

Team: Longxiang Cui, Ying Ou, Jordan Makansi, Chenyang Xu

The Marauder's Map

Project Goal

This project will create a counter recording occupancy of the room and transfer the results to a remote server page or a local computer. These results can be utilized to control other features of the room or be acquired from another device, such as cell phone. We will also be able to identify the people in the room if time allows. Information of occupancy of room is important both for energy saving and convenience reasons. It is common for an office to light up the whole night just because the last person left forgets to turn off the light. It might also be a waste of energy if the AC keeps the office cool in summer night when nobody is present. The occupancy information can also be useful for us to determine whether or not to go to public shared area, such study rooms, labs, or cafeteria. We can first check the number of people present there, and then visit these public places when there is more seating available. Furthermore, if we can identify the person in the room, we are able to provide customize the room's environment for that person.

Project Approach

The project will model the arrival of students using a combination of sensors, such as infrared proximity sensors, and weight sensors. We can have two sets of infrared proximity sensor on different side of doors, one inside, and one outside. Based on which sensor getting triggered first we can decide whether there is someone entering the room, or leaving the room. The weight sensor implemented at the entrance of the door will help to verify the presence of people. If there are people present, we can further control the temperature inside the room based on readings from the thermometer. Or we can use other devices checking numbers of people presented inside one room from the remote server.

Resources

The full system is composed of three main different modules. First module is a proper power supply either has output of 9V or 5V DC to power the peripherals and mbed Raspberry Pi/FRMD KL25Z microcontroller. Second part is the main microcontroller and third section would include WiFi receiver, environment sensors and actuators. We will use the microcontroller provided by the class and for the unavailable parts, we would purchase them via Digikey. The first step in the project will be to investigate types of sensors we will integrate into the project and their compatibility with the microcontroller. Afterwards, obtained and verified the appropriate sensor group we need, our next step is mainly to focus on building the wireless communication feature of the monitoring system with routers and WiFi receiver. By the data read from different types of sensors, the microcontroller should analysis and calculate the occupancy situation inside a room. Giving the real time number of people inside a room and display the result on a remote server page or transfer them back to the local computer. The current sensors in our scopes are infrared sensor, temperature sensor, and weight sensor. At last, based on the collected data, a feedback actuator would perform a certain task to reflect the room occupancy status such as having a sound, displaying some information on LED or driving a servo. The possible extra upgrades of the project will be designing a status-monitoring platform via an online server accompanying with the sensor readings.

Schedule

- October 21: Deliver Project Charter
- October 28: Platform for hardware development, and sensors will be chosen.
- November 4: Project Review with mentor and GSI's.
- November 8: All software necessary for development will be downloaded. Wi
- November 17: Project Update. "Hello-world" hardware equivalent for all components.
- November 25: Wireless communication tested. Milestone report turned in.
- December 2: Actuation of sensors tested. Real-time communication implemented.
- December 9: Interface and display developed. Exhaustive testing.
- December 16: Demonstration video made, powerpoint prepared.
- December 17: Powerpoint prepared and rehearsed. Final presentation and demo.
- December 19: Project report and video turned in.

Risk and Feasibility

Our first risk might come from the availability of resources. Due to the huge demand of student, we might not be able to acquire our desired sensors at the beginning. Our Second risk might come from our communication unit. We might not be able to send our signal to server. If we failed to send out our signal, we would display the acquired information locally through LED arrays.