Final Project Proposal

Year: 2024 Semester: Fall Team: 8 Project: Smart Seating System

Creation Date: 08-24-2023 Last Modified: 08-24-2023

Team Members (#1 is Team Leader):

Member 1: Roshan Sundar Email: rmsundar@purdue.edu

Member 2: Giang Nguyen Email: nguye683@purdue.edu

Member 3: Gabriel Wang Email: wang4340@purdue.edu

Member 4: Lee Dongeun Email: ldongeun@purdue.edu

1.0 Project Description:

In light of the growing utilization of shared spaces and the challenges they pose in terms of occupancy management, the Smart Seating System effectively tackles the issue by tracking seating in common spaces, and reporting that information to visitors in a convenient way. It consists of four major components: the Sensor Module, Control Unit, Web Server, and Phone App. Every seat in a public space can be equipped with a dedicated Sensor Module and Control Unit, enabling real-time tracking.

Employing sensors like distance, weight, and RFID, the Sensor Module collects data regarding seat occupancy. The Control Unit processes the data and sends it to the Web Server, which receives data from all Control Units and employs intelligent analysis to determine seat occupancy. For users, the Phone App provides a user-friendly interface to access seating information remotely. By connecting to the Web Server, the app retrieves real-time occupancy data and statistics, empowering visitors to make informed decisions about seating availability, especially during peak periods.

The Sensor Module, Control Unit, and Web Server will be the focus of development. If time permits, the Phone App may be developed as a stretch goal.

2.0 Team Member Expertise and Team Roles and Responsibilities:

2.1 Team Member Expertise:

2.1.1 Team Member: Roshan Sundar

* Coursework: ECE 362, ECE 40862, ECE 337, ECE 264, ECE 368, ECE 463
* Experience: Software developer (Flexware Innovation), Research (IUPUI)
* Expertise: Software Development, Embedded Systems

2.1.2 Team Member: Giang Nguyen

* Coursework: ECE 362, ECE 40862, ECE 473, ECE 337, ECE 368
* Experience: ECE 40862 TA, Toyota Product Development Test, AI/ML Research.
* Expertise: Embedded, Software Development, Machine Learning and Data Mining

2.1.3 Team Member: Gabriel Wang

* Coursework: ECE 362, ECE 40862, ECE 368, ECE 264, ECE 463
* Experience: ECE 270 TA, Software Engineer for General Motors
* Expertise: Software Integration, Deployment, Embedded Systems

2.1.4 Team Member: Lee Dongeun:

* Coursework: ECE 362, ECE 337, ECE 437, ECE 264
* Experience: ECE 437 TA, ECE 337 TA, Purdue NanoML Research Assistant
* Expertise: VDHL, AI modeling, Embedded Systems

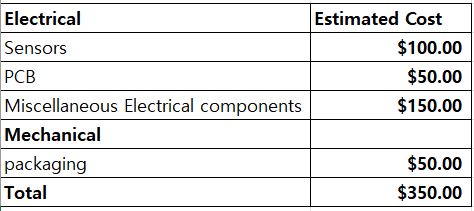
2.2 Team Roles and Responsibilities:

| Role | Team Member |
| --- | --- |
| Team Leader | Roshan Sundar |
| Systems Engineer | Gabriel Wang |
| Hardware Engineer | Lee Dongeun |
| Software Engineer | Giang Nguyen |

3.0 Homework Assignment Responsibilities*.*

| *Design Component Report* | | *Professional Component Report* | |
| --- | --- | --- | --- |
| A3-Software Overview | Roshan Sundar | A9-Legal Analysis | Giang Nguyen |
| A4-Electrical Overview | Lee Dongeun | A10-Reliability and Safety Analysis | Gabriel Wang |
| A6-Mechanical Overview | Giang Nguyen | A11-Ethical/Environmental Analysis | Lee Dongeun |
| A8-Software Formalization | Gabriel Wang | A12-User Manual | Roshan Sundar |

4.0 Estimated Budget



5.0 Project Specific Design Requirements

1. [Hardware] An ability to interface between a ESP32 micro and RFID sensor via UART bus
2. [Hardware] An ability to interface between a ESP32 micro and Pressure/Weight sensor via I2C bus
3. [Hardware] An ability to interface between power supply and the micro/sensors
4. [Hardware] An ability to interface between micro and wireless Bluetooth module, in order to send sensor data to a web server
5. [Software] An ability for a web server to take in wirelessly transmitted sensor data and compute occupancy

6.0 Sources Cited:

External sources were not used in this report.