

## Faculty of Engineering

### Summer Research Program 2024-2025

Project Title: Advanced Techniques for Noise Removal and Information Extraction in Physiological Data

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#### Objective

The main objective of this project is to develop advanced techniques for noise removal and information extraction from physiological data, leveraging multi-channel and/or multi-modal data. The goal is to enhance the quality and accuracy of the extracted information, ultimately improving diagnostic and monitoring capabilities in health applications. This project aims to address the challenge of separating useful signals from noise, especially in complex scenarios.

#### Project Details

This project will involve conducting a literature review to become familiar with existing techniques for noise removal and information extraction in noisy physiological data. It also requires studying the application of reference signals for noise cancellation and mutual information extraction. Following this, you will design methods to extract meaningful information from the processed signals, such as improving heart sound segmentation using ECG as a reference. You will develop and apply machine learning and AI techniques to enhance information extraction, ensuring the interpretability and explainability of the results. Working with real-world data that we have already collected, you will evaluate the performance of the algorithms.

#### Prerequisites

Students interested in this project should have the following:

Programming Skills Python and MATLAB.

Signal and Systems or Signal Processing: Completion of coursework in these areas, preferably with HD grade.

Preferred Knowledge/Experience or Interest in AI: Familiarity with AI techniques and a keen interest in applying them to physiological data analysis.

Other Preferred Skills: Experience with physiological signals, data visualization and statistical analysis will be useful.