Faculty of Engineering

ASPIRE Summer Research Program 2026-2027

Project Title: **Computational Digital Twin for Fetal Monitoring System Development**

Supervisor(s): A/Prof Faezeh Marzbanrad, Dr Rob Galinsky

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Objective

Develop a computational digital twin of fetal physiology for non-invasive fetal monitoring. The project will create a virtual platform to simulate fetal physiology and support the development and validation of signal processing and AI algorithms.

Project Details

This project will contribute to the development of a computational digital twin of the fetus for next-generation fetal monitoring. The student will develop computational models in Python to simulate fetal physiological processes and investigate how changes in physiological states influence non-invasive transabdominal signals. Simulated outputs will be compared with representative animal and human recordings where appropriate. The project provides hands-on experience in biomedical engineering, computational modelling, signal processing, AI, and digital health, contributing to future affordable and explainable fetal monitoring technologies.

Project Timeline

TASK	1	2	3	4	5	6	7	8	9	10
Literature review										
Familiarisation with models and datasets										
Develop computational models										
Implement and refine										
Simulate physiological scenarios										
Optimise and evaluate										
Documentation/presentation										

Prerequisites:

Essential: ENG1005, ENG1014, Preferred: ECE2111, ECE2191, Interests: Biomedical Engineering, Programming, Artificial Intelligence, Signal Processing, and Physics.

Student Placement Agreement: A student placement agreement must be signed by the project supervisor and the student prior to commencement of the ASPIRE program.

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