter to orient, answer questions, and support. This student will also be encouraged to attend student activities and events. The student will also attend team meetings.

Project #4

Supervisor: Haruna Suzuki-Kerr & Michelle Pokorny (joint supervision), Manuakau Superclinic (Health NZ, Michelle), The University of Auckland, FMHS (Haruna)



Student to be hosted in: Grafton campus, the University of Auckland

Project Title: Hearing health and research communication

This is a summer studentship project jointly hosted by Dr Michelle Pokorny (Audiology kairangahau, Manukau superclinic) and Dr Haruna Suzuki-Kerr (Ear Physiology kairangahau, UoA). Michelle is working on multiple projects using AI and other emerging tool to efficiently diagnose and treat hearing loss, while Haruna is working on developing a new diagnostic and treatment medical device for hearing loss. Michelle and Haruna are both passionate about hearing health and sharing their research with the community, however, in recent years noticed need for more open, community focused resources. The aim of this summer studentship is to produce appropriate information material to communicate research and health information accurately and clearly that can be used in hearing screening, and research showcases with the community. Over the summer, the summer studentship scholar will work with Michelle and Haruna to learn about hearing health, research and clinical activities to produce these materials.

The aim of the project is to produce creative communication material to accurately capture hearing health information. An enthusiastic student, with creative mind and interest in sharing health and

science information with general public will be suitable for this project. The student will have opportunity to work with both Michelle and Haruna to learn about audiology and hearing research; as well as being part of the future community engagement. As such, a student with strong interest in ear health, hearing loss, or becoming audiologist will benefit the most from the opportunity.

Student will have opportunity to work on the Grafton campus to access the lab and computer to learn about hearing research and clinical practice.

The student scholar will have regular meetings with both Michelle and Haruna. In addition, we have regular meetings with other postgraduate students and staff within the research team to provide peer support and culture.

Project #5

Supervisor: Dr Madeleine White, Gillies McIndoe Research Institute



Student to be hosted in: Wellington, onsite at Gillies McIndoe Research (Victoria of University affiliate) Institute

Project Title: Exploring Natural Product Testing for Health Tech Applications

This project offers a unique opportunity to explore how natural products can be tested using modern biological assays. The student will gain hands-on experience working with human and mouse cell lines to investigate anti-inflammatory effects, barrier function, and toxicity. Alongside lab work, there will be scope to explore the commercial and health tech potential of these assays — including

identifying market needs and opportunities for future service development. This is a great fit for students interested in combining lab science with real-world impact.

Ideal candidates will have biomedical or health background, biology students with an interest in commercialisation and industry engagement. Ideally they will be keen to get some wet lab experience but doesn't have to focus on that side of the project, could focus on market research.

Project #6

Supervisor: Dr Hamid Abbasi, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: Unlocking Temporal EEG Signatures of Neonatal Hypoxic-Ischemic Brain Injury with Machine Learning



Newborns, particularly those born pre-term, face a substantial risk of brain injury after hypoxia-ischaemia (HI), a period of reduced oxygenation and cerebral blood flow that can lead to lifelong neurodevelopmental disability. Although neonatal care has advanced, dedicated neuroprotective and neuro-reparative therapies remain scarce. HI may arise during labour or in utero, and the resulting injury progresses through distinct pathophysiological phases that span days to weeks. Therapeutic success, as illustrated by hypothermia treatment for term infants, depends on precise timing; our group has shown that the optimal window for cooling lies within the first 6–7 hours after HI, with maximal benefit when initiated in the initial 3 hours of life.

Accurate treatment timing requires biomarkers that reveal both the risk of injury and its evolving stage. Continuous electroencephalography (EEG) provides a bedside measure of cerebral function, and our previous work confirms its utility in tracking HI progression. Building on this foundation, the proposed summer project here will analyse high-resolution EEG recordings from pre-term and full-term fetal sheep to characterise how spectral features change after HI and under different therapeutic interventions.

Aims
The project will address three objectives:
1. Quantify the temporal evolution of EEG spectral power and connectivity during each injury phase.
2. Compare EEG biomarkers between pre-term and full-term models to identify gestational age–specific patterns.

3. Assess how candidate interventions modulate these EEG signatures and refine the timing of therapy.
The insights gained will guide future translation of EEG-based biomarkers to neonatal intensive care and support the development of phase-specific treatments for vulnerable infants.

Timing: 4 months

Desired skills: We seek a motivated student with a background in engineering, computer science, or biomedical engineering, with a strong interest in medical data analysis and computational neuroscience, and proficiency in Python or Matlab. Experience in machine/deep learning, and/or medical signal/image analysis is highly beneficial.

Project #7

Supervisors: Jichao Zhao, Fan Feng, Auckland Bioengineering Institute (ABI)



Student to be hosted in: Auckland, ABI

Project Title: Investigating Epicardial Adipose Tissue Geometry and Shape: Unraveling Its Role on Atrial Fibrillation

Atrial Fibrillation (AF) is the most prevalent cardiac arrhythmia, leading to increased risks of stroke, heart failure, and other cardiovascular complications. Emerging evidence suggests that the geometry and shape of Epicardial Adipose Tissue (EAT) play a critical role in the development and persistence of AF. However, the exact mechanisms through which EAT geometry influences atrial function and AF onset remain poorly understood, limiting the effectiveness of current therapeutic approaches.

EAT is a unique fat depot located between the myocardium and the visceral pericardium. Its proximity to the heart's atrial chambers suggests a significant influence on atrial electrophysiology and structural integrity. Variations in the geometry and shape of EAT may contribute to atrial remodeling, a key factor in AF pathogenesis.

The aims of this study are to:
1. Utilize Deep Learning to Segment Epicardial Adipose Tissue (EAT) and the Four Cardiac Chambers from Large-Scale CT Data
2. Establish Statistical Shape Models to Study the Geometry Distribution of Epicardial Adipose Tissue
3. Conduct clinical studies to assess how variations in EAT geometry influence ablation outcomes and develop personalized ablation approaches based on patient-specific EAT characteristics

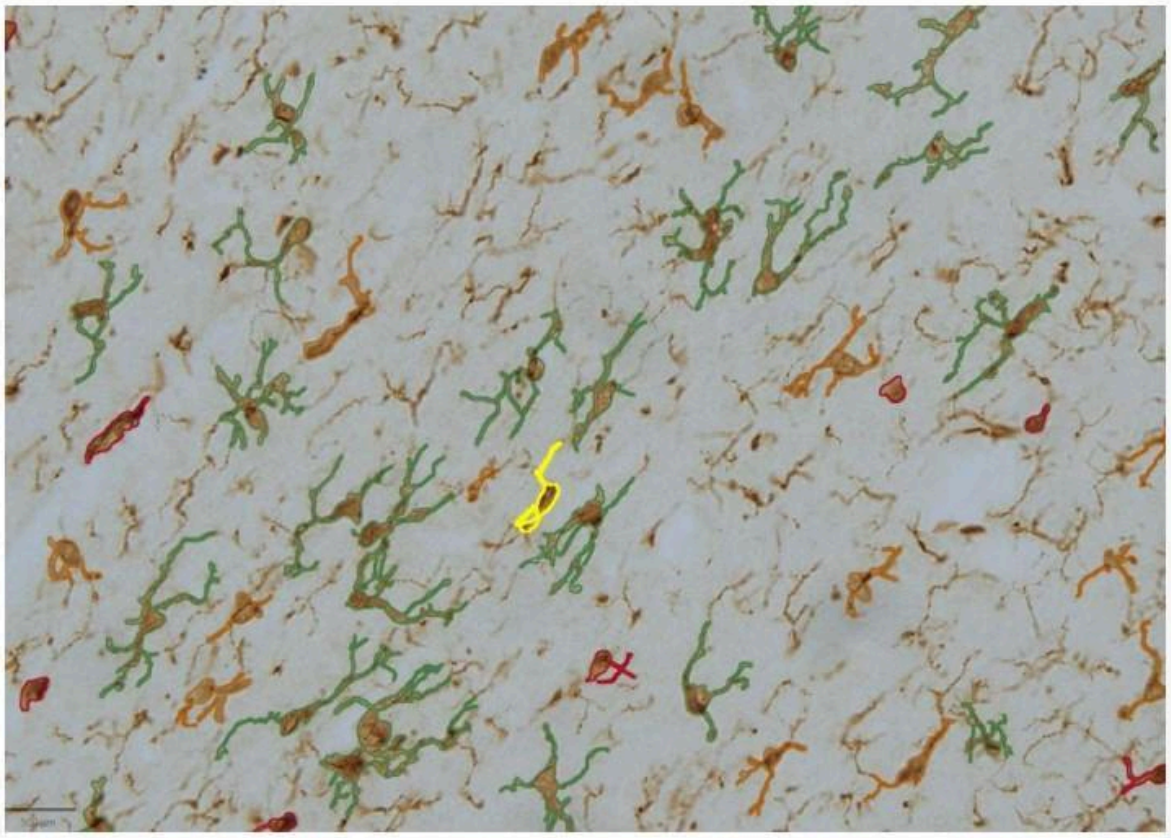
Desired skills: Ideal candidates will have solid background in Engineering/Mathematics and programming skills. Experience in medical imaging will be beneficial.

Project #8

Supervisor: Dr Hamid Abbasi & Associate Professor Joanne Davidson, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: Machine Learning for Enhanced Glial Cell Detection in Hypoxic–Ischaemic Brain Injury Images



Insufficient oxygen and cerebral blood flow around birth can precipitate hypoxic-ischemic encephalopathy (HIE), triggering a complex inflammatory cascade in which microglia and astrocytes

play central roles. This summer project will accelerate computational investigations of these glial cells by assembling a meticulously annotated image repository and creating augmentation pipelines that broaden its research value.

You will assist in the annotation process using a mix of manual labeling and semi-automated techniques, and potentially also working on extensions for the segmentation GUI that will benefit the broader community.

Following dataset curation, you will explore and implement novel data augmentation strategies aimed at expanding the dataset without the use of manual annotations. These augmentations will be validated using basic machine learning models (e.g., CNN or transformer based segmentation models).

By the conclusion of the project, you will have developed robust methodologies and user-friendly tools that substantially accelerate glial-cell investigations in neonatal brain-injury research.

Required skills:

Proficient Python programming

Familiarity with image processing libraries (e.g., OpenCV, scikit-image)

Exposure to the PyTorch machine learning frameworks is desirable, but not required

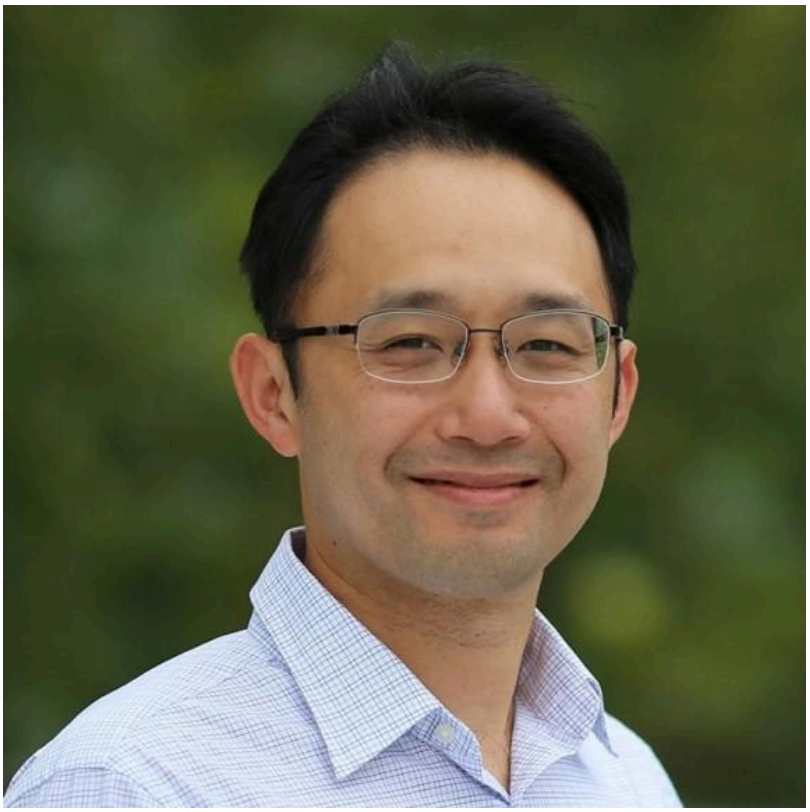
Attention to detail

A team player

A basic knowledge of biology, including microglia and astrocytes.

Project #9

Supervisor: Leo Cheng, Nipuni Nagahawatte, Recep Avci, Auckland Bioengineering Institute (ABI)



Student to be hosted in: Auckland, ABI

Project Title: Waxing and Waning of Intestinal Slow Wave Activity

Your gut contracts to enable the breaking down, mixing, and propulsion of food within your gut. These movements or contractions are coordinated by rhythmic electrical events known as slow waves. It is hypothesised that waxing and waning is related to competing pacemakers operating in and out of phase. High-resolution GI slow wave mapping allows the mapping of spatial propagation patterns of small intestine slow wave activity. The opportunity now exists to:

1. Investigate the spatial distribution of waxing and waning activity in the small intestine, to determine if it is a spatial effect of competing pacemakers.

2. Compare the prevalence and morphology of waxing and waning in different regions of the small intestine.

3. Determine the frequency content of in vivo waxing and waning recordings, combined with the spatial distribution, to investigate potential of coupling of multiple dominant frequencies.

The student should ideally have a strong interest and background in signal processing, data analysis. Proficiency in MATLAB is preferred. No previous experience with experimental physiology is required.

Project #10

Supervisors: Nipuni Nagahawatte, Leo Cheng, Peng Du, Auckland Bioengineering Institute (ABI)



Student to be hosted in: Auckland, ABI

Project Title: Design and development of an endoscopic training tool

Endoscopy is a minimally invasive procedure used to visualise the interior of the gastrointestinal tract using a flexible tube with a camera. It aids in diagnosing conditions such as tumours and ulcers. Therapeutic interventions, such as polyp removal or bleeding control, can also be performed endoscopically. Endoscopic bariatric procedures, such as endoscopic sleeve gastroplasty and intragastric balloon placement, promote weight loss without external incisions.

Endoscopy training typically involves a combination of physical and virtual reality simulation-based practice, supervised procedures on patients, and structured feedback to develop technical and diagnostic skills. Modern methods may include virtual reality simulators and competency-based assessments to enhance learning and ensure proficiency.

This project will design and create a custom endoscopic training tool. It will include two main geometries: an idealised cube domain and a realistic stomach shaped domain. Possible training tasks may include, grasping, manipulating and moving objects between different regions of the domain.

The student should ideally have a strong interest and background in device design, CAD, 3D printing etc. Proficiency in SolidWorks is preferred.

Project #11

Supervisor: Hayley Reynolds & Tharanga Don, Auckland Bioengineering Institute (ABI)



Student to be hosted in: Auckland, ABI

Project Title: Advanced analysis of lymphatic drainage pathways in head and neck melanoma

Melanoma is the most aggressive form of skin cancer, known to spread from the skin to nearby lymph nodes, which can lead to to secondary tumours. Understanding this metastatic pattern is crucial for improving treatment planning and patient outcomes. In this project, students will analyse a large-scale lymphoscintigraphy (LSG) imaging dataset from over 17,000 melanoma patients, focused specifically on the head and neck region. These imaging data have been spatially mapped onto a 3D computational model of the skin and lymph nodes. Additionally, more than 6,000 patients are linked to rich clinical metadata -including demographics, pathology, and long-term follow-up - the Melanoma Institute of Australia, the world's most comprehensive melanoma database. Students will apply image analysis and visualisation techniques to uncover patterns in lymphatic spread, with the goal of understanding potential metastatic pathways in head and neck cancer.

Skills desired: computer programming and statistical methods.

Project #12

Supervisor: Recep Avci, Leo Cheng, Nipuni Nagahawatte, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: Cracking the Gut's Electric Code

Rhythmic electrical signals that govern stomach function are often disrupted in patients with conditions such as nausea and indigestion. Despite their clinical relevance, non-invasive methods for detecting and analysing these signals remain underdeveloped due to weak signal characteristics and the complexity of stomach anatomy. Our research aims to bridge this gap by leveraging cutting-edge

tools to map and model the intricate relationship between gastric electrical signals, bioelectromagnetic fields outside the body, and subject-specific anatomy.

Our vision is to revolutionise the diagnosis of gastric disorders by developing reliable, non-invasive tools that clinicians can use to detect and monitor bioelectromagnetic patterns indicative of these conditions. As a summer student, you will contribute to the computational aspects of this vision, gaining expertise in advanced electrophysiology, bioengineering, and healthcare innovation.

This project aims to develop a mathematical model of gastric electrical signals by optimising source configurations and forward computations. Specifically, you will

(i) investigate different source configurations and compare their corresponding bioelectromagnetic fields outside the body, and

(ii) evaluate and compare software packages for solving the forward problem of gastric electrical signals.

Desired Skills: Interest in electrophysiological modelling, working knowledge of MATLAB and/or Python, and familiarity with finite element method techniques.

Project #13

Supervisor: Peng Du, Jadranka Travas-Sejdic, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: Actuated printing of conducting polymer sensors

Medical device for diagnosis and rehabilitation are involving ever increasing number of sensors. In this project we will develop and refine manufacturing capabilities of 3D extrusion printing of conducting polymer sensors for multi-electrode bio-signal acquisitions. However, one of the challenges with a multi-electrode setup is the robustness of the tracks as they are printed onto the substrate material. To further improve the mechanical robustness of the sensor array, we will develop an approach with incorporating the single-pair twining technique of te raranga me te whatu (traditional weaving and pattern) to produce durable conducting tracks. The general scope of the work will involving the following tasks: (1) Identify the key specifications of non-invasive medical electrode applications (e.g. for cardiac, gastric and muscle recordings); (2) Visit automated dispenser setup and learn the extrusion manufacturing technique and its key production parameters;

The ideal candidate should be eager to engage and has an interest in engineering and chemistry.

Project #14

Supervisor: Mark Billinghurst & Kunal Gupta, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: User Study and Data Support for a Digital Human Mental Health Tool



The Tōku Hoa project at the Empathic Computing Lab explores how digital mental health companions can support emotional wellbeing in young people. Built in collaboration with Soul Machines, the Tōku Hoa mobile app features a conversational AI agent that provides personalized support using physiological and contextual inputs from the user's smartwatch and smartphone. The app enables reflective journaling, emotional check-ins, lightweight goal-setting, and just-in-time support conversations that adapt to the user's stress or emotional state.

This summer project will support the real-world evaluation study of the Tōku Hoa app, where participants will use the app daily over a four-week period, while physiological and behavioural data are collected passively through the smartwatch and smartphone sensors. The study aims to assess usability, engagement, and emotional expressiveness in naturalistic, everyday settings.

Key Responsibilities:

You will contribute to both study operations and data management tasks, including:

Participant Support and Technical Setup

Assist in onboarding participants and setting up the smartwatch-app system

Troubleshoot basic technical issues (e.g., device sync, connectivity)

Maintain participant tracking and check-in logs

Data Preprocessing and Management

Clean and organize multimodal data from app usage and sensor logs (e.g., HRV, activity, journaling entries)

Tag and anonymize datasets using consistent conventions

Documentation and Reporting

Maintain clear logs of data processing steps and participant study sessions

Contribute to internal summaries on app engagement and study adherence

Deliverables:

Cleaned and anonymized dataset from smartwatch and app logs

Internal report or slide deck summarizing key usage metrics

Contribution to usability issue log or app improvement suggestions

Learning Outcomes:

Real-world experience supporting a human-cantered technology evaluation

Practical skills in handling wearable and app-based data

Exposure to applied affective computing and personalized mental health support

Understanding of user-cantered research methods in digital wellbeing

Ideal Candidate:

Basic experience with data analysis tools (e.g., Python/Pandas or R)

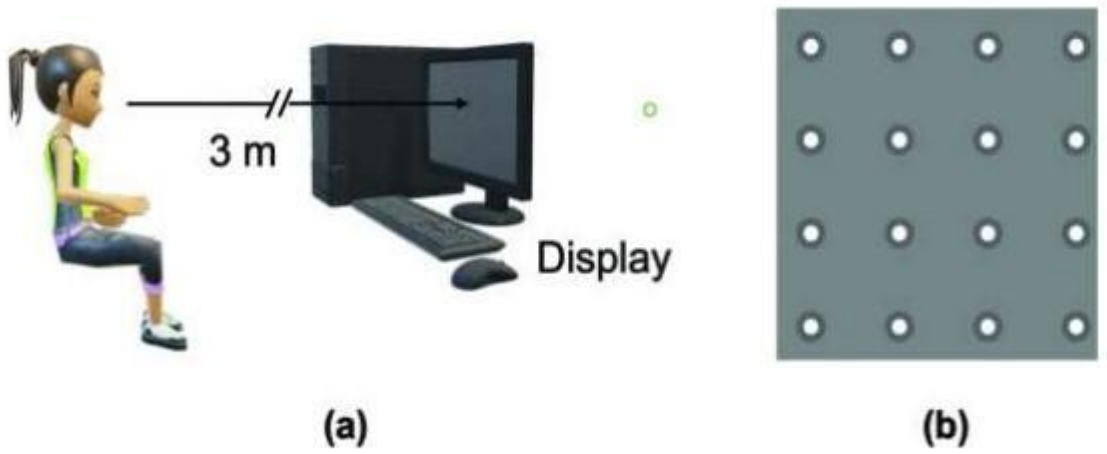
Reliable and detail-oriented

Interest in mental health, UX, or AI-driven digital interventions

Bonus: Familiarity with Android systems, physiological data, or HCI research

Project #15
Supervisor: Dr Mohammad Norouzifard & Dr Jason Turuwhenua, Auckland Bioengineering Institute (ABI)
Student to be hosted in: Auckland, ABI

Project Title: Eye motion analysis by machine learning



Be familiar with Python programming and computer vision, AI, Deep learning and GenAI - full time internship.

Project #16

Supervisor: Eryn Kwon, Vickie Shim, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: Building a pioneering child health study with community participation.

Paediatric imaging studies help understand human anatomy as we grow and develop. They can inform our understanding of normal anatomy and the epidemiology of disease, and help us identify early biomarkers of diseases.

The University of Auckland and Mātai Medical Research Institute are developing an ambitious, long term study to follow up a cohort of children in Tairāwhiti district. Advances in MRI technology make this an opportunity to understand the human body in greater detail than before.

This study is being developed with community and academic collaborators. Kaupapa Māori values will be central to the full study.

The research student will assist in designing the full study, building relationships with community stakeholders in the district along with academic collaboration. We are looking for a student who is interested in child health and Māori health, community participation, and research design. Being a strong communicator will be essential.

The research will be conducted in Tairāwhiti, so the student should be able to spend majority of the internship time in Gisborne.

Skills gained:

- Understanding research processes

- Working with community stakeholders

- Academic writing

Project #17
Supervisor: Dr. Prasad Babarenda Gamage, Dr. Alex Trevarton
Student to be hosted in: Auckland, ABI
Project Title: Co-designing an interactive digital storybook for advancing breast health awareness

Breast cancer affects 1 in 9 women in Aotearoa New Zealand. Raising awareness of breast cancer issues and educating all women about breast health is vitally important and can contribute to early detection and outcomes.

The overall goal of this project is to co-design an interactive digital storybook with the community to communicate key concepts for advancing breast health awareness. This information resource will integrate visualisations from breast cancer research to help communicate information to a range of audiences including the general public, patients, and whanau.

You will join a multi-disciplinary team of community engagement specialists, web application developers, bioengineers, clinicians, and nurse educators from the New Zealand Breast Cancer Foundation.

This project will suit students with an interest in community engagement, design, and communication.

Project #18
Supervisor: Eryn Kwon, Vickie Shim, Auckland Bioengineering Institute (ABI)
Student to be hosted in: Auckland, ABI
Project Title: Evaluating Targeted MRI for Enhanced Sensitivity and Specificity.

This summer research project will focus on analysing images from a novel Ultra-High Contrast (UHC-)MRI method developed by our team, to detect and visualise neuroinflammation in the brain. This cutting-edge technique aims to enhance the specificity and sensitivity of MRI in identifying neuroinflammatory processes associated with various neurological conditions such as multiple sclerosis, Alzheimer's disease, and traumatic brain injury. The project will involve comparing UHC-MRI images acquired on a clinical cohort of participants and comparing their efficacy with standard clinical MRI. The overall goal of the research team is to establish a reliable, non-invasive imaging biomarker for neuroinflammation that can improve diagnosis, monitor disease progression, and evaluate the efficacy of therapeutic interventions.

As the research will be mainly based in Tairāwhiti, the student is required to spend most of the internship in Gisborne.

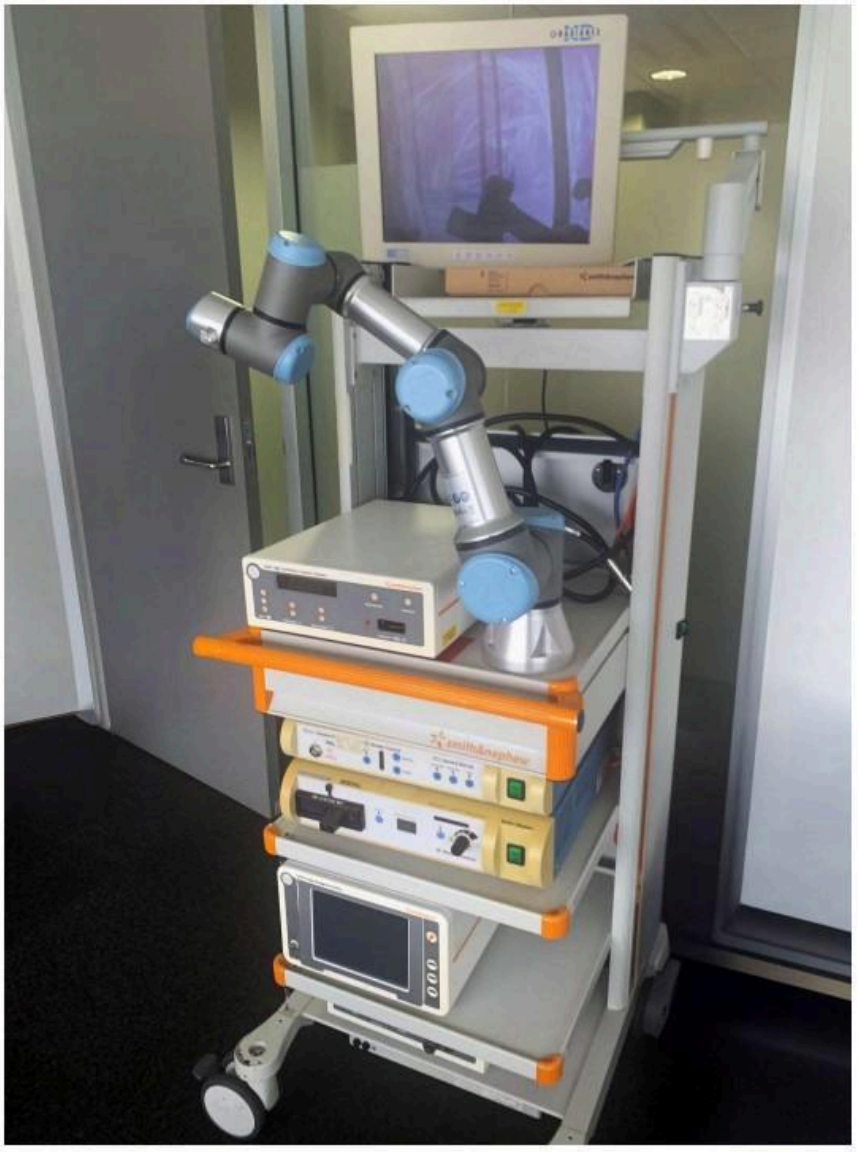
Skills recommended: MATLAB, image processing, data analysis.

Project #19

Supervisor: Huidong Bai, Auckland Bioengineering Institute (ABI)

Student to be hosted in: Auckland, ABI

Project Title: Periscope3D - A Robotic 3D Sensing System for Enhanced Remote Physical Collaboration



We propose Periscope3D - a robotic system that replaces traditional 2D camera feeds with real-time 3D spatial reconstruction to enable more immersive and spatially-aware remote collaboration. Current remote physical collaboration systems typically involve a remote expert (helper) guiding a local worker through physical tasks via a robot-mounted 2D camera, but suffer from occlusion issues, viewpoint constraints, and split attention between task execution and camera management.

Our proposed system integrates multiple 3D sensing modalities to create a real-time 3D representation of the workspace that can be explored intuitively by remote collaborators through VR/AR interfaces, while maintaining the proven shared control mechanisms. This approach aims to overcome fundamental limitations of 2D-based robotic collaboration by providing complete spatial awareness, eliminating viewpoint constraints, and enabling independent exploration of the workspace without disrupting the local worker's activities.

Project Duration:

- 10 - 12 weeks

Required Skills:

• Programming skills in C++ and/or Python under Linux

Preferred Qualifications:

• Experience with ROS (Robot Operating System)

• Previous work with computer vision libraries and/or depth sensing technologies