EE250 Final Project Report

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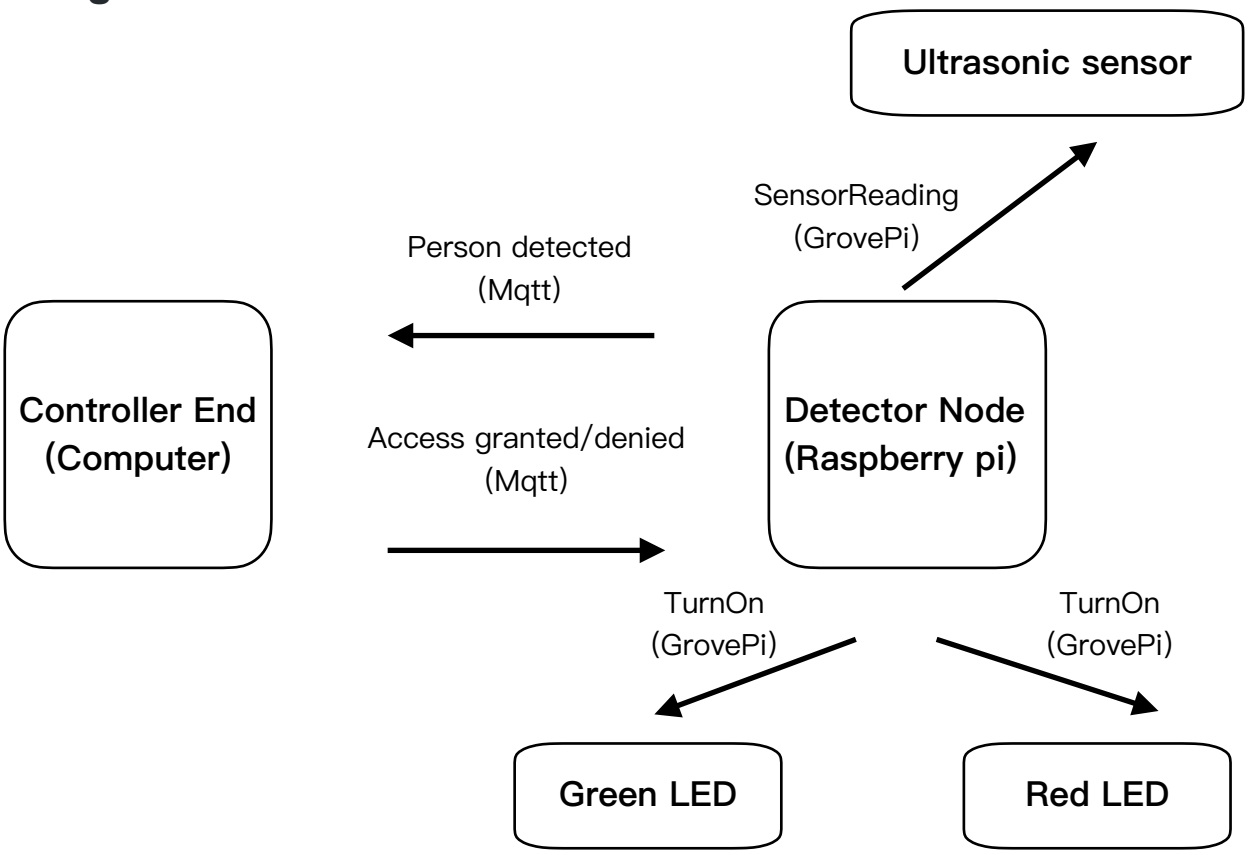
What it does

We want to create a security system that allow the home owner to detect visitors from the door and grant or deny their access.

Our project is consist of two parts: A computer that acts as the controller end and a raspberry pi which acts as the detector node.

When someone is at the door, the ultrasonic sensor on the detector node will have a reading below the threshold and will send an Mqtt message to the controller end. The owner then can a responds yes or no to let the person in. If the owner says yes it flashes green and no flashes red on the raspberry pi.

Block diagram



Things we used to make it work:

For the communication between the computer and raspberry pi, we use Mqtt which a publish-subscribe, machine to machine network protocol for message queue/message queuing service. It is lightweight perfect for IoT implementation like ours. We also learned and used it a few times in this class so we are familiar with it.

To get the data from the ultrasonic sensor as well as show the access status(granted/denied), we use GrovePi shield to connect ultrasonic sensor and LEDs to the Raspberry Pi. GrovePi has build-in ADC and provides easier API to interact with. As for ultrasonic sensor and LEDs, they are just standard components that comes with the GrovePi kit.

Reflection

Looking back, we feel like there are some limitations to this project that could impact its functionality and usability. First, relying on an ultrasonic sensor for detecting visitors at the door may not be accurate in all situations, especially in noisy or crowded environments. Adding multiple sensors or even a camera for human detection might solve the problem. In addition, the system only allows for a binary response (yes or no) from the homeowner, which may not be sufficient in cases where more nuanced access control is required. During the project, we didn’t make our mind whether to prioritize security or accessibly and just made a basic frame that we can add more functionalities later. We feel like if we target just one very specific using scenario in the beginning, the project might be more practical even with limited resource and time.