



## ASSIGNMENT 2

<b>Qualification</b>	<b>BTEC Level 5 HND Diploma in Computing</b>		
<b>Unit number and title</b>	<b>Unit 43: Internet of Things</b>		
<b>Submission date</b>		<b>Date Received 1st submission</b>	
<b>Re-submission Date</b>		<b>Date Received 2nd submission</b>	
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<b>Student declaration</b> 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.			
		<b>Student's signature</b>	Tuan

### Grading grid

P5	P6	P7	M5	M6



☐ Summative Feedback:

☐ Resubmission Feedback:

**Grade:**

**Assessor Signature:**

**Date:**

**Internal Verifier's Comments:**

**Signature & Date:**



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## Introduction

I've created an Internet of Things solution for a particular issue, continuing from assignment one. I will provide an example of an Internet of Things application that was created utilizing any combination of hardware, software, data, platforms, and services in the section that follows. After that, I'll create a movie that showcases my Internet of Things system and contains code examples. After that, I review the input and do end-user research. The next step in the evaluation process is to describe the issue my IoT application seeks to solve, any potential effects it might have on end users, businesses, society, or other societal groups, and any integration issues it might have with the larger IoT ecosystem.

## P5. Analyze what aspects of IoT are necessary and appropriate when designing IoT system on network platform.

### 1. Problem

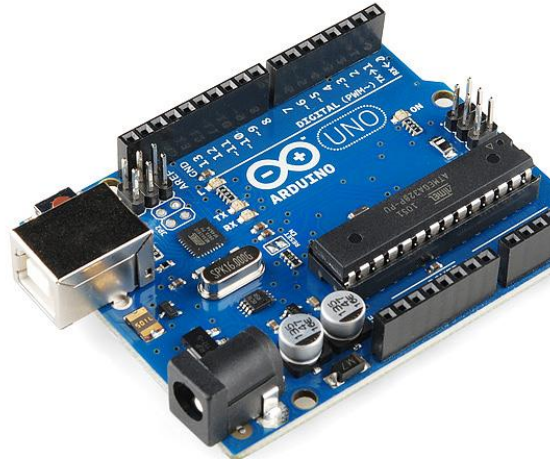
The prevalence of smart houses will increase as technology advances. A home is considered a smart home if it has electrical and electronic technology that can be controlled, automated, or partially automated. Substitute machines for people in a few management and control functions. Through an interior electronic board, a mobile phone app, a tablet computer, or a web interface, this electronic system can connect with the user. Currently, the automated unlocking method will also be quite helpful.

### 2. Solution

With the project of automatic doors and smart door locks used on RFID cards or doors can be opened on the application on smartphone devices or even websites. I believe that my product will help people a lot in the future. Its applicability will be very high when used by everyone, which shows that today people will find things connected to the system, and smartphone devices will become very convenient and helpful for them in life.

### 3. Hardware

Here are some of the most used typical hardware in life:

Image of Hardware	Name of Hardware	Description
	Arduino UNO R3	Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.



#### **RFID – PC522**

RFID is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves. RFID is similar to barcoding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software.



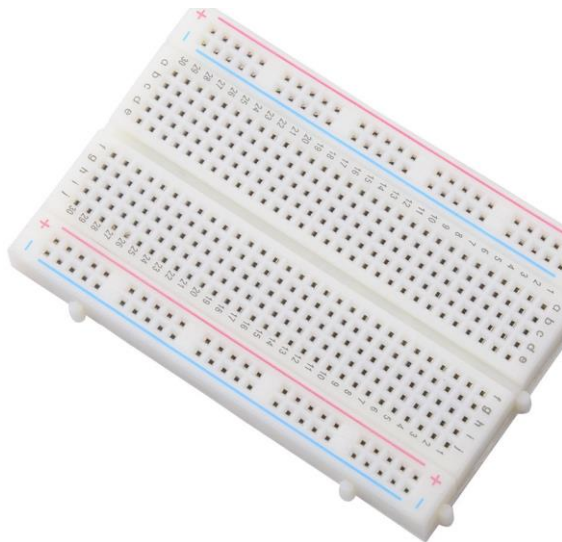
#### **Led Light**

LEDs are small, powerful lights that are used in many different applications. To start, we will work on blinking an LED, the Hello World of microcontrollers. It is as simple as turning a light on and off.



**Servo SG-90**

Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos.



**Bread Broad**

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.



To connect between among hardware  
in my project.

### **Jumper Wire**



#### 4. Product Implementation

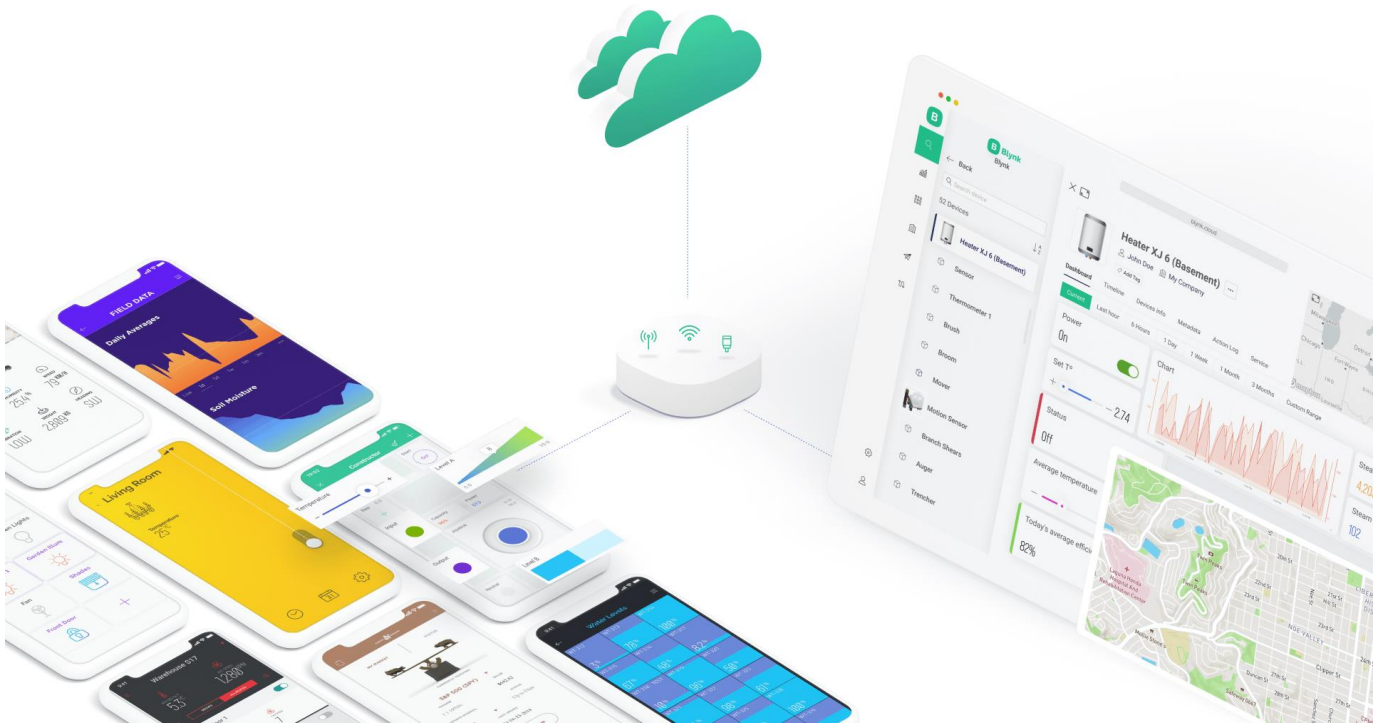


##### 4.1. Assemble

- **Step 1:** Connect the wires to Arduino, SCK - D13, MISO - D12, MOSI - D11, SDA - D10, and RST - 9.
- **Step 2:** Connect the servo to the breadboard the GND port connects to the GND on the breadboard, VCC connects to the 5V port on the breadboard and the Output connects to D3.
- **Step 3:** Connect LEDs light to the cathode through the resistor, Red light - D6, Blue light - D7.
- **Step 4:** Connect Buzzer - D4.
- **Step 5:** Connect the battery to the breadboard.
- **Step 6:** Connect the negative/positive power from the Arduino to the breadboard for the power supply.

## 4.2. Tools

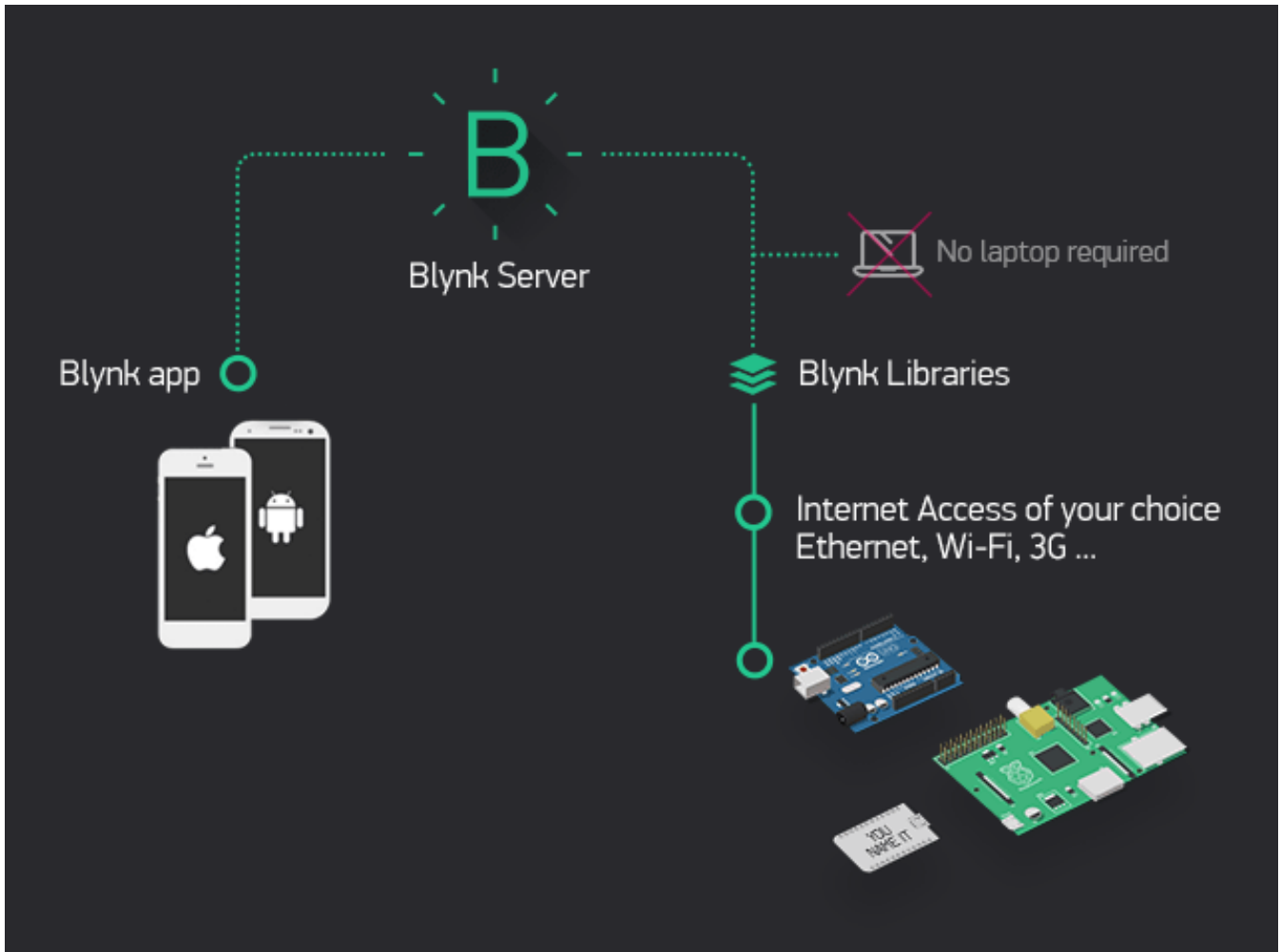
IoT Tools stands for the Internet of Things Tools. It is a network or connection of devices, vehicles, equipment applying embedded electronics, home appliances, buildings and many more. This helps in collecting and exchanging different kinds of data. It also helps the user to control the devices remotely over a network.



### *Blynk*

Each project can contain graphical widgets, like virtual LEDs, buttons, value displays and even a text terminal, and can interact with one or more devices. With the help of the Blynk library, it is possible to control Arduino or ESP32 pins directly from your phone, without having to write any code at all.

It is also possible to share a project with friends and even customers so that they can access the connected devices but not be able to modify the project. Imagine a scenario where you build a smartphone application where you can control lights, window blinds and room temperature from your phone. You can share the project with other family members so that they can also access the functionality.



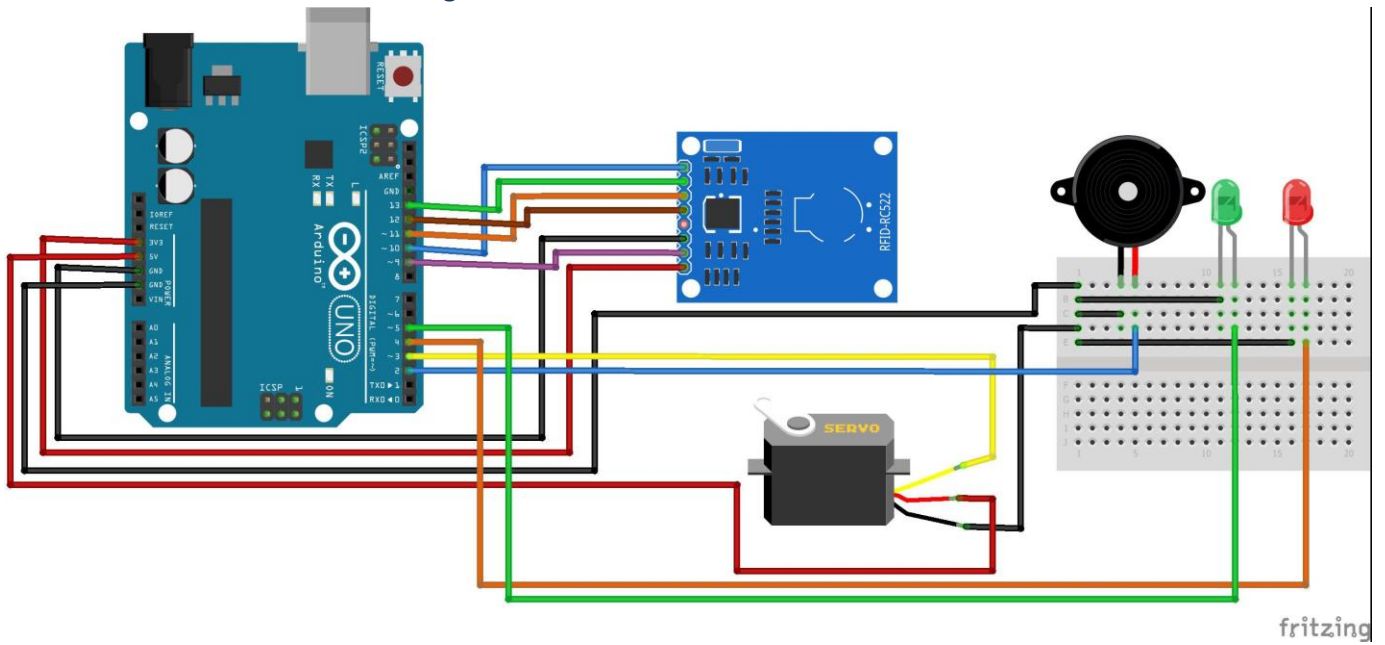
Blynk work: To connect to Blynk, the system will need to update the Blynk library at Arduino, then access via the internet via 3G/4G- WIFI or Ethernet and USB waves to connect with Blynk Server and then synchronize on the system Blynk App.

### Arduino

Arduino is an Italy based IT company that builds interactive objects and microcontroller boards. It is an open-source prototyping platform that offers both IoT hardware and software. Hardware specifications can be applied to interactive electronics and software includes Integrated Development Environment (IDE). It is the most preferable IDEs in all IoT development tools. This platform is easy and simple to use.

Arduino work: The Arduino is a board based on an ATMELE AVR microcontroller. Microcontrollers are integrated circuits where instructions can be recorded, which you write with the programming language that you can use in the Arduino IDE environment. These instructions allow you to create programs that interact with the circuitry on the board.

#### 4.3. Product Diagram





#### 4.4. Source Code

Link Source Code: <https://github.com/Tunniez/Internet-of-Things-Smart-Lock.git>

```
#include <Blynk.h>
#define BLYNK_PRINT SwSerial
#include <Ethernet.h>
#include <deprecated.h>
#include <MFRC522.h>
#include <MFRC522Extended.h>
#include <require_cpp11.h>
#include <BlynkSimpleStream.h>

//Blynk
// Template ID, Device Name and Auth Token are provided by the Blynk.Cloud
// See the Device Info tab, or Template settings
#define BLYNK_TEMPLATE_ID "TMPLhgH3bq55"
#define BLYNK_DEVICE_NAME "SmartLock"
#define BLYNK_AUTH_TOKEN "BCxk2bm7s3Z8ERjEYaSQ1Fxx5JaorDIk"

// Comment this out to disable prints and save space
#define BLYNK_PRINT SwSerial

#include <SoftwareSerial.h>
SoftwareSerial SwSerial(1, 0); // RX, TX

#include <BlynkSimpleStream.h>
char auth[] = BLYNK_AUTH_TOKEN;

//
*****
//

// Comment this out to disable prints and save space
#define BLYNK_PRINT SwSerial

//#include <BlynkSimpleSerialBLE.h>
#include <SPI.h>
#include <MFRC522.h>
#include <Servo.h>

#define SS_PIN 10
#define RST_PIN 9
#define buzzer 4
#define LED_G 5
#define LED_R 6
#define S1 A0

#define SERVO_PIN 3
```



```
Servo myservo;

#define ACCESS_DELAY 2000
#define DENIED_DELAY 1000
MFRC522 mfrc522(SS_PIN, RST_PIN);  // Create MFRC522 instance.

void setup()
{
  Serial.begin(9600);  // Initiate a serial communication
  SPI.begin();        // Initiate  SPI bus
  mfrc522.PCD_Init();  // Initiate MFRC522
  Blynk.begin(Serial, auth);
  tone(buzzer, OUTPUT);
  noTone(buzzer);
  pinMode(LED_G, OUTPUT);
  pinMode(LED_R, OUTPUT);
  myservo.attach(SERVO_PIN);
  myservo.write( 45 );
  Serial.println("Tap the card");
  Serial.println();
}

void loop()
{
  Blynk.run();
  // Look for new cards
  if ( ! mfrc522.PICC_IsNewCardPresent())
  {
    return;
  }
  // Select one of the cards
  if ( ! mfrc522.PICC_ReadCardSerial())
  {
    return;
  }
  //Show UID on serial monitor
  Serial.print("UID tag :");
  String content= "";
  byte letter;
  for (byte i = 0; i < mfrc522.uid.size; i++)
  {
    Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
    Serial.print(mfrc522.uid.uidByte[i], HEX);
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
  }
  Serial.println();
  Serial.print("Message : ");
  content.toUpperCase();
  if (content.substring(1) == "00 1F C6 20" || content.substring(1) == "F0 68 E0 1F" )
  //change here the UID of the card
  {
```



```
Serial.println("    Access Granted    ");
Serial.println();
int i=0;
do
{
    i++;
    digitalWrite(LED_G,HIGH);
    delay(800);
    digitalWrite(LED_G, LOW);
    tone(buzzer, 4000);
    delay(300);
    noTone(buzzer);
    delay(100);
}
while(i<1);
myservo.write(230);
delay(4000);
myservo.write(55);

}

else {
    Serial.println("    Access Denied    ");
    int i=0;
    do
    {
        i++;
        digitalWrite(LED_R,HIGH);
        delay(300);
        digitalWrite(LED_R, LOW);
        tone(buzzer, 4000);
        delay(200);
        noTone(buzzer);
        delay(100);
    }
    while(i<4);

    delay(DENIED_DELAY);
}
}

//Blynk
BLYNK_WRITE(V0) //Write to Virtual Pin V0
{
    int pin = param.asInt();
    if (pin == 1)
    {
        myservo.write(230);
    }
    else
    {
        myservo.write(50);
    }
}
```



```
//Blynk

BLYNK_WRITE(V1) //Write to Virtual Pin V2
{
  int pin = param.asInt();
  if (pin == 1)
  {
    digitalWrite(LED_G,HIGH);
    tone(buzzer, 4000);
    delay(300);
    noTone(buzzer);
    delay(100);
  }
  else
  {
    digitalWrite(LED_G,LOW);
    tone(buzzer, 4000);
    delay(200);
    noTone(buzzer);
    delay(100);
  }
}

BLYNK_WRITE(V2) //Write to Virtual Pin V2
{
  int pin = param.asInt();
  if (pin == 1)
  {
    digitalWrite(LED_R,HIGH);
    tone(buzzer, 4000);
    delay(300);
    noTone(buzzer);
    delay(100);
  }
  else
  {
    digitalWrite(LED_R,LOW);
    tone(buzzer, 4000);
    delay(200);
    noTone(buzzer);
    delay(100);
  }
}

//Read ID in RFID CARD
BLYNK_READ(V4) //Read from Virtual Pin V4
{
  String content= "";
  byte letter;
  for (byte i = 0; i < mfrc522.uid.size; i++)
  {
```





```
Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
Serial.print(mfrc522.uid.uidByte[i], HEX);
content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
content.concat(String(mfrc522.uid.uidByte[i], HEX));
}
Serial.println();
Serial.print("Message : ");
content.toUpperCase();
if (content.substring(1) == "00 1F C6 20" || content.substring(1) == "F0 68 E0 1F" )
//change here the UID of the card
{
  Serial.println("      Access Granted      ");
  Serial.println();
  int i=0;
  do
  {
    i++;
    digitalWrite(LED_G,HIGH);
    delay(800);
    digitalWrite(LED_G, LOW);
    tone(buzzer, 4000);
    delay(300);
    noTone(buzzer);
    delay(100);
  }
  while(i<1);
  myservo.write(230);
  delay(4000);
  myservo.write(45);

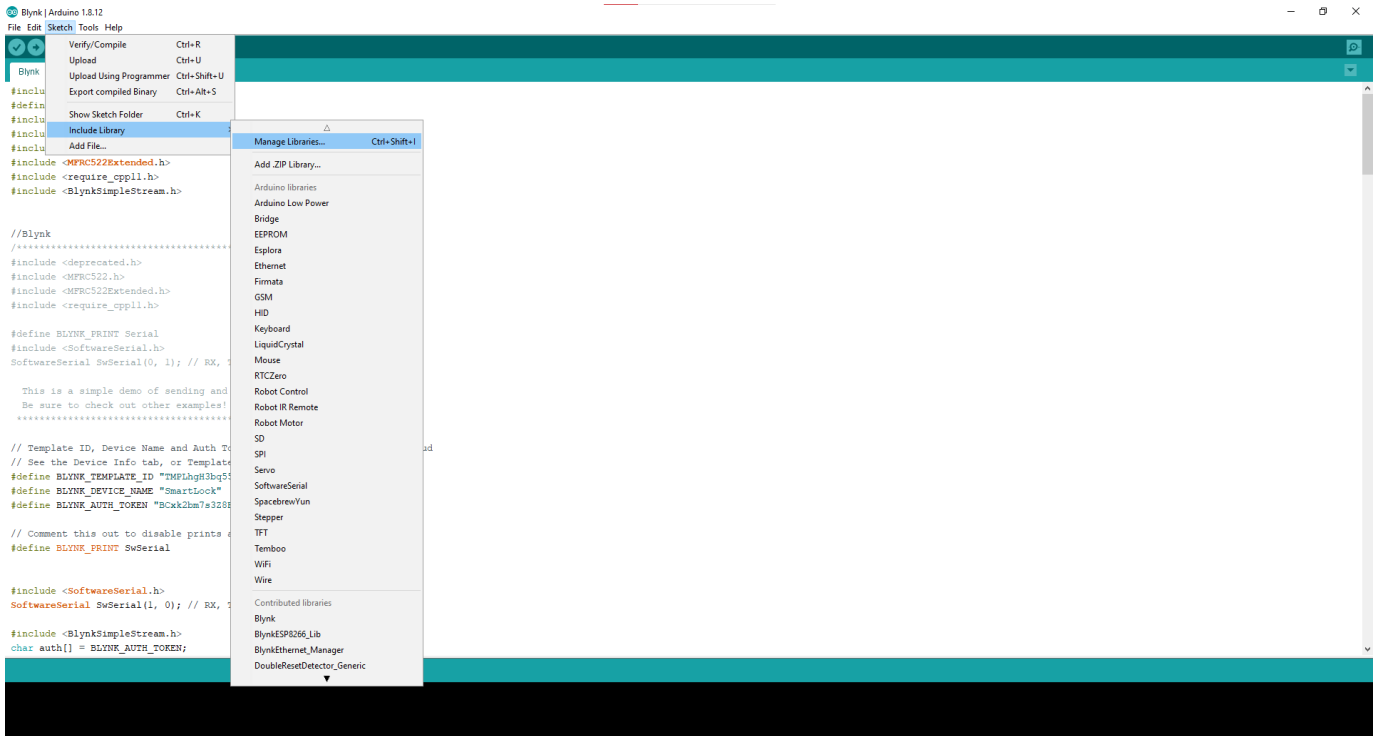
}

else {
  Serial.println("      Access Denied      ");
  int i=0;
  do
  {
    i++;
    digitalWrite(LED_R,HIGH);
    delay(300);
    digitalWrite(LED_R, LOW);
    tone(buzzer, 4000);
    delay(200);
    noTone(buzzer);
    delay(100);
  }
  while(i<4);
  delay(DENIED_DELAY);
}
}
```

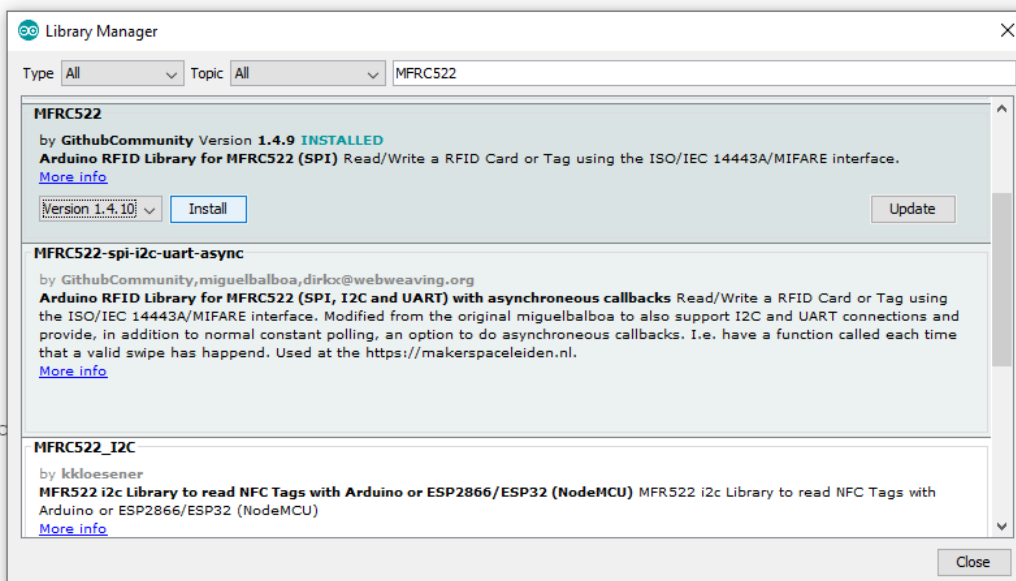
## 5. Development Step

### Step 1: Install MFRC522.h and Blynk library

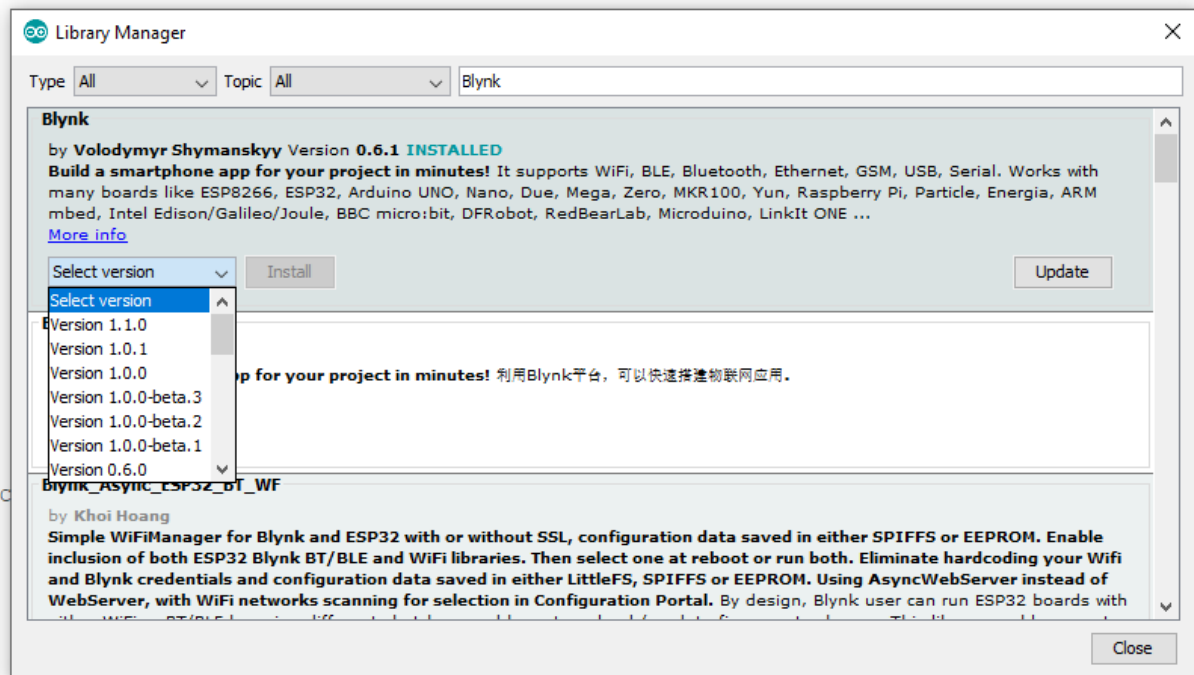
Click on sketch and choose include library and select manage library.



Search “MFRC522” and select version then install.



Search and select version then install Blynk



Step 2: Install Blynk App on Smartphone

Go to App Store or Google Play and search Blynk – Choose Get/Install to Download application

Filters ▾

🔍 blynk



Blynk - IoT for Arduin...

ESP8266, Raspberry Pi, No...

★★★★☆ 54

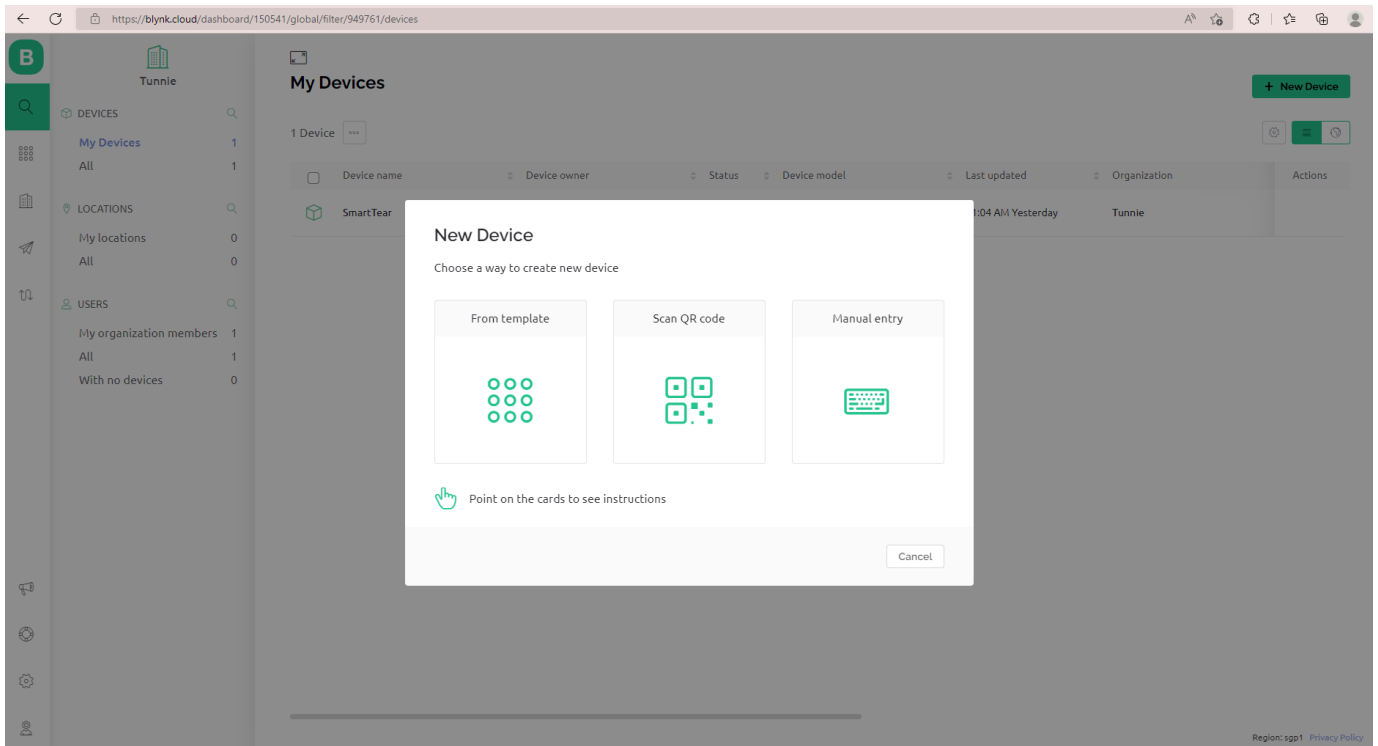
OPEN



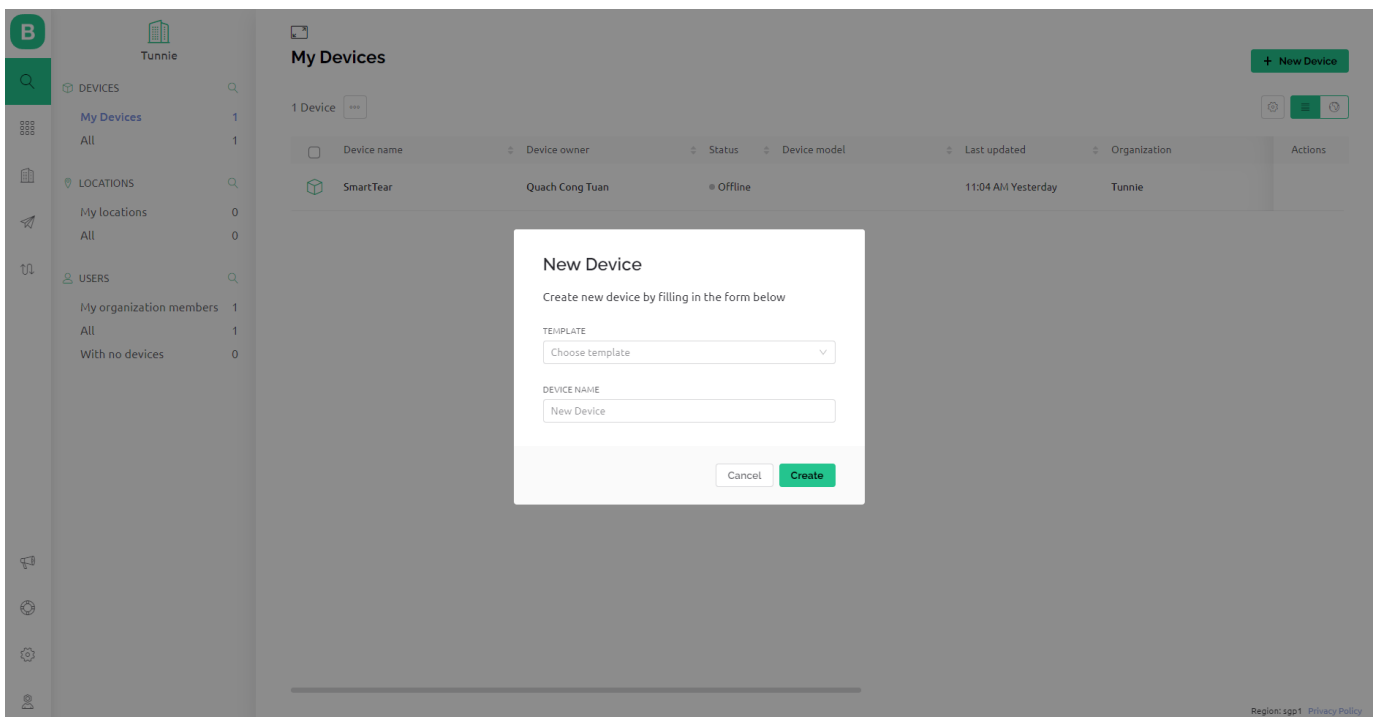
And then please register and login to access on system.

Step 3: Login Blynk and connect to application on website

After login, please choose scan QR Code/From template to create new device.



You can choose template or create a new template, set your device name and create.



After creating, we choose Data Stream to create a data stream for the project.





#### Step 4: Code

In this part, I only focus on declaring the necessary libraries and variables for the project and declaring the Arduino ports connected to the servo.

Then I declare the input values of the servo.

Next, I make a condition for the servo to receive the signal and report it to the cloud.

Finally, I consider the condition for the servo to be able to open and close when you touch a card on RFID.

Below is the code for my "Smart Lock" project.

```
#include <Blynk.h>
#define BLYNK_PRINT SwSerial
#include <Ethernet.h>
#include <deprecated.h>
#include <MFRC522.h>
#include <MFRC522Extended.h>
#include <require_cpp11.h>
#include <BlynkSimpleStream.h>

//Blynk
// Template ID, Device Name and Auth Token are provided by the Blynk.Cloud
// See the Device Info tab, or Template settings
#define BLYNK_TEMPLATE_ID "TMPLhgH3bq55"
#define BLYNK_DEVICE_NAME "SmartLock"
#define BLYNK_AUTH_TOKEN "BCxk2bm7s3Z8ERjEYaSQ1Fxx5JaorDIk"

// Comment this out to disable prints and save space
#define BLYNK_PRINT SwSerial

#include <SoftwareSerial.h>
SoftwareSerial SwSerial(1, 0); // RX, TX
```



```
#include <BlynkSimpleStream.h>

char auth[] = BLYNK_AUTH_TOKEN;


// *****
//

// Comment this out to disable prints and save space
#define BLYNK_PRINT SwSerial

//#include <BlynkSimpleSerialBLE.h>
#include <SPI.h>
#include <MFRC522.h>
#include <Servo.h>


#define SS_PIN 10
#define RST_PIN 9
#define buzzer 4
#define LED_G 5
#define LED_R 6
#define S1 A0


#define SERVO_PIN 3
Servo myservo;


#define ACCESS_DELAY 2000
#define DENIED_DELAY 1000
MFRC522 mfrc522(SS_PIN, RST_PIN); // Create MFRC522 instance.
```





```
void setup()
{
  Serial.begin(9600);  // Initiate a serial communication
  SPI.begin();         // Initiate  SPI bus
  mfrc522.PCD_Init();  // Initiate MFRC522
  Blynk.begin(Serial, auth);
  tone(buzzer, OUTPUT);
  noTone(buzzer);
  pinMode(LED_G, OUTPUT);
  pinMode(LED_R, OUTPUT);
  myservo.attach(SERVO_PIN);
  myservo.write( 45 );
  Serial.println("Tap the card");
  Serial.println();
}

void loop()
{
  Blynk.run();
  // Look for new cards
  if ( ! mfrc522.PICC_IsNewCardPresent())
  {
    return;
  }
  // Select one of the cards
  if ( ! mfrc522.PICC_ReadCardSerial())
  {
    return;
  }
}
```



```
//Show UID on serial monitor
Serial.print("UID tag :");

String content= "";
byte letter;
for (byte i = 0; i < mfrc522.uid.size; i++)
{
    Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
    Serial.print(mfrc522.uid.uidByte[i], HEX);
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
}
Serial.println();
Serial.print("Message : ");
content.toUpperCase();

if (content.substring(1) == "00 1F C6 20" || content.substring(1) == "F0 68 E0 1F" )
//change here the UID of the card
{
    Serial.println("    Access Granted    ");
    Serial.println();
    int i=0;
    do
    {
        i++;
        digitalWrite(LED_G,HIGH);
        delay(800);
        digitalWrite(LED_G, LOW);
        tone(buzzer, 4000);
        delay(300);
        noTone(buzzer);
        delay(100);
    }
    while(i<1);
}
```



```
myservo.write(230);
delay(4000);
myservo.write(55);

}

else {
    Serial.println("    Access Denied    ");
    int i=0;
    do
    {
        i++;
        digitalWrite(LED_R,HIGH);
        delay(300);
        digitalWrite(LED_R, LOW);
        tone(buzzer, 4000);
        delay(200);
        noTone(buzzer);
        delay(100);
    }
    while(i<4);

    delay(DENIED_DELAY);
}

}

//Blynk
BLYNK_WRITE(V0) //Write to Virtual Pin V0
{
    int pin = param.asInt();
    if (pin == 1)
```



```
{
  myservo.write(230);
}
else
{
  myservo.write(50);
}
}

//Blynk

BLYNK_WRITE(V1) //Write to Virtual Pin V2
{
  int pin = param.asInt();
  if (pin == 1)
  {
    digitalWrite(LED_G,HIGH);
    tone(buzzer, 4000);
    delay(300);
    noTone(buzzer);
    delay(100);
  }
  else
  {
    digitalWrite(LED_G,LOW);
    tone(buzzer, 4000);
    delay(200);
    noTone(buzzer);
    delay(100);
  }
}
```



```
}  
}  
  
BLYNK_WRITE(V2) //Write to Virtual Pin V2  
{  
  int pin = param.asInt();  
  if (pin == 1)  
  {  
    digitalWrite(LED_R,HIGH);  
    tone(buzzer, 4000);  
    delay(300);  
    noTone(buzzer);  
    delay(100);  
  }  
  else  
  {  
    digitalWrite(LED_R,LOW);  
    tone(buzzer, 4000);  
    delay(200);  
    noTone(buzzer);  
    delay(100);  
  }  
}  
  
//Read ID in RFID CARD  
BLYNK_READ(V4) //Read from Virtual Pin V4  
{  
  String content= "";  
  byte letter;  
  for (byte i = 0; i < mfrc522.uid.size; i++)  
  {
```



```
Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
Serial.print(mfrc522.uid.uidByte[i], HEX);

content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
content.concat(String(mfrc522.uid.uidByte[i], HEX));
}

Serial.println();

Serial.print("Message : ");
content.toUpperCase();

if (content.substring(1) == "00 1F C6 20" || content.substring(1) == "F0 68 E0 1F" )
//change here the UID of the card
{
    Serial.println("      Access Granted      ");
    Serial.println();
    int i=0;
    do
    {
        i++;
        digitalWrite(LED_G,HIGH);
        delay(800);
        digitalWrite(LED_G, LOW);
        tone(buzzer, 4000);
        delay(300);
        noTone(buzzer);
        delay(100);
    }
    while(i<1);
    myservo.write(230);
    delay(4000);
    myservo.write(45);

}
```



```
else {  
    Serial.println("    Access Denied    ");  
    int i=0;  
    do  
    {  
        i++;  
        digitalWrite(LED_R,HIGH);  
        delay(300);  
        digitalWrite(LED_R, LOW);  
        tone(buzzer, 4000);  
        delay(200);  
        noTone(buzzer);  
        delay(100);  
    }  
    while(i<4);  
    delay(DENIED_DELAY);  
}  
}
```


## 6. Test case

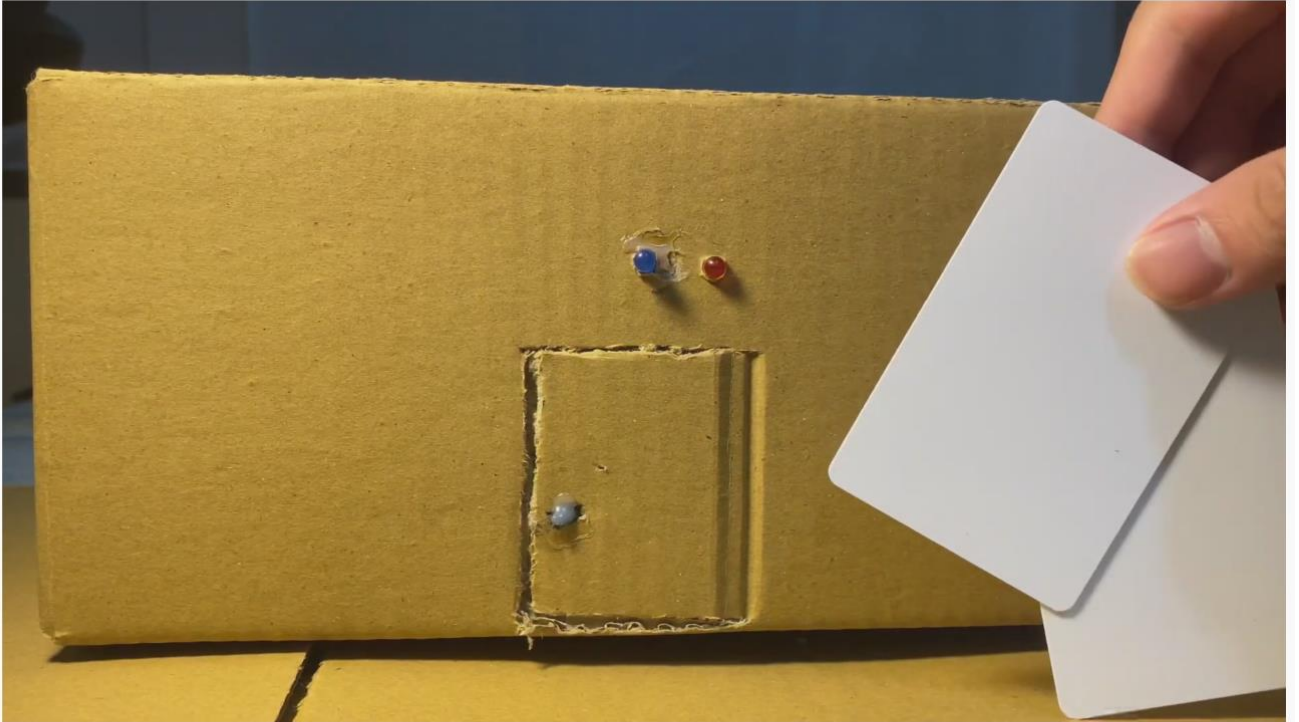
No	Name	Action	Inputs	Onputs	Expected Output	Actual Output	Status
1	Check if the card is connected to the system	Touch the card to the RFID [Card Access]	ON	V0	The connection is successful, and the door is open	The servo rotates and door is opened	PASS
2	Check for cards that don't store data in the cloud	Touch the card to the RFID [Card Denial]	ON	V0	The connection is successful, and the door is close and no open, so data do not save in cloud	The servo does not rotate, and door is closed	PASS
3	Check the Blue LED warning light when the door is opened successfully	Touch the card to the RFID [Card Access]	ON	V0	The connection is successful, and the door is open, and blue led is high in 1s	LED lights are on	PASS
4	Check the Blue LED warning light when the door is closed successfully	Touch the card to the RFID [Card Denial]	ON	V0	The connection is successful, and the door is close, and red led is high in 1s	LED lights are on	PASS
5	Check the warning sound when access is allowed	Touch the card to the RFID [Card Access]	ON	V0	The connection is successful, and the beep sounds 1 time	Sound alert	PASS
6	Check the warning sound when denied access	Touch the card to the RFID [Card Denial]	ON	V0	The connection is successful, and the alarm sounds 4 times	Sound alert	PASS
7	Open on application	Click button open	ON	V0 Value = 1	The connection is successful, and the door is open	The servo rotates and door is open	PASS
8	Close on application	Click button close	OFF	V0 Value = 0	The connection is successful, and the door is close	The servo rotates and door is close	PASS
9	Turn on the blue light	Click button Blue Light	ON	V1	The connection is successful, and the blue light is on	LED lights are on	PASS




10	Turn on the red light	Click on button Red Light	ON	V2	The connection is successful, and the red light is on	LED lights are on	PASS
11	Turn off the blue light	Click button Blue Light	OFF	V1	The connection is successful, and the blue light is off	LED lights are off	PASS
12	Turn off the red light	Click button Red Light	OFF	V2	The connection is successful, and the red light is off	LED lights are off	PASS

## 7. Video Demo


YouTube





VIETNAM

Smart Lock | Internet of Things | Quach Cong Tuan

33 views · 19 Aug 2022

4
DISLIKE
SHARE
SAVE
...


TnunieTek

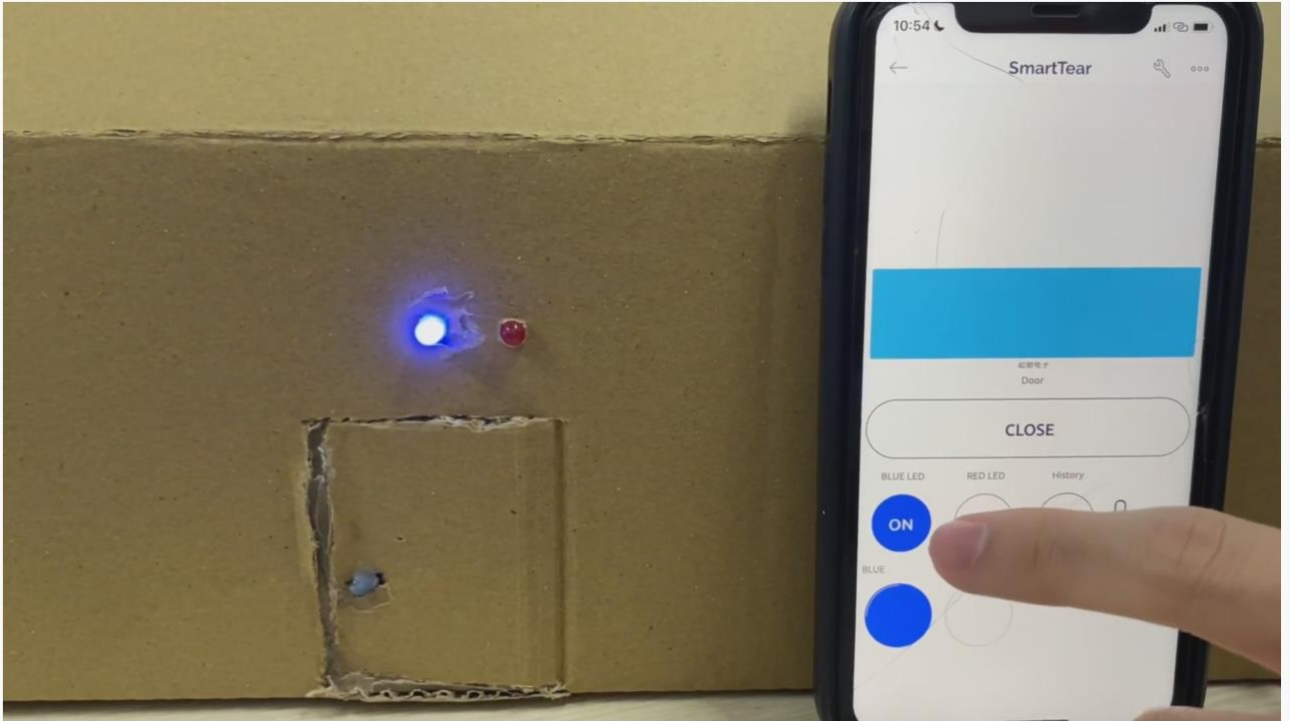
ANALYTICS
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## And Video connect to Blynk

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1 DISLIKE SHARE SAVE ...

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## P6. Run end user experiments and examines feedback.

To get user feedback through my IOT product usage. I have done survey questions via google form service and interview. Below is the survey questionnaire I put out to get feedback.

### 1. Survey

# SMART DOOR LOCK

This poll gathers feedback about users' experiences with smart door locks.

Please provide feedback so I can make my project and IoT product better in the future.



tuangcbhaf200014@fpt.edu.vn (chưa chia sẻ)



[Chuyển đổi tài khoản](#)

### 1) How do you feel when you experience the smart parking system

	1	2	3	4	5	
Very bad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good

### 2) Do you believe there is future growth and development potential for smart door locks?

- ☐ Yes
- ☐ No
- ☐ Maybe



3) What features of the smart door lock do you like?

- ☐ Safety
- ☐ Modern technology
- ☐ Convenience
- ☐ Reasonable price

4) What functions or enhancements do you believe the IoT Door Lock should get in the future?

- ☐ Automatically closes after 30 seconds
- ☐ Audible alerts when someone enters
- ☐ Add an RFID door opener feature.
- ☐ Report an error when someone hits the door hard

5) If IoT technology is widely used, would you utilize a smart door lock?

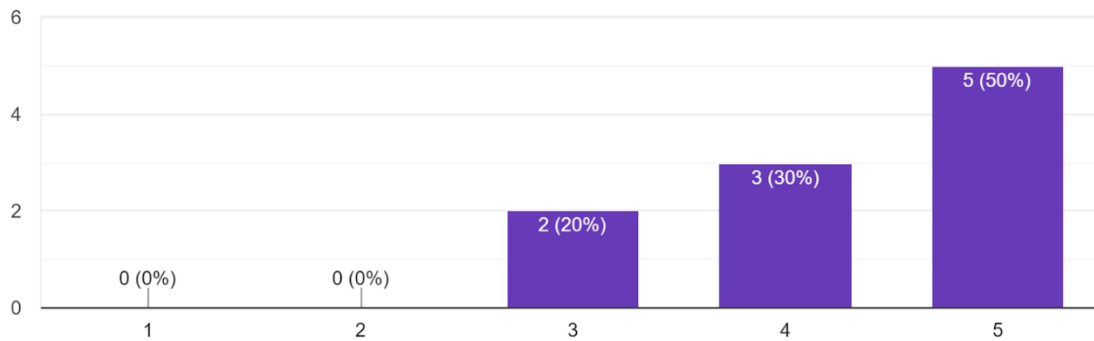
- ☐ Yes
- ☐ No
- ☐ Maybe

Gửi

Xóa hết câu trả lời

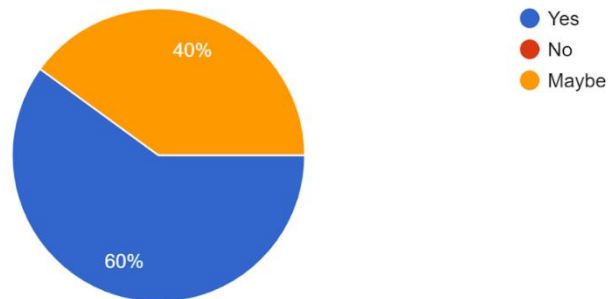
### 1) How do you feel when you experience the smart parking system

10 câu trả lời



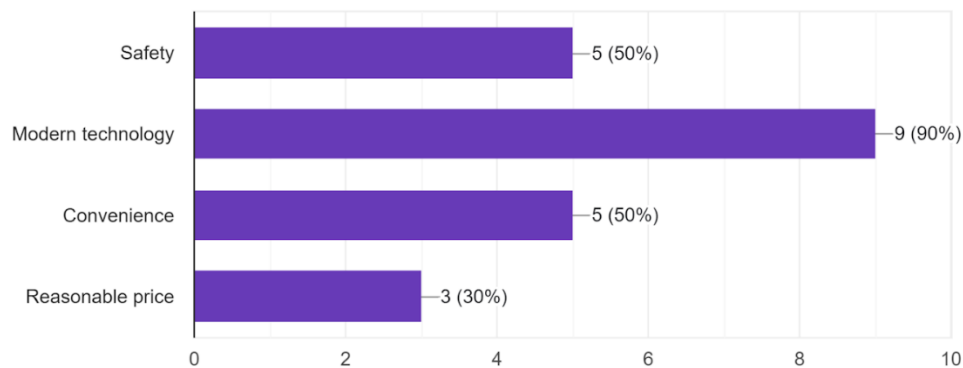
### 2) Do you believe there is future growth and development potential for smart door locks?

10 câu trả lời



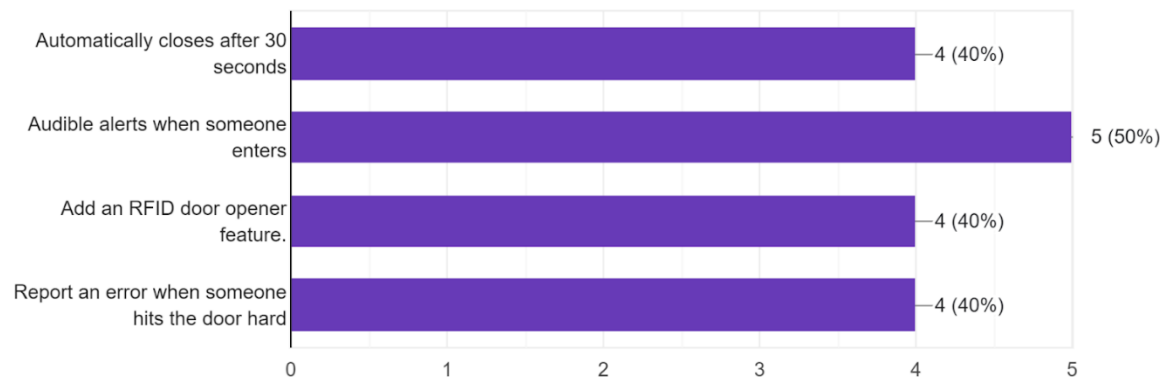
### 3) What features of the smart door lock do you like?

10 câu trả lời



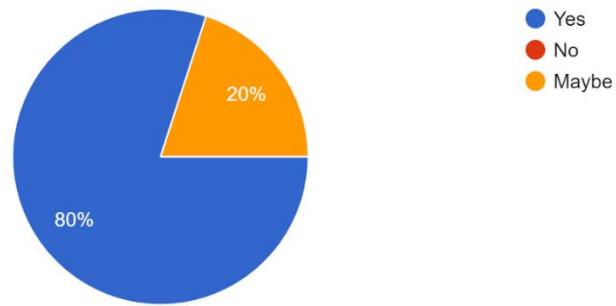
### 4) What functions or enhancements do you believe the IoT Door Lock should get in the future?

10 câu trả lời



5) If IoT technology is widely used, would you utilize a smart door lock?

10 câu trả lời





## 2. Interview

### Interview 1:

- Interviewer: Have you heard of smart door locks?
- Lam Khanh: I have that product. Does the door lock use a magnetic card or fingerprint to open the door?
- Interviewer: That's right. But my product uses the phone app to unlock the door. Do you know that feature?
- Lam Khanh: No, I have never heard of that feature. I think if the lock door is opened on the phone, it will be very secure.
- Interviewer: Because it is connected on Blynk, it will be encrypted according to each device you are using. So the security feature will be optimized. My device is in early version right now, so I need everyone's opinion. What do you think about my product?
- Lam Khanh: This is the first time I've heard of this feature, so I can't think of more features to improve
- Interviewer: Thanks for the interview.

### Interview 2:

- Interviewer: Have you ever heard of unlocking using a smartphone?
- Dinh Hieu: I have heard about this feature on the Internet.
- Interviewer: So what do you think about smart phone unlocking products?
- Dinh Hieu: I think it's quite new to everyone because the product is applied with new technology. However, it will still have its downsides. For example, if I lose my Internet connection or my phone breaks, I cannot enter the house. I see that as a big minus point in this product.
- Interviewer: So would you like to add any features in my product?
- Dinh Hieu: Integrating the use of magnetic cards in smart lock doors is a good choice. It will help eliminate the downside when your phone has problems.
- Interviewer: Thanks for your comments.





### 3. Product improvement

In this project I made my project using a real device and connected it to Blynk. With the phone unlock feature in my product by controlling the Servo Motor, my product already has the basic features of a smart door lock. However, after doing the survey and interview I received comments from people who know my product and those who don't know about its features.

First, I will integrate RFID unlocking technology into my product. Thereby, I was able to eliminate the biggest drawback in my locked door product. It's a phone and Internet connection problem.

Second, I want to develop more unlocking features with smartwatches that get data from smartphones. Because we don't always hold and use the phone, integrating the application on the watch will be a good idea to bring convenience during use.

Finally, I want to improve the house's entry and exit tracking. This is not a prominent feature, but it will help users to manage the entrance or exit of the house. From there, we will be better able to protect our assets.

These are the features I want to improve in my product in the next versions. I hope my smart lock product can be widely used in homes and apartments.



## P7. Evaluate end user feedback from your IoT application.

After going through a survey of Smart Door Lock users and also some improvement through that feedback. I have sent the product to market and have some users using it and giving feedback.

Through user reviews, we can see that the "smart lock" system product is a useful product.

in life, especially with security issues in big cities today.

Smart locks are controlled through a cloud service. Creating, removing, and sending e-keys is done by means of a mobile application. The user can choose whether the key is for one-time use, will be available for a set time, or is a permanent key, and send it straight to the recipient's smartphone.

### Advantages:

Smart locks are no doubt convenient. These devices allow you to completely forget about your house keys, which then can no longer be lost in women's handbags, left somewhere, maybe at home before going out, with the risk of being locked out.

Smart locks allow exclusive access only to authorized people and everything is handled via smartphones. Doors equipped with this locking system are not subject to mechanical forces through the keyhole, the preferred way of thieves to get into the premises. The keyhole is replaced by the biometric reader or a smartphone detection unit.

With the installation of a smart lock system, you will have full access control. In fact, the smart lock is an electronic device that allows you to record at any time, who goes in and out, with dates and times. This system is however particularly useful for domestic contexts as well, especially when you want to control your children.

### Disadvantages:

The most striking problem is linked to the possibility of not being able to open the door when the battery of the smartphone is down. This kind of inconvenience is pretty relevant, and it would never happen with a conventional lock. The autonomy of these devices is limited and whenever you cannot recharge your smartphone, the risk of being unable to open your door is possible.

Another matter related to smart locks regards a sudden blackout of the control unit or a fault of the recognition device. In both cases, the risk is that you cannot enter into your house because the system is unable to authenticate you. In this case, the only thing you can do is to contact a specialist capable of diagnosing the problem.

Smart locks, especially those that aren't updated regularly, can be exposed to tampering. Being electronic devices, they might be violated by IT experts who can create unauthorized fake access codes with smartphones.

After utilizing the product, I learned through user evaluations that a few crucial features would be enhanced and shortly offered for the greatest user experience.



## M5. Reconcile and evaluate end user feedback and determine advantages and disadvantages of your chosen IoT techniques.

In this project, I defined my project based on software development and engineering. Besides the user experience, I have identified the pros and cons of this project that need to be improved. In the feedback from users, I made the following comparisons:

Advantages	Disadvantages
The data on RFID systems are usually secure because it takes specialized equipment to read the data. This helps to maintain the lock system security.	Unlike the traditional locks, forgetting or misplacing the modern keycard gives you a double headache of figuring out how to open the lock or track back the keycard to access the appliances.
It only takes up a fraction of a second to put an RFID key in the proximity to unlock the security system. The procedure is highly convenient and fast.	Electric RFID keycards malfunction when power outages, causing some lockers to shut you out or leave the lockers open. It offers a lot of uncertainty to the users of keycards.
The size of the card is handy and the same as a regular bank card. Thus, it is easy to store. Users have fewer chances of forgetting these cards when going to the place where they require access. RFID cards are convenient and easy to store.	Users need to manually change their computer clock twice a year. This is required if the server computer is not connected to the internet or if there is a time-based access restriction.
	Vulnerability to Hackers Installation/Cost

#### M6. Undertake a critical review and compare your final application with the original plan.

In the basic and relativistic evaluations of the product, I noticed that my product is still not optimized and needs to develop on additional systems. That is one of the weak points of this project. Further development of security features and information storage as well as granting access rights will need to be exploited and developed in the future. The product has achieved the expected price as originally. However, in terms of features, the new product reaches a basic level and is perfect between opening and closing functions like other devices on the market. I was expecting the system to improve even more and achieve optimized techniques and software. The app needs to be improved with better UX/UI.





## Conclusion

I've pretty much covered every aspect of the subject at hand. I was able to turn my idea into an Internet of Things application by utilising the appropriate technology. After that, I conducted end-user testing and examined the responses of survey and interview respondents. The user input for my Internet of Things application was assessed last. I utilised it to assess, polish, and make future adjustments to my product.

In this assignment 2, I have included the issue, the project's solution, a list of the required hardware components, auxiliary tools, a functional diagram, and the project's development phases. appraisal of the project. To obtain the most unbiased evaluation of the project, I performed surveys with actual consumers, gathering feedback from users and interviewing subject-matter experts. In order to provide the greatest product for consumers, I have ultimately provided my evaluation of the project in terms of its potential for use in real life. I have also highlighted its merits and disadvantages through user feedback.

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