ASSIGNMENT 1 FRONT SHEET

Qualification	**TEC Level 5 HND Diploma in Computing**		
Unit number and title	**Unit 43: Internet of Things**		
Submission date		**Date Received 1st submission**	
Re-submission Date		**Date Received 2nd submission**	
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Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student's signature	Tan Anh

Grading grid

P5	P6	P7	M5	M6	D2	D3

❒ Summative Feedback:	❒ Resubmission Feedback:

Grade:	Assessor Signature:	Date:

Internal Verifier's Comments:

Signature & Date:

Table of Content.

A. Introduction.

In this assignment, I will use an appropriate set of tools to develop my plan in task 1 into an IoT application. Next, I will run end-user tests and generate test feedback, which will serve as the basis for evaluating system quality and defects from which to make decisions for future system development.

B. Contents.

I. Employ an appropriate set of tools to develop plan into an IoT application (P5).

Project: Smart home-Control light through blynk connecting with IOT devices. Below is tools and hardware require to develop the project. This project uses motion sensors to detect movement in your home, sensors that can be installed in doors, in rooms to control an automatic electric light system that turns on and off. convenience in the house. Moreover, this system can be applied to enhance the security of your home through motion detection and

notification to the homeowner's phone. The system can integrate and develop more modular features in the future.

1. Hardware.

- **Arduino Uno R3**:

Figure 1: Arduino Uno R3

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Arduino Uno R3 Tech Specs:

Micro-controller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6

DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm

- **Module Wifi ESP8266**: This is important component in this system, the purpuse is make the system can communicate through internet.

Figure 2: Esp8266

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability, produced by Espressif Systems[1] in Shanghai, China.

The chip first came to the attention of Western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands

- **PIR Sensor**: PIR sensors allow you to sense motion. They are used to detect whether a human has moved in or out of the sensor's range. They are commonly found in appliances and gadgets used at home or for businesses.

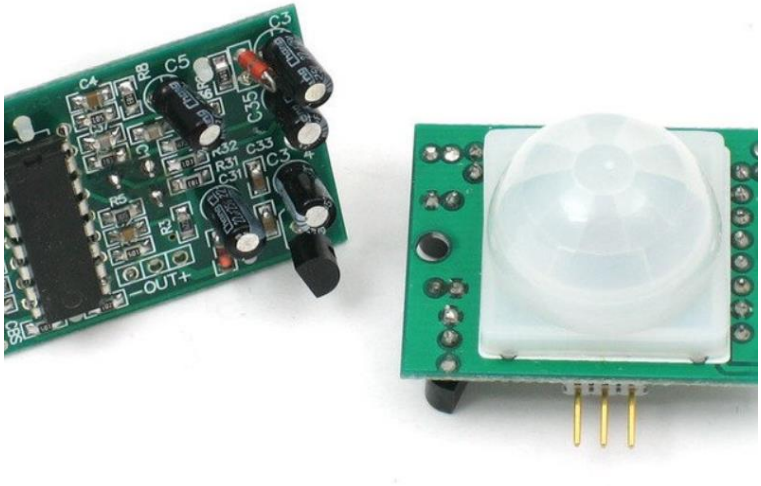
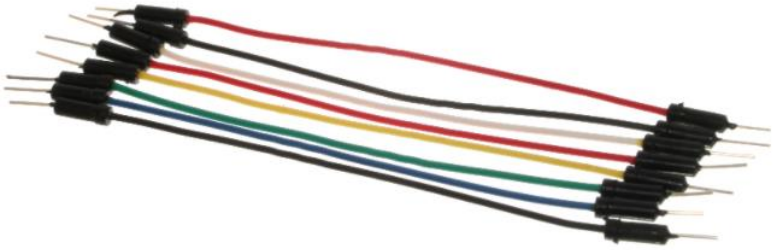


Figure 3: PIR Sensor.

- **LED light**: Used to simulate the light in house for control it.

Figure 4: LED

- **Jumper wire**: To connect the components in this system.



2. Implement.

Because of the pandemic, it is impossible to practice with the device, so we use simulation software to realize the project, in the immediate future, so that customers have the clearest view of the system as well. as the interaction between the system and the environment.

- **Arduino IDE:** The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards. I used it to coding and compiling code for this project.

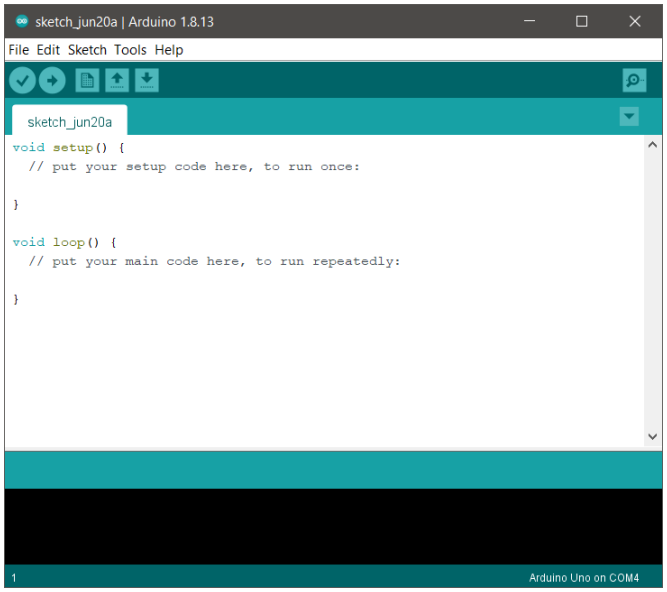


Figure 5: Arduino IDE

Below is the source code of this system, which takes the data of 3 different motion sensors. These data will be collected and calculated to make decisions, and by connecting through the virtual COM

port on the computer, the system can connect to the internet, so the system canbe controlled via the blynk app.

```
#include <SimpleTimer.h>
#include <SoftwareSerial.h>
#include <BlynkSimpleStream.h>
#define BLYNK_PRINT SwSerial

#define pir_pin_door 13
#define pir_pin_bed 4
#define pir_pin_lv 2

#define BLYNK_PRINT Serial


SoftwareSerial SwSerial(10, 11); // RX, TX

// KEY authentical to blynk app
char auth[] = "6RWTTCN_eVQK5Ub5_5bmGlTi2zsiZ2Vi";


// Initial variable for pin port in circui
int pin_value_bed;
int pin_value_lv;
int pin_value_door;

SimpleTimer timer;


void setup()
{
  Serial.begin(9600);
  Blynk.begin(Serial, auth);
  timer.setInterval(500, doorState);
  timer.setInterval(1, lightLvControl);
  timer.setInterval(1, lightBedControl);
}

// Function to control the led in bed room
void lightBedControl() {
  pin_value_bed = digitalRead(pir_pin_bed);
   if(pin_value_bed == HIGH) {
    if (digitalRead(12) == LOW) {
        digitalWrite(12, HIGH);
    }
   }
```

```
// Function to control the led in living room
void lightLvControl() {
  pin_value_lv = digitalRead(pir_pin_lv);
   if(pin_value_lv == HIGH) {
    if (digitalRead(8) == LOW){
        digitalWrite(8, HIGH);
    }
   }
}

// Funtion control the door states
void doorState(){
  pin_value_door = digitalRead(pir_pin_door);

  if(pin_value_door == HIGH) {
      Blynk.notify("The door opened");
      if( digitalRead(8) == LOW) {
          digitalWrite(8, HIGH);
      }
  }
}


void loop()
{
  Blynk.run();
  timer.run();
}
```

- **Virtual COM**: A virtual serial port is a software representation of a serial port that either does not connect to a real serial port, or adds functionality to a real serial port through software extension. The reason I used this app because I must implement this system to in virtualization software (proteus), then to connect this app with internet must have a third party app that connect with module wifi of laptop.

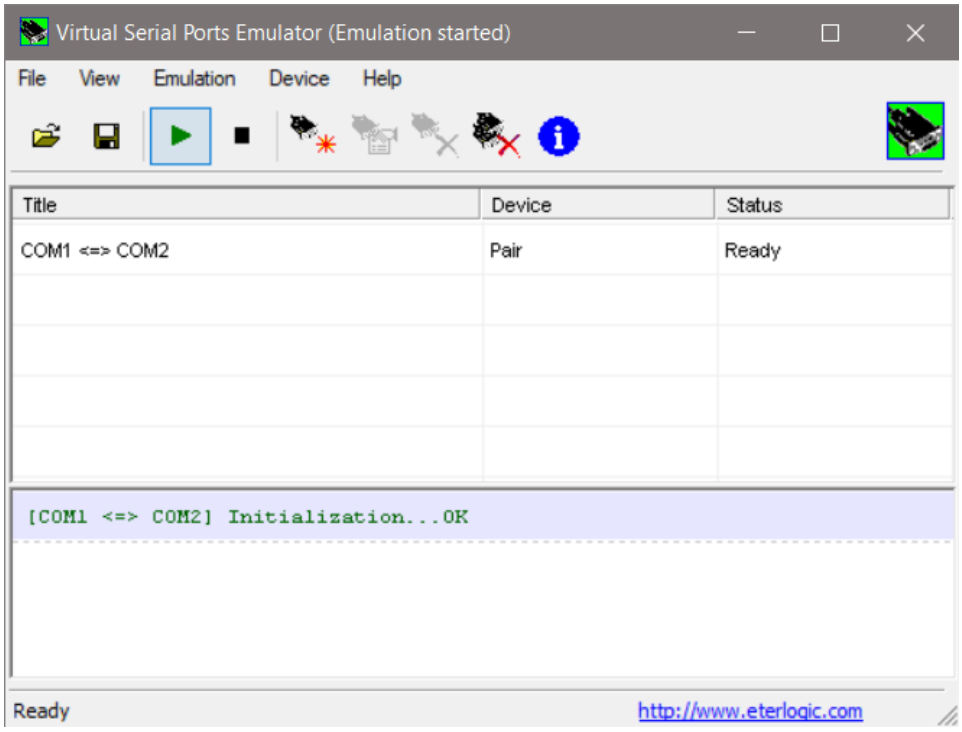


Figure 6: Virtual COM Port.

- **Design Blynk app:** The control interface on the blynk app needs to be designed specifically for each system, in this system there are 2 buttons to control the light bulbs and a component that receives notifications from the push system.

- **Design semantic:** Because pademic we must use proteus app to visualizing system, below is the system included: PIR sensor (3 items), Arduino Uno R3, LED (2 items), COM pin (to connect with virtual com app.)

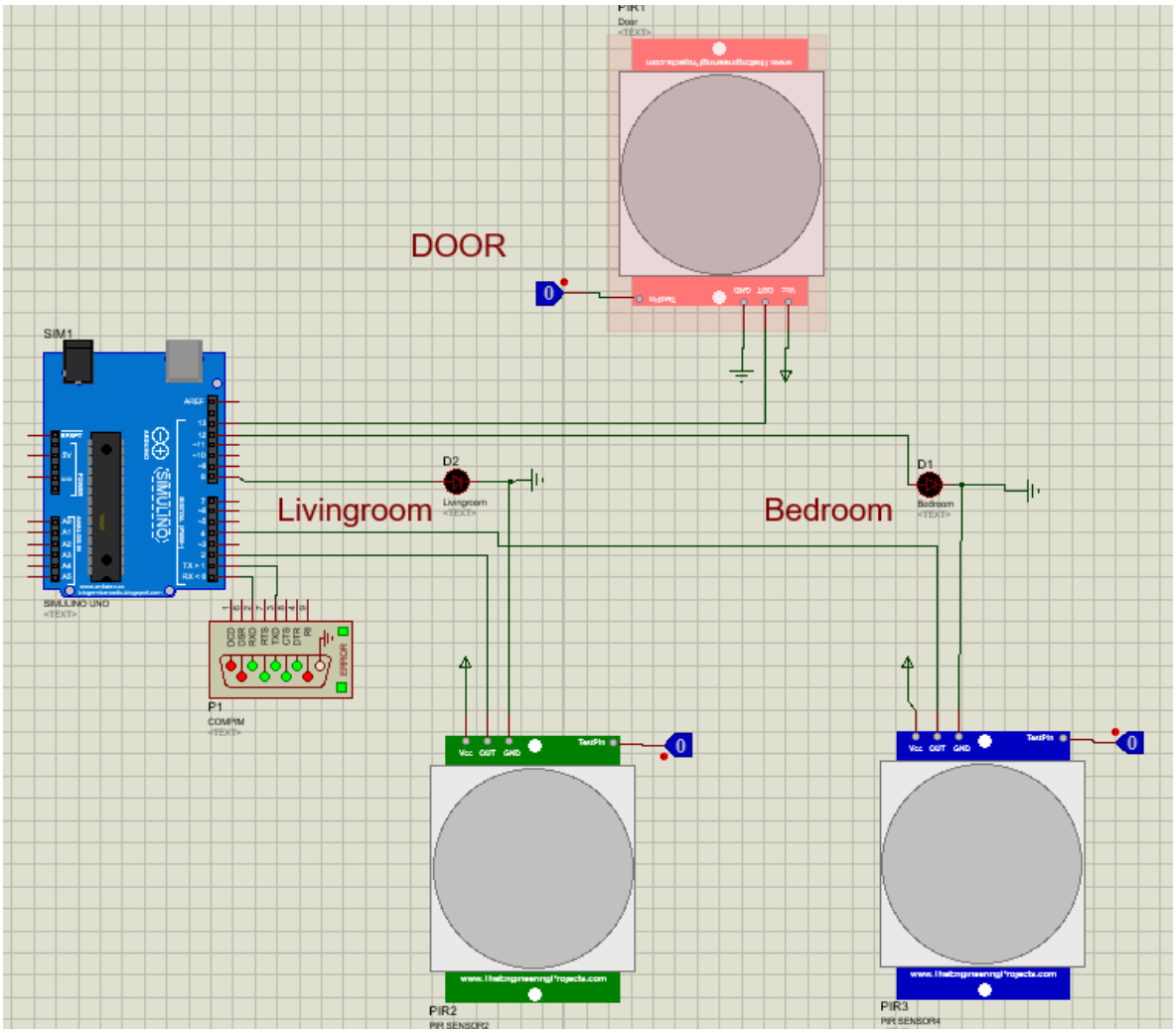


Figure 7: The system in proteus app.

II. Run end user experiments and examines feedback (P6).

1. Run end user experiments.

The system will be controlled via blynk app so we designed the user interface in the image below. As shown in the photo, there will be 2 buttons responsible for controlling the electric lights in the 2 rooms that are the living room and the bedroom. At the same time, there is a notification module to be able to receive notifications from the system.

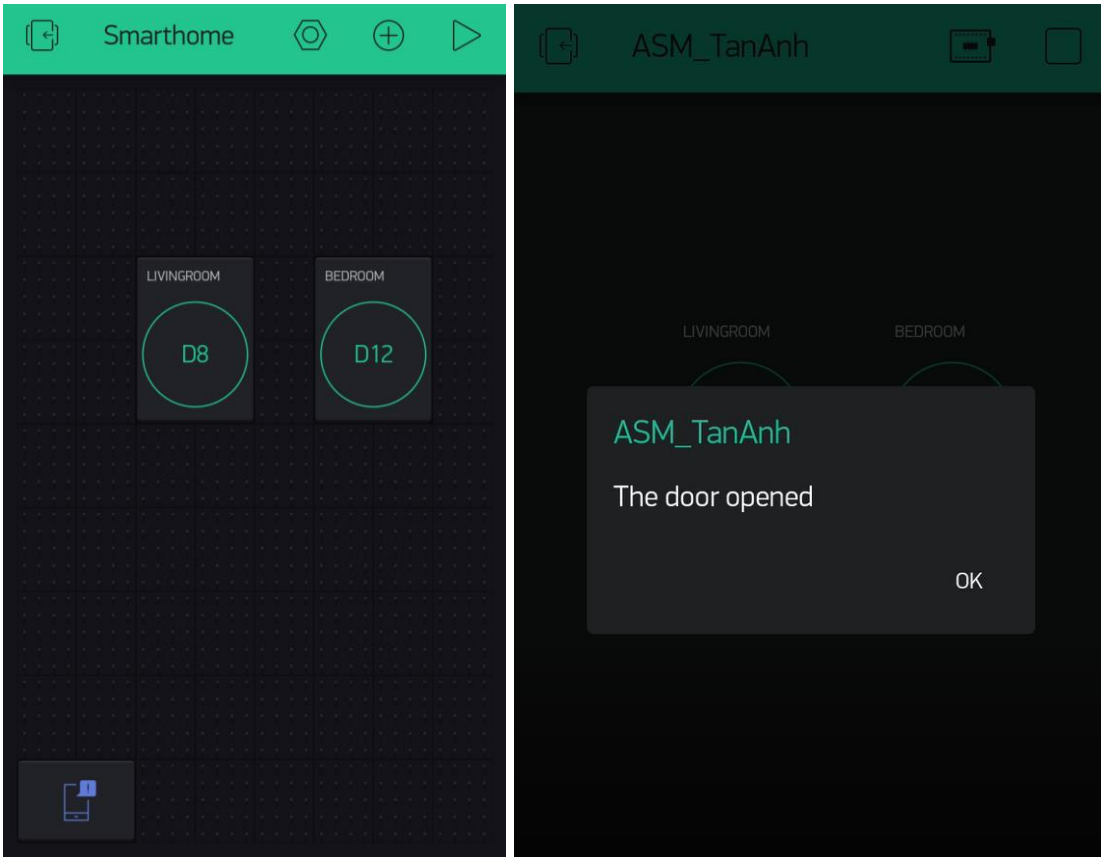


Figure 8: User interface in blynk app and notification feature.

Here is video links to that I was caputured when using this app to control system.

- Video 1: Link video control in blynk app.
- Video 2: Link video system's simulation in proteus (desktop).

2. Examines feedback.

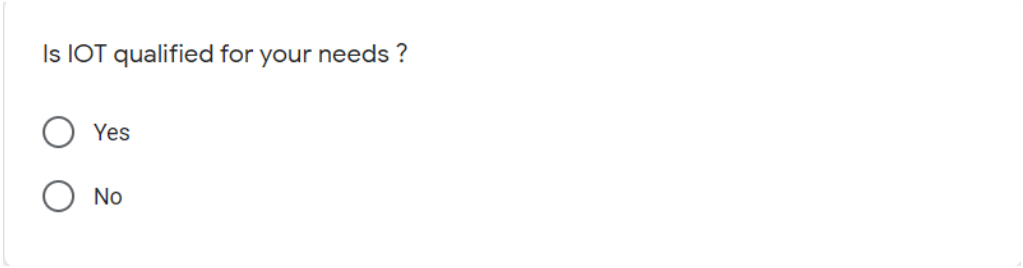
For the user's feebacks, I was created a google form to collect feedbacks and analysis according these feeback to improve the system in the future. (Link survey)

List of questions:

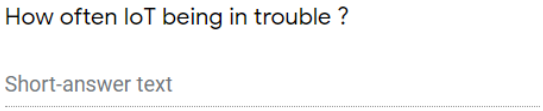
a. *Is IOT qualified for your needs ?*
b. *How often IoT being in trouble ?*
c. *Is IoT easy to use ? Ranked from 1 to 5*
d. *Does IoT safe for your home ?*
e. *Which part of this system do you like best?*

These question I created cover some problem about system such as: Usage, error, easy to use, security, convenient.

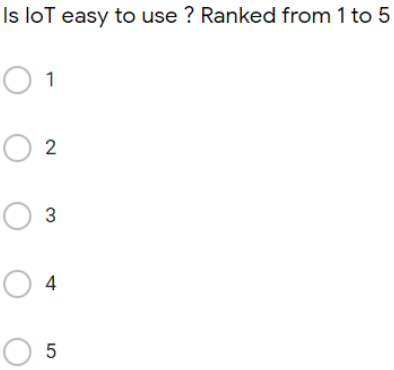
Question a: A yes/no question about “Are you satisfied with the system?” ask about the utility that the system brings to satisfy the requirements of customers.



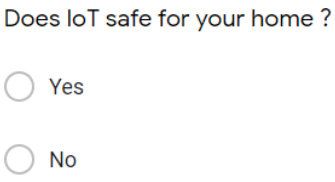
Question b: This question tend to ask about the frequently of error occur when user using system.



Question c: This question for evalution of user’s experience when using system.



Question d: This question ask about the security when this system installed in user’s home.



Question e: The last question is about what part which user like most in this system.

Which part of this system do you like best?

- [ ] Auto turn-on the light
- [ ] Notificate to user when door opened.
- [ ] Detech movement in rooms

III. Evaluate end user feedback from your IoT application (P7).

Through the survey, I received answers from which to identify the problem and provide a solution.

1. Is this IOT system qualified for your needs?

According to the results of the first question, the launch of this project ensures most of the customer's requirements along with the majority of requirements have been met. However, there is still a part that does not meet the requirements well, these target groups will be emailed to receive more requests from which to evaluate and make decisions for further development.

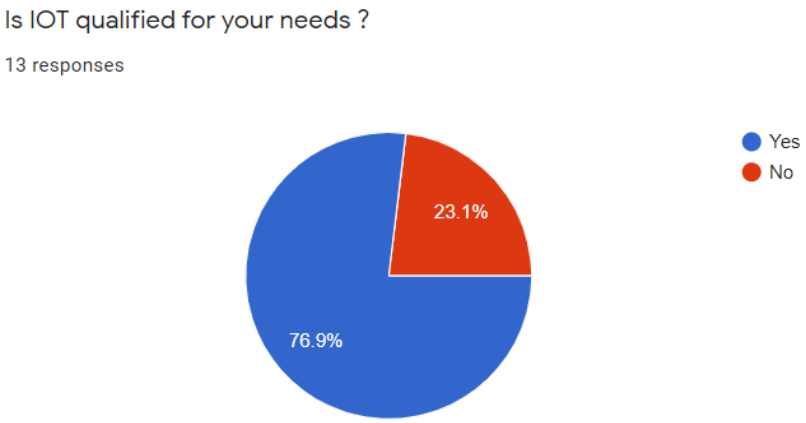


Figure 9: Result of question 1.

2. How often IoT being in trouble ?

This question assesses whether the system's performance is satisfactory and whether the system is prone to errors. From the graph, it can be seen that the system has errors, in which the error-free rate is very low, indicating a deficiency in the development process. So the system needs to be checked and revised, the goal is to increase the error rate of the customer.

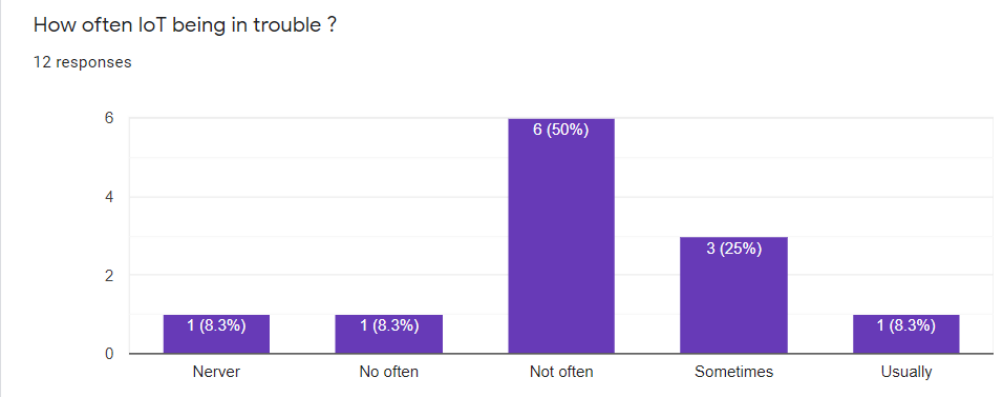


Figure 10: Result of question 2.

3. Is Iot system ease to use ?

The rating scale gives the clearest result that the system is easy to use, but there are still some problems in use, along with that need to focus on correcting these important parts.

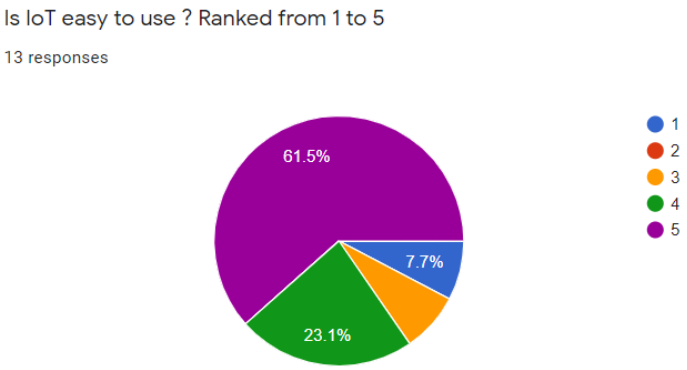


Figure 11: Result of question 3.

4. Does IoT safe for your home ?

Security is an essential issue in every information system, especially IOT system, so we focus on this question in order to improve the security of the system as well as determine the vulnerability index. of the system. Through the chart, we see that more than 90% of users do not have security problems, but 7.7% of users have found security errors. A system for the family this is a large number and can lead to serious consequences if not handled in time. We will continue to improve the security level so that the system can operate with the highest satisfaction and peace of mind for customers.

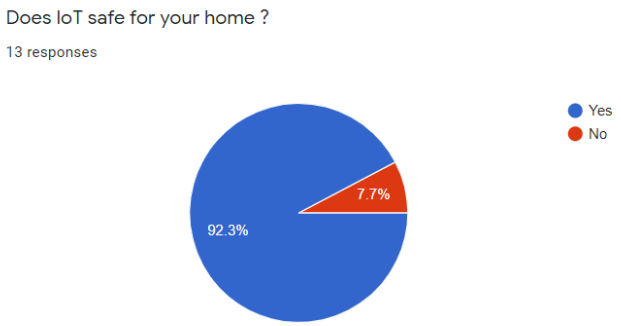


Figure 12: Result of question 4.

5. Which part in this system do you like most ?

The last question aims to evaluate the features and components of the system that users love the most. The chart shows that the feature of sending notifications via the internet to the phone is the most appreciated feature, showing the convenience for customers. So in the future, it is possible to build more convenient applications from basic foundations.

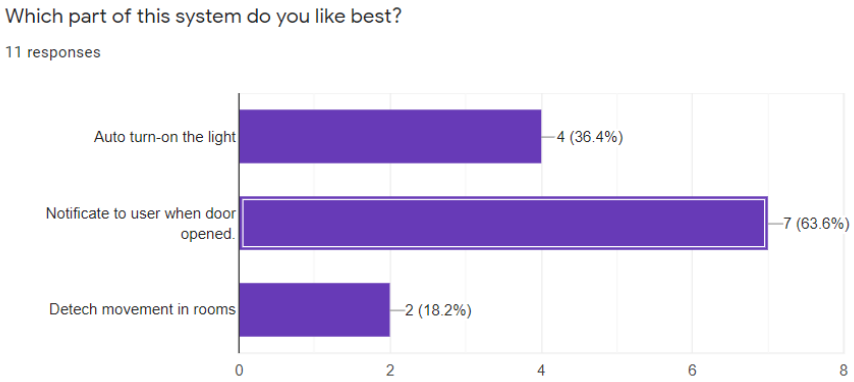


Figure 13: Result of question 5.

C. Conclusion.

In the parts I mentioned above I have done the tasks as I used the tools to set up the iot system from there having a system based on the plan given in asm 1. Continuity I then proceeded to let users experience using the system, and after that experience, I collected reviews about the system. The evaluation and analysis of the surveys have shown the problems encountered by users, thereby providing a long-term development direction for this system.

D. References.

- https://www.labcenter.com/tutorials/
- https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor/how-pirs-work

- https://en.wikipedia.org/wiki/Virtual_COM_port
- http://www.eterlogic.com/Products.VSPE.html
- https://docs.blynk.cc/