ASSIGNMENT 1 FRONT SHEET

Qualification	TEC Level 5 HND Diploma in Computing		
Unit number and title	Unit 43: Internet of Things		
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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	*Tuan Hung*

Grading grid

P5	P6	P7	M5	M6	D2	D3

☐ **Summative Feedback:**   ☐ **Resubmission Feedback:**

Grade: | **Assessor Signature:** | **Date:**

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Signature & Date:

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Introduction

In this report, I will provide detail information about hardware, software, data, platform when implement an IOT project. Come with that is detail assessment of the product impact on user life.

Employ an appropriate set of tools to develop your plan into an IoT application.

1. Adjustment for P4 in Assignmnet 1

For the assignment 1: the first scenario is create a system that measure water lever

The first scenario:

The IOT system we thinking about it a system using ultrasonic sensor to measure water. It cheap, it send online result to far people suitable for explore deeper river or lake or measure the place human cannot reach at the moment. Ultrasonic sensor will give us exactly number of deepest place, how deep it is that will be and for sure to make this device is very cheap.

Ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal.

Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has traveled to and from the target).

In this report, I will have another scenario and another IOT system that have application that is more practical in daily life sot for that I will change the scenario and the requirement of the IOT system:

Fixing scenario:

In a city that produces the handicraft made from copper. They calcined the copper to make copper decorations and sale it to market. For the copper furnace to operate at optimum status without consuming many materials. For that reason, they had to incubate the hot coal from 9pm from the day before until 2-3am next morning, to prevent the coal starting fire and consume much material hey had to wake up and put the lid on to keep the heat until 8-9am to operate multi-capacity and no coal consumption. So for that reason, I thinking about building a IOT system to detect flame.

2. Hardware and requirement:

A. Hardware and components

We should use wireless connection for all of the devices to make sure that we still have data when explore water people cannot reach. The detail about this system requirement will be described in the below

For making this project, we will be needing a few basic components.

ESP8266 NodeMCU board: This will be the heart of our whole project.
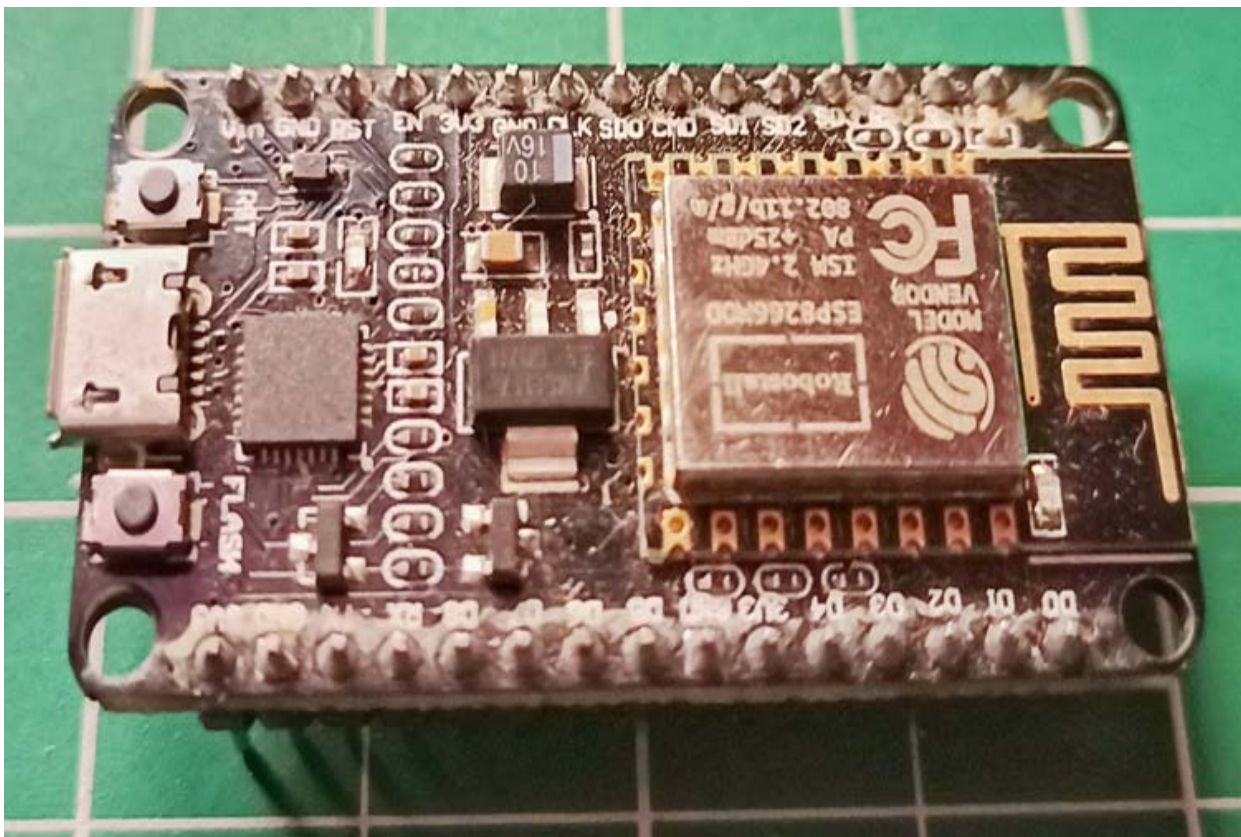
Flame Sensor

Flame sensor is a device which is used to detect the presence of fire in its surrounding. There are many types of flame sensors available such as Infrared Flame sensor, Ultraviolet flame sensor etc. In this project we will be using **Infrared Flame Sensor** to detect the fire.

Infrared Flame Sensor consists of a photodiode coated with black epoxy which makes it sensitive to the infrared radiations having wavelength between 700nm to 1mm and **can detect fire up to**

distance of 100cm within 60 degrees of angle of detection. This photodiode is based on a three terminal YG1006 NPN Photo transistor.

Every object including the "fire" emits some amount of Infrared rays which are detected by the photodiode. An operation amplifier is attached across the photodiode to detect the change in voltage. If the voltage detected is zero it gives digital output "1" and if it detects some voltage in case of fire then it gives digital output as "0".

DHT11 Sensor:

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2 seconds old.
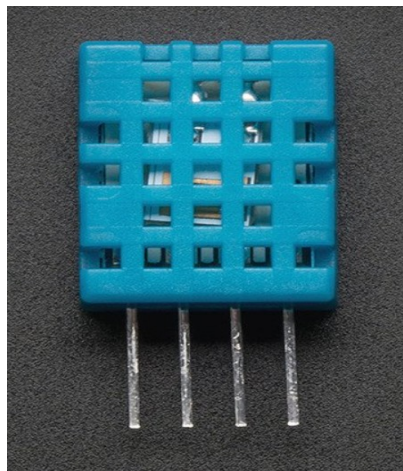
Breadboard: All the connections will be made on the breadboard itself for making it simple.

Jumper wires: As we are using a breadboard, jumper or hookup wires are the way to go for connections.

B. Software

The software I use for coding is Arduino:

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

C. Video demo product

Video introduction about the product model will be uploaded on youtube. You can follow up with the link below:

https://youtu.be/oOkW2LPndIk

D. Explanation about the system

First, we are using two sensor, one it flame sensor, second one is data-logger:

- The flame sensor is responsible for knowing flame.

- Data-logger responsible for knowing the temperature

They calcined the copper to make copper decorations and sale it to market. For the copper furnace to operate at optimum status without consuming many materials. For that reason, they had to incubate the hot coal from 9pm from the day before until 2-3am next morning, to prevent the coal starting fire and consume much material hey had to wake up and put the lid on to keep the heat until 8-9am to operate multi-capacity and no coal consumption. If the fire start, the alarm will ringing for people know that the fire start and the status will send direct to website for people read to know that the fire already start. This IOT system have many application in real life.

3. Demo connection

   Diagram
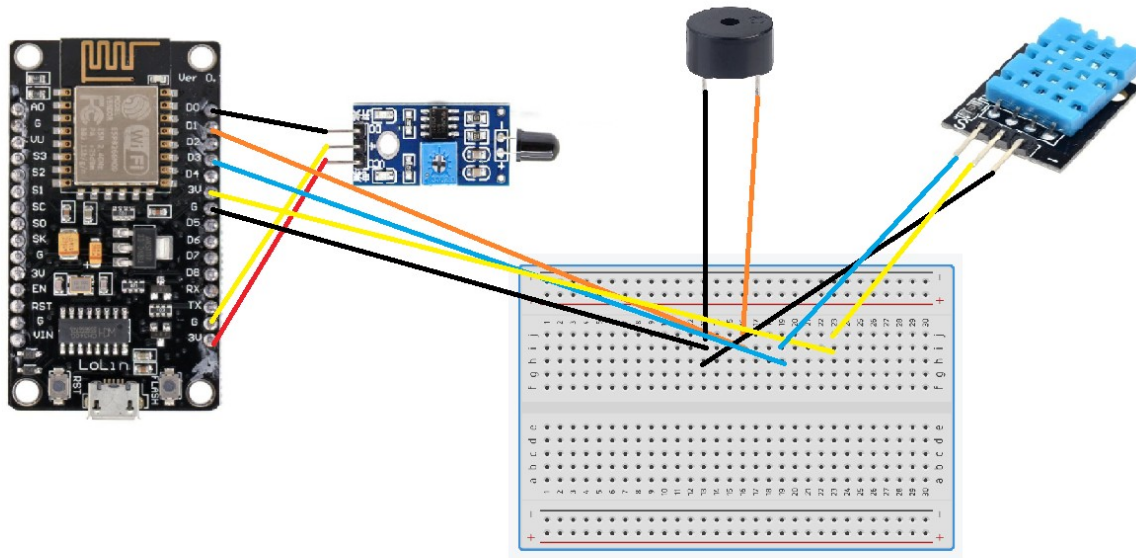
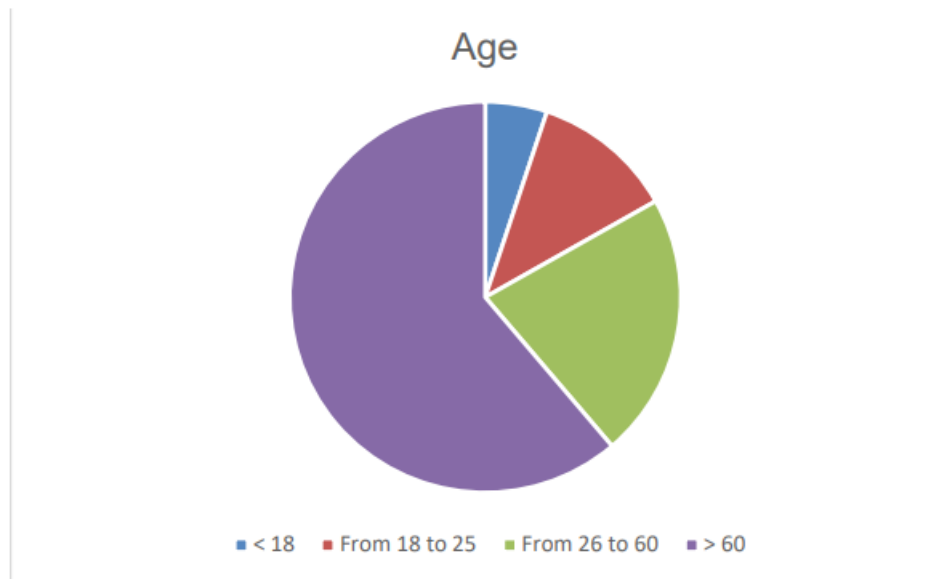| Wire connection	Gate
Flame sensor -> ESP8266	VCC -> 3V3 GND -> GND DO -> D0
Buzzer -> ESP8266	(+) -> D1 (-) -> GND
Data-logger -> ESP8266	(+) -> 3V3 (-) -> GND S -> D3

Run end user experiments and examines feedback

1. Survey

Question 1: How old are you?

- < 18 : 10%

- From 18 to 25 : 23%

- From 26 to 60 : 43%

- 60 : 24%

Looking at the age survey shown within the chart above, we are able to see the age ratio of using products divided into 3 groups. The primary group is a smaller amount than 18 years old, accounting for 10%. Next is that the second group, from 18 to 25 year's old, accounting for 23%. The third group from 26 years old to 60 years old accounts for 43%. At last, the group of over 60 years old accounts for twenty-four. From the results listed above, we will see that the merchandise is suitable for all ages, especially from 26 to 60.

Question 2: What is gender?

- Male : 48%

- Female: 47%

- Other: 5%

Gender

According to the survey results, we are able to see that both men and women trust the alarm automatical from the old system and the old fire alarm, with a very small difference of just one, of which men account for 48% while women account for 47%. However, man is trustier in technology so for that our new fire alarm is more trustily by the man than a woman.

Question 3: How much are user's income per month?

- <1000$: 55%

- From 1000$ to 2000$: 33%

- >2000$: 12%

Income

■ <1000$ ■ From 1000$ to 2000$ ■ >2000$ ■
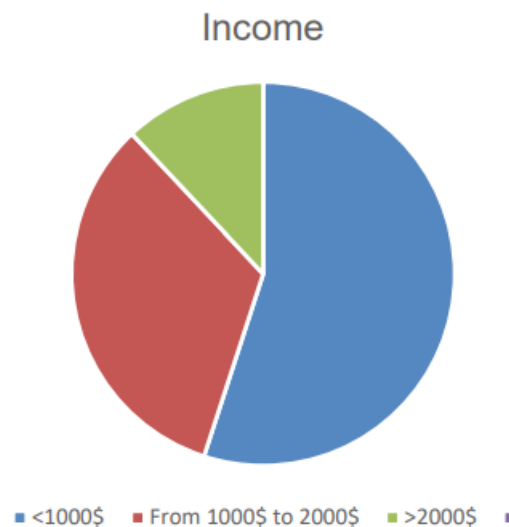
The statistical results show that the proportion of individuals with incomes <1000 $ use the merchandise the foremost, accounting for 55%, followed by those with incomes between $ 1,000 and $ 2,000 accounting for 33%. Finally, those with incomes over $ 2000 account for 12%. Because this is often a consumer product, the worth is cheap, suitable for all sources of income.

Question 6: Have you use fire alarm?

- Yes, I have: 35%

- No, I haven't: 35%

- Know fire alarm but not use: 30%
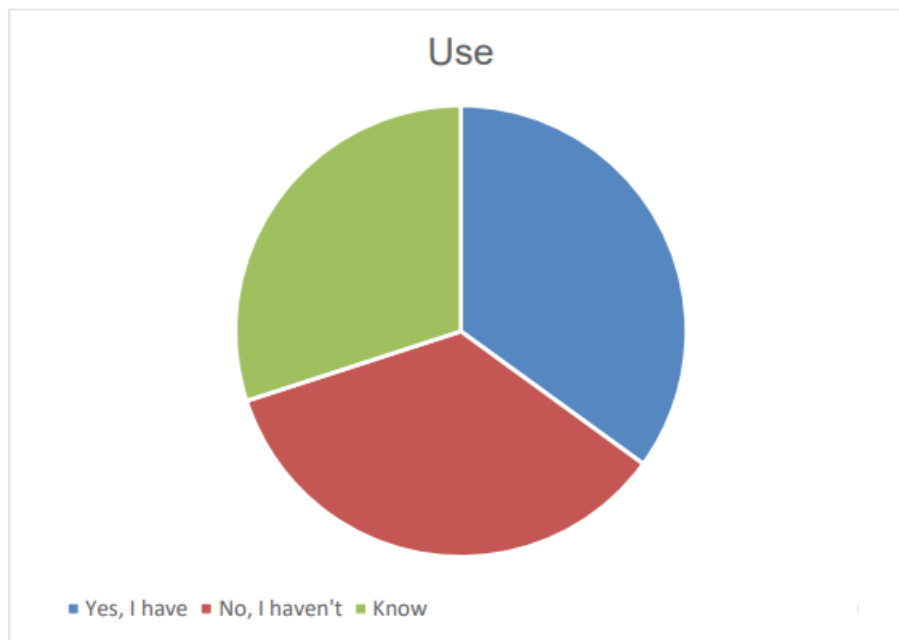
The statistics show that the share of individuals who use and know "Smart fire alarm" is extremely high. Users account for 35% and other people who know the fire alarm for 30%. However, the ratio of users and non-users is 35%. Because users still believe using traditional fire alarm with trigger by hand.

Question 7: Does the fire alarm web help you increase productivity and save resource?
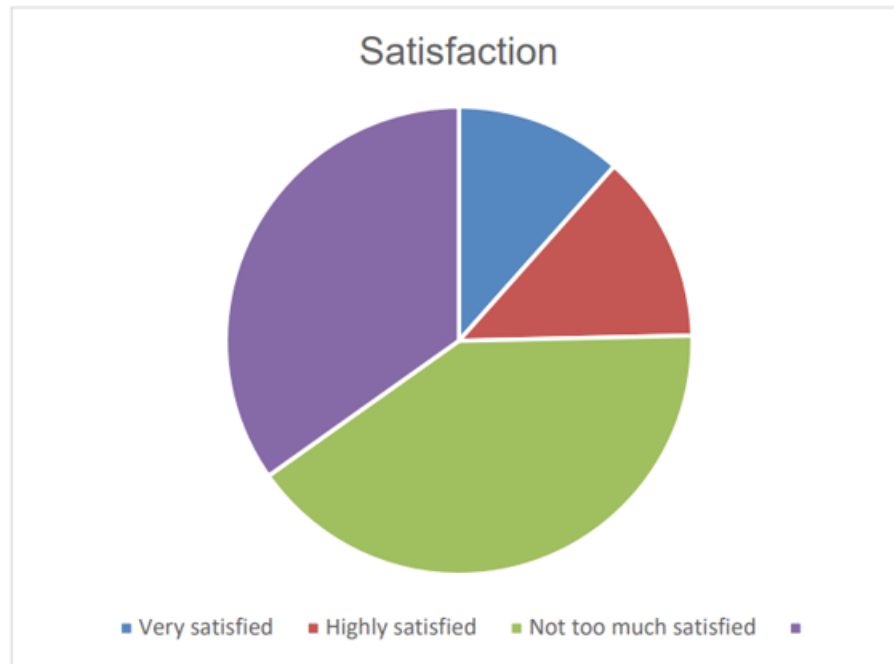
- Yes : 57,1%

- No : 28,6%

- Maybe : 14,3%
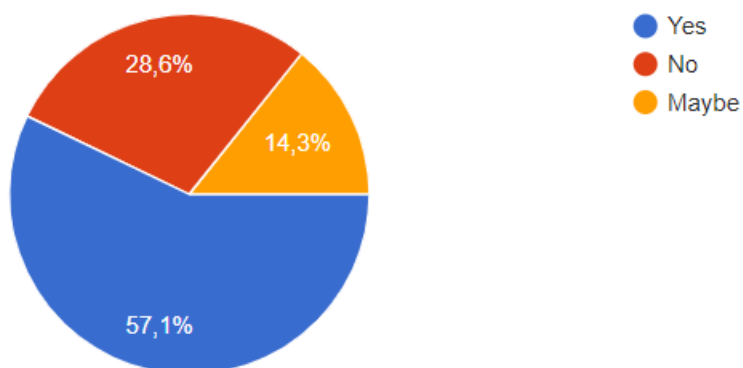
The results showed that 57.1% of the respondents were YES and 14.3% answered it MAYBE.

Looking at it, we see that fire alarm application really brings many benefits to users.

Question 8: Your satisfaction to "Smart fire alarm"?

• Very satisfied: 40%

• Highly satisfied: 45%

• Not too much satisfied: 5%

Looking at the statistical results, it shows that the product "Smart fire alarm" brings high user satisfaction. Regarding the level of satisfaction, 40%, extremely satisfied, 45%, and 5%, not too satisfied with the product. Although there are still shortcomings, the data has shown that it was more or less successful when it first launched, the product received a lot of feedback and support from users.

2. Interview

Questions 1: Have you ever heard about the IoT systems or smart houses before? Do you think it necessary for your life.	
Nguyễn Văn Hùng(30 years old, living in Bac Giang)	I have known about fire alarms before. However, I do not know about the IoT system. In my opinion, this system is quite necessary because most people prefer convenient life.
Cao Duy Khanh (25 years old, working at Lao Cai)	I already know about the fire alarm and I think it is necessary for our life because there are so many things to do in a day and I need this system.
Dao Xuan Hanh (60 years old, living in Lao Cai)	I have known about it but I think that I might not need it because it is too complicated to use.
Questions 2: If you had an automatic fire alarm, would you use it in your home and work?	
Nguyễn Văn Hùng(30 years old, living in Bac Giang)	If I live in a small apartment, or do a small business I will be in my own pocket because it saves money.
Cao Duy Khanh (25 years old, working at Lao Cai)	I think I will install an automatic fire alarm at my facility because my time is very busy and I do not have time to watch the fire.
Dao Xuan Hanh (60 years old, living in Lao Cai)	I will use this fire alarm system because I find it suitable for my job.

Questions 3: What is your suitable cost for this kind of system? Will you introduce this product to your friends and family?	
Nguyễn Văn Hùng(30 years old, living in Bac Giang)	I like the price level between 5 000 000 VND and 10 000 000 000 VND because I have a low income. I will also introduce this product to my friend.
Cao Duy Khanh (25 years old, working at Lao Cai)	I will spend for about 20 000 000 VND or higher for this system because I care about the safety quality. I will introduce this system to my family.
Dao Xuan Hanh (60 years old, living in Lao Cai)	I think the suitable price level for me is over 10 000 000 VND a bit. I will introduce this product to my friend.

Question 4: Do you want to continue using the product or not?	
Huy	Of course, I want to use the product for a long time, is there a perennial customer care regimen?
Hung	Yes, I am sure.
Hoa	Of course, I will always support.

Evaluate end user feedback from your IoT application

Based on analysis process, we summed up some things:

- This is a product suitable for the market now and in the future (especially it cheap to make and suitable for everyone).
- Anyone can use this product, which is of great benefit to human life.
- The product's price is cheap, suitable for all families, organizations, schools ...
- Everyone is aware of the fire, so this product will be very easy to commercialize.
- When using this product, most people think it is possible to reduce the risk of fire.

1. Evaluate IoT application

Because the effect of greenhouse so the summer it become hotter and hotter, so for many countries like Australia, USA, etc... It easy to have a fire in forest or even our house. I think it very practical idea to create this project, because it cheap, easy to use and suitable for many age. Mostly it cheap and effect anyone can buy one even a pour people.

In general, smart fire detected meet the set criteria. Data is quickly transmitted and faithfully displayed on web clients and firebase. However, due internet connection the transmitted data a little bit slowly. This is an acceptable result that our team thinks is acceptable, but compared to the original design and goal there is still quite a distance where the team needs to work harder.

This is a difficult project for us. During the implementation, we encountered many problems such as not connecting to firebase, sensors could not get data, wrong code ... However, and after all, we still found a solution.

In terms of team spirit, we had a serious time working together. Under the leadership of the leader, we have completed our duties, while supporting the members to learn and find better directions together. Although we have not achieved our best yet, we have had a good time together.

2. Advantages and disadvantages of Smart fire detected

Advantage	Disadvantage	Further improvement
Sensors working very good with high accuracy	Cause of transfer data to firebase so there is sometimes the system will be delay.	Improve the hardware and software to ensure the product can working property as well as possible.
Data transfer from the sensors to Node MCU ESP8266 and from Node MCU ESP8266 to the client and firebase very stability	The design is still not good, it need to improve more in the future.	Transformed from model to actual product
Can working long time.		Integrate AI into the system
The sensing distance of the infrared sensor is: 60cm	The infrared sensor can only identify obstacles in the front, cannot determine over 60cm	Add sensors and other functions to the product.