MONASH
ENGINEERING

MONASH University

Faculty of Engineering
Summer Research Program 2023-2024

Project Title: Compact Radar Sensor Design for Health Monitoring

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Objective

The project requires the design of a low-power radar technology for measurement of human body signals.

Project Details

The detection and monitoring of medical signals such as heart and respiration rate without any contact to the skin has become an important research project recently. This project will develop a low-cost radar system that will be used as a platform for non-contact monitoring of medical signals. The system should be able to detect some important medical signals with a high signal-to noise ratio (SNR) by eliminating other non-ideal signals including motion artifact.

Development and production of the radar system will be based on low-frequency RF signals, including ultra-wide band (UWB) wireless system. The radar system should have a dimension smaller than 2.5cm x 2.5cm with built-in computing and processing capabilities. The radar system should wirelessly interface with a computer using a Bluetooth or WiFi connection to implement necessary algorithms for detecting and monitoring medical signals.

One of the key features of this research is the power reduction in hardware and efficient algorithm design using both software and hardware techniques to achieve the project goal. The system should also operate when the subject is moving.

Expectations: The students will be responsible for the development of a radar system and computer programs using MATLAB for low-noise monitoring of medical signals. The quality of medical signals could be enhanced with machine learning algorithms. At the end of the project, the students should evaluate the performance of the overall system with different environments e.g., indoor and outdoor conditions.

Prerequisites:

This project only accepts students from Electrical and Computer Systems Engineering, Robotics/AI, Mechatronics, and Biomedical Engineering. Students should be motivated to work on hardware development.