De La Salle University
Computer Technology Department

NSEMBED
Final Project

1   Introduction

The NSEMBED final project is based on the hardware aspect of your NSAPDEV final project. The embedded system is the device that sends data to the server in the NSAPDEV project. There are several embedded systems that can be the hardware device: RFID terminal for POS system or toll service, remote vibration recorder, pedestrian traffic detector, and mini weather station.

2   Objectives

- General Objective:
  - To develop a remote embedded system that sends required data to a remote server
- Specific Objectives:
  - To interface a sensor to the ESP32;
  - To use timers and interrupts on the ESP32 in collecting sensor data;
  - To use threading in assigning tasks to a function;
  - To establish communication between the ESP32 and computer using wireless communication;

3   Requirements

- RFID Terminal for Point of Sale / Toll Road service
  - Embedded system is a RFID terminal that sends information to the server
  - The RFID terminal is to send the time stamp or transaction time, RFID tag information, terminal ID and other required information to the server
  - The RFID terminal should have LEDs to show the status of the transaction
- Vibration Recorder
  - Embedded system sends time stamp and seismic (vibration) data to the server
  - Embedded system can use the ADXL345 or the MPU6050 to record vibration data
  - The system should have an LED that lights up if vibration has peaked a certain g force, it should turn off after one second
- Pedestrian Flow Detector
  - Embedded system sends pedestrian data traffic flow to the server
  - Embedded system can PIR sensors to detect pedestrian traffic
  - Embedded system should have an LED to show a pedestrian is detected
- Mini Weather Station
  - Embedded system sends temperature data in a location to a server
  - Data sent by the embedded system should have a time stamp, station ID and temperature data
  - Additional sensors like humidity and rain sensors can be also be included

Aside from the mentioned requirement in the type of project, all the embedded system in the project is required of the following:

- All data from the embedded system should be sent using wireless communication to the server.
- All data sent from the embedded system should be in JSON format
- Embedded system should use timers or interrupts when collecting data
- Embedded system should use threading for wireless communication
- A server code on a PC that displays the received data from the embedded system (for groups without NSAPDEV subject)

4   Documentation

Documentation should include the following:

- Cover Page

<div style="border:1px solid black; padding:20px; min-height:400px;">

NSEMBED Mini-Project 2

Section:
Group No:
Members:
    Last name, First name (Member 1)
    Last name, First name (Member 2)
    Last name, First name (Member 3)

</div>

- Document Content Outline
    1. System Overview

        In diagrams, flowcharts, short descriptions, and photos, explain how your system works (hardware and software) and how the test environment and methodology is set up.

    2. Results and Analysis

        Share the results gathered from the experiment using tables, graphs, and charts. Do not just show raw data. Include short descriptions that explains and analyzes the results.

    3. Conclusion

Include a short conclusion that reviews the introduction and objectives.

4. References

Include references, if any.

5 Project Rubric

Embedded System - Functionality	The developed system is successfully able to complete all the required specifications.	The developed system is successfully able to complete most of the required specifications, only missing out on one or two minor features.	The developed system is successfully able to complete some of the required specifications, missing out on one major feature or on more than three minor features.	The developed system is successfully able to complete a few of the required specifications, missing out on two or more major features and on more than three minor features.	The developed system is not able to successfully complete any requirement.
	20 points	19 – 15 points	14 – 10 points	9 – 1 points	0 points
Documentation – System Overview	The discussion includes all the hardware, software, and testing methods that were conducted. It is supported by several diagrams, flowcharts, and photos.	The discussions include some of the hardware, software, and testing methods that were conducted. It is supported by only one or two supporting diagrams, flowcharts, and photos.	The discussions include only a few of the hardware, software, and testing methods that were conducted. It is not supported by diagrams, flowcharts, and photos.	No system overview is included.	
	5 – 4 points	3 points	2 points	0 points	
Documentation – Results and Analysis	The results are presented using a variety of tables, charts, and graphs, which are companied by short descriptions. Analysis of results are included relevant.	The results are presented using only a single table, chart, or graph, which is companied by short descriptions. Analysis of results are included but is not very relevant.	The results are presented using only a single table, chart, or graph, which is companied by short descriptions. No analysis to the results is provided.	Raw data is presented, and no analysis is included.	
	5 – 4 points	3 points	2 points	1 – 0 points	
Documentation – Conclusion	The conclusion is well-written.	The conclusion misses out of particular pieces of information or	No conclusion is included.		

		details. It is not very well-written.			
	5 – 4 points	3 – 1 points	0 points		

6   Submission Deadline and Deliverables

- ESP32 microcontroller source code
- Computer application program source code
- Documentation