PROJECT SCOPE

Project Title : Intruder Counter Project

Team Member : Peiling Chan [24547042]
Richard Chuah [25656732]

Project Justification

The IoT motion sensor detects intruders based on the assumption of having a consecutive of four motions with the sequences of "long short long long" and the web page application is developed to count how many times the IoT motion sensor can detect the intruders.

Project Objectives

The objective of this project is to develop a web page application that can count the number of intruders detected by the IoT motion sensor.

Project Scope Description

Hardware Components

This application uses the following hardware components:

1. **Arduino Uno** – *a microcontroller board*
2. **USB Cable A** – *to connect the microcontroller board and the computer*
3. **Led**
4. **Motion sensor** – *to detect the motion*
5. **Jumper cables** – *to connect the led and motion sensor to the microcontroller board*

Software & Platform

This application uses the following software and platform:

1. **Arduino IDE** – to *write code and upload to the microcontroller board*
2. **Arduino plugins/driver** – *StandardFirmata: to communicate with the microcontroller board from the software*
3. **Node.js**
4. **Johnny-Five** – the *IO plugins allow Johnny-Five to communicate with the hardware which is the Arduino Uno microcontroller board*
5. **Google Firebase** – *uses the Google Firebase real time DB as a communication platform. The firebase allows the developer to store data and synchronize data across several clients. In this case, client is the web page application*

Functions

This application has the following functions:

1. **Switch LED on/off**
   - This allows the user to control the led. The led should works according to the switch. When the switch is on, the led should turn on. When the switch is off, the led should turn off.

2. **Switch motion sensor on/off**
   - This allows the user to control the motion sensor. The motion sensor can only detect the motion when the motion sensor switch is on. The motion sensor will not response when the motion sensor switch is off.

3. **Total number of motion detected by the motion sensor**
   - This will only work when the motion sensor switch is on. It should count the total number of motion detected by the motion.

4. **Total number of long motion detected by the motion sensor**
   - This will only work when the motion sensor switch is on and there is a motion detected by the motion sensor. It will detect whether it is a short or long motion and update the total number of short or long motion accordingly. When the motion is longer than 7 secs, it is known as a long motion.

5. **Total number of short motion detected by the motion sensor**
   - This will only work when the motion sensor switch is on and there is a motion detected by the motion sensor. It will detect whether it is a short or long motion and update the total number of short or long motion accordingly. When the motion is less than 7 secs, it is known as a short motion.

6. **Total number of the intruders detected by the motion sensor**
   - The motion is considered as an intrusion when it detected a sequence of "Long Short Long Long" motion. If such sequence exists, it will update the counter for intruders.

7. **Reset**
   - This reset button will reset all the database. This means it will reset the counter for motion detected, short motion, long lotion and intruders to zero (0).
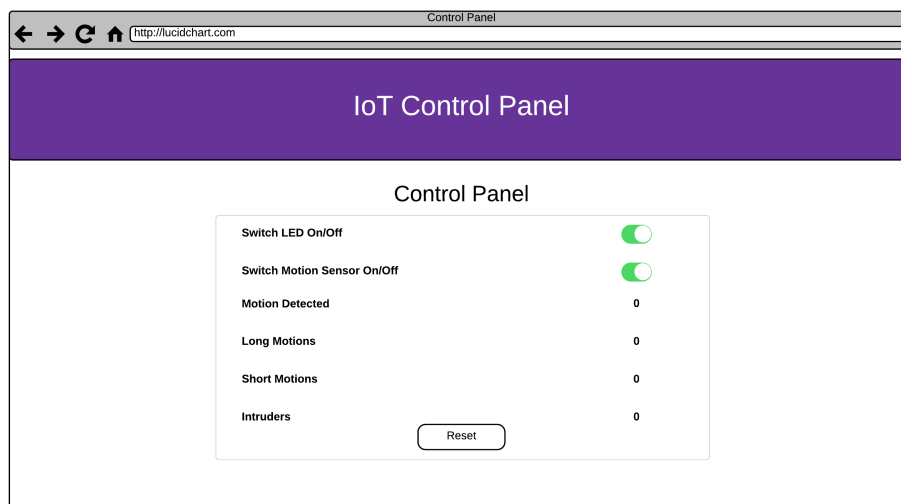
The image above is the mockup screen of the web application.

How the system will work

Client Side

Using the Firebase DB allows the web page application to fetch old data if exists. This mean if the user reconnects or refresh the web page application and there exist old data, the web page application should load the old data. It listens to the new update of data from the server side. Besides that, it displays the total number of motion detected, short motion, long motion and intruders. Client can send request to the sever. This web application can send command to turn on or off the led and motion sensor. It can also send command to reset the DB. This means it will delete all the DB and reset all the value to default.

Server Side

The server listens to motion sensor and read its data. Then it will send the data to the Firebase DB. The server also listen to the commands of turning the led on/off and motion sensor on/off. Client sends the command by sending data to the Firebase and the server fetches data from firebase to perform action. This is how the server and client communicate.

Project Constraints

1. **Not allow to use socket.io**
   As we are not allowed to use socket.io, it limits the time for us to achieve the goal. We need figure out the communication. We also need to learn how to apply Google Firebase into the system. This takes up time as these are new to both of us.

2. **Connecting the Arduino board on Mac**
   Whenever we need to connect the Arduino board using the Mac and our Mac is running on Mac OS, we always encounter the problem where the Arduino board is not connected. It is always very hard to connect the board. Sometimes it takes up to 30 minutes to connect it. However, the problem is fixed by running Window on Mac.