EPCS 205: Wireless Sensor and actuator networks, Fall 2024

Final Project 1

Instructor: Mahya Safavi

Wireless Pulse Monitoring System

Develop a wireless pulse monitoring system using two Raspberry Pi units. This system will capture pulse signals through a sensor, transmit the data over Bluetooth, and display the pulse data along with other relevant health metrics on a GUI at the receiving end. 3-4 students per group.

Materials Needed

Two Raspberry Pi units per group

ADC (Analog to Digital Converter) module (like MCP3008 or other compatible modules, as most pulse sensors are analog and Raspberry Pi doesn't have a built-in ADC)

Pulse sensor

Necessary cables and accessories

Project Breakdown

Setup and Sensor Integration

Task 1.1: Understand the working of the pulse sensor and the necessity of an ADC module due to the analog nature of most pulse sensors and the lack of a built-in ADC in Raspberry Pi units.

Task 1.2: Setup the first Raspberry Pi unit to integrate with the pulse sensor and the ADC module if necessary.

Data Transmission:

Task 2.1: Establish a Bluetooth connection between the two Raspberry Pi units utilizing online libraries such as BlueDot or similar.

Task 2.2: Configure the first Raspberry Pi to transmit the pulse signal data to the second Raspberry Pi wirelessly over Bluetooth.

GUI Development and Data Representation:

Task 3.1: Develop a GUI on the second Raspberry Pi to visually represent the received pulse data.

Task 3.2: Incorporate features in the GUI to calculate and display vital health metrics including BPM (Beats Per Minute), IPM (Impulses Per Minute), HRSTD, and RMSSD (Root Mean Square of the Successive Differences).

Testing and Documentation:

Task 4.1: Test both sender and receiver components to ensure the accuracy and reliability of data transmission and representation.

Task 4.2: Document the setup process, code, and functionality of the system in a comprehensive report. Though any programming language can be used for development, Python is recommended for its versatility and compatibility with Raspberry Pi.