# OTP BASED LOCKING SYSTEM

## INTRODUCTION TO ENGINEERING

## REPORT

*Submitted by*

SOC – T  BATCH 01

| | |
|---|---|
| **D . CHANDU** | **(VTU24198)** |
| **SK . RAHIL BASHA** | **(VTU21948)** |
| **CH . SAI BHARGAV** | **(VTU22497)** |
| **A . TEJA SREE** | **(VTU21897)** |
| **J . AKSHAYA** | **(VTU21751)** |
| **K . SINDHU REDDY** | **(VTU23137)** |

**FRESHMAN ENGINEERING**

**VEL TECH RANGARAJAN DR.SAGUNTHALA R&D INSTITUTE OF SCIENCE AND TECHNOLOGY**

**JANUARY 2023**

i

# VEL TECH RANGARAJAN DR.SAGUNTHALA R&D INSTITUTE OF SCIENCE AND TECHNOLOGY

## CHENNAI 600 062

## BONAFIDE CERTIFICATE

Certified that this project **"OTP based locking system"** is the bonafide work of **D. Chandu (VTU24198), CH. Sai Bhargav (VTU22497), SK. Rahil Basha (VTU21948), A. Tejasree (VTU21897), J. Akshaya (VTU2175), K. Sindhu Reddy (VTU23137).** who carried out this project work under my supervision.

**SIGNATURE**                               **SIGNATURE**

   **HOD**

                               **PROJECT COORDINATOR**

                               Mr.K Subramani

                               Asst.professor, MechanicalEngineering

                               Mrs.Suma Nair

                               Asst.professor, ECE

The Examination is held on _____

**EXAMINER 1**                                              **EXAMINER 2**

## ABSTRACT

Security is the most concern for anyone nowadays. As the most natural way physical key is widely used to lock or unlock the door. Different locks have different keys so it is burden to carry ,sometimes it may be stolen , misplaced and lost. The purpose of the proposed system is to provide extra security that can be used in homes and services. The proposed system is OTP based smart wireless lock system using Arduino Uno. If the user generate correct password OTP is sent on the user's device via GSM Module. If the entered OTP is matched then the system will be unlocked and required task can be initiated. If either of the password or OTP is wrong then the access is denied. The proposed system provides low cost service and high security compared to the available security systems. This smart lock can generate a new password every time yo unlock it,  which further  enhances  your  security  level. This new device is much safer than the traditional key-based system andelectron wireless lock system.

# TABLE OF CONTENTS

# LIST OF FIGURES

# CHAPTER I

## INTRODUCTION

The primary goal of public safety is to protect citizens, organizations and communities by preventing them from being in danger and guarding in their wellbeing. It refers to the welfare and protection of the general public it is usually expressed as a governmental and public responsibility. The primary goal of these is prevention and protection of the public from dangers affecting safety such as theft and robbery. Today the public order and safety domain face many challenges one of the challenges is robbery. The main idea behind this project is to make your home and office where this project would be implemented to be more secured. But along with that, the system should be easy to access and also execute as fast as possible. All the existing door lock system mainly use key based locks.so there is a high risk of keys being misplaced or getting into the wrong hands. This is where this project comes into sense, and it is more necessary.

# CHAPTER II

## EXISTING SYSTEM

The electronic wireless locking system is not that safe because you might forget your password, or it might be hacked by others, while entering the password on your device. A key-based locking system has now become outdated because if your key is lost or stolen, it creates a huge problem. Carrying many keys is a burden and it can be stolen, misplaced or lost. So, we can make a smart lock that has the capability to remove all these security problems.



**FIG 2 Existing System**

# CHAPTER III

## PROBLEM IDENTIFICATION

### PROBLEM:

• The main problem according to this, forgetting passwords, lost keys.

### SOLUTION:

•     This can be overcome by using smart lock system this include OTP based locking system. In case of forgetting password, we can use OTP based system as a alternative method. The main advantage of this theme is it cannot be stolen by anyone and highly securable method.

# CHAPTER IV

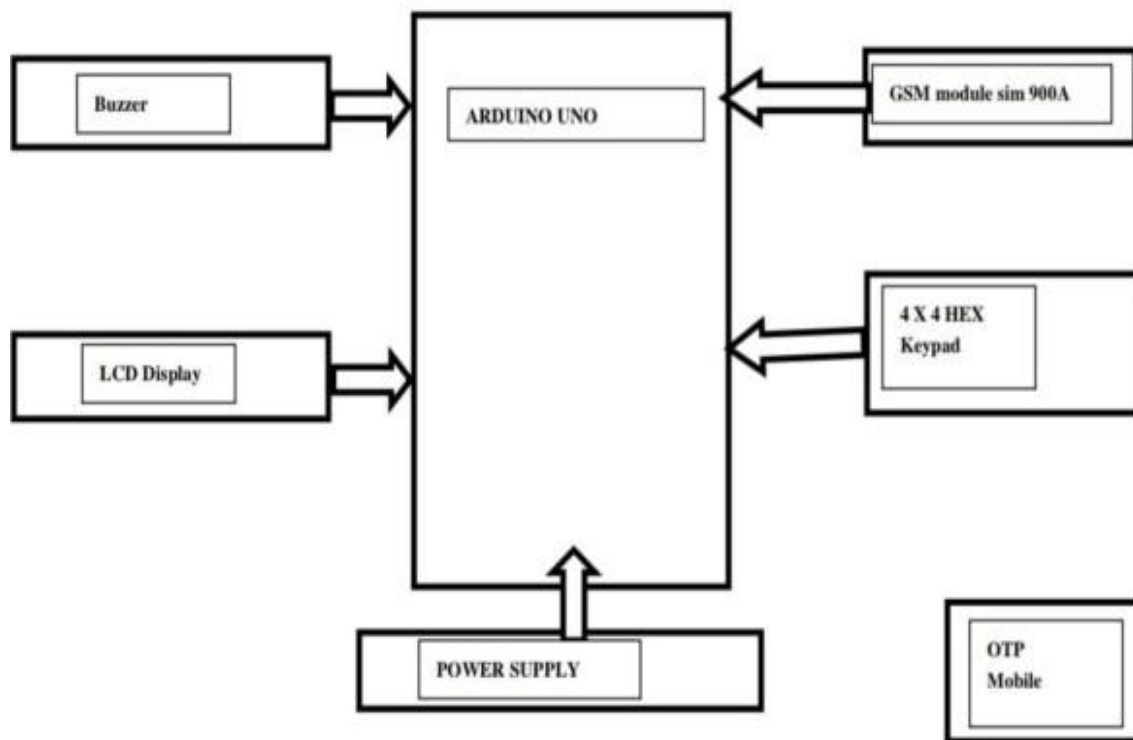# PROPOSED SYSTEM

In present situation protection plays a major role in day to day life. Insecurity is facing by many people now a days. So, to over come this we have proposed a new locking system which has high end security level.The proposed system is via OTP that is OTP Locking system.The system has a high end protection this is the solution for the people who are facing insecurities.Key based locking system is a traditional method is widely used in now a days which is having highly insecurity because the key may get stolen or robbered.We introduced the modern technology of locking system via OTP. The system works through one time password by the access of authorized card which is having high level protection.

# CHAPTER V

# BLOCK DIAGRAM / DESIGN

**BLOCK DIAGRAM**

| Buzzer | → | ARDUINO UNO | ← | GSM module sim 900A |

```
   ┌─────────┐        ┌──────────────┐        ┌──────────────────┐
   │ Buzzer  │ ──►    │              │  ◄──   │ GSM module sim 900A│
   └─────────┘        │              │        └──────────────────┘
                      │ ARDUINO UNO  │
   ┌─────────┐        │              │  ◄──   ┌──────────────┐
   │LCD Display│ ──►  │              │        │ 4 X 4 HEX    │
   └─────────┘        │              │        │ Keypad       │
                      │              │        └──────────────┘
                      └──────▲───────┘
                             │
                      ┌──────────────┐        ┌──────────────┐
                      │ POWER SUPPLY │        │ OTP          │
                      └──────────────┘        │ Mobile       │
                                              └──────────────┘
```

**Fig. 5.1 Block diagram of OTP Based Locking System**

# DESIGN
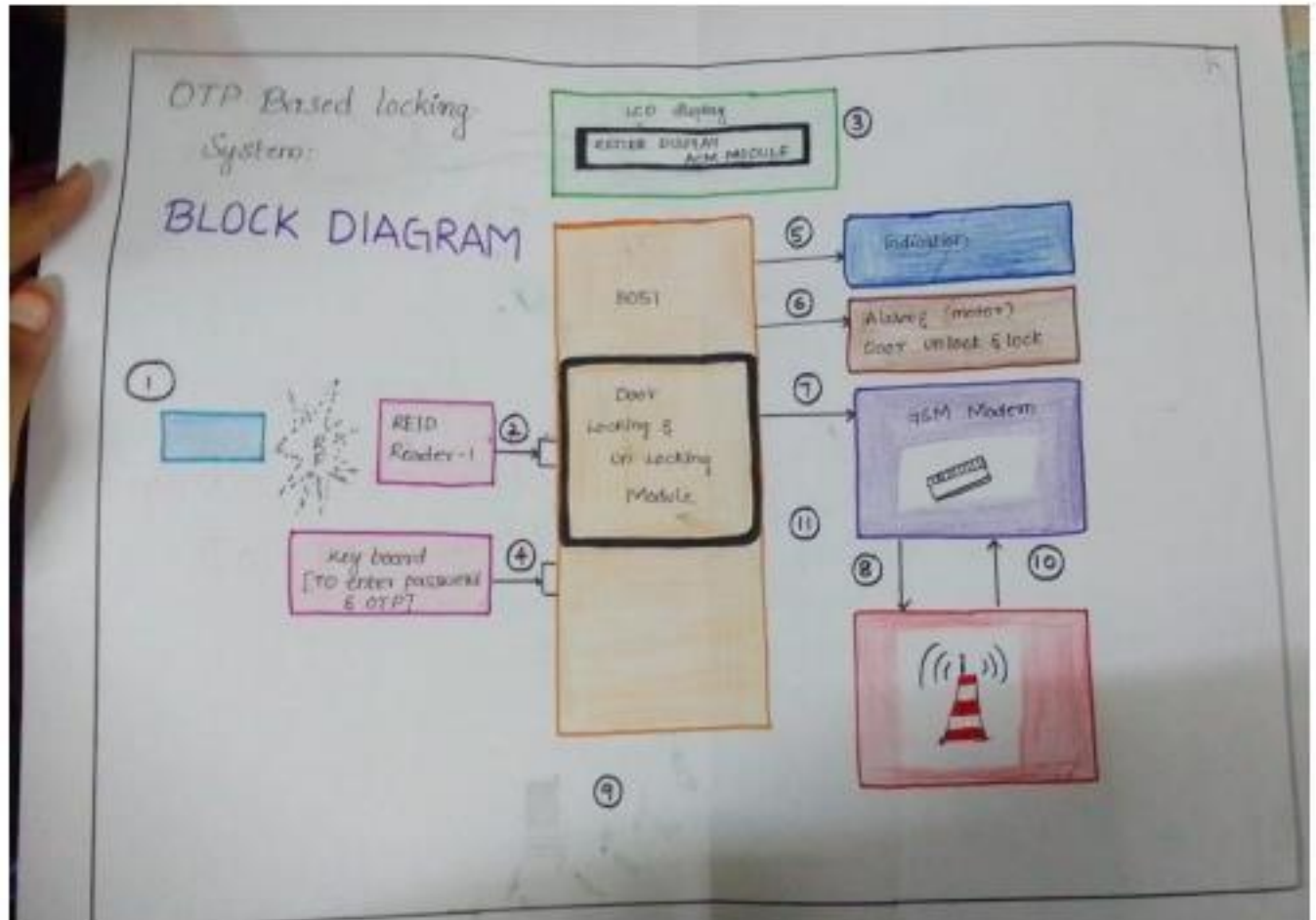


**Fig. 5.2 Design of project**

# CHAPTER VI

# MATERIALS

| ITEMS | QUANTITY |
| --- | --- |
| Arduino UNO | 1 |
| RFID (Radio Frequency Identification) | 1 |
| Servo Motor | 1 |
| Adapter | 1 |
| GSM Modem | 1 |
| Keyboard | 1 |
| Jumper wires | 2 |

**Arduino Uno** is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.



**Fig. 6.1 Arduino**

- **RFID ( Radio Frequency Identification)** methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader.



**Fig. 6.2 RFID (Radio Frequency Identification Device}**

• **Servomotor** (or servo motor) is a rotary actuator or linear actuator thatallows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.



**Fig. 6.3 Servo Motor**

- **Adapter** is of 12V 2A and which is of 24W output voltage to the run the project which included with Arduino, RFID, GSM modem,LCD Display and etc. it can be run and work with minimum of voltage of 24W.



**Fig. 6.4 Adapter**

**jumper wires** (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.



**Fig. 6.5 Jumper wires**

• **GSM Modem** can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. It can be used to send SMS or make voice calls. This GSM modem is a highly flexible. Supports features like Voice, SMS, Data/Fax, GPRS and integrated TCP/IP stack.
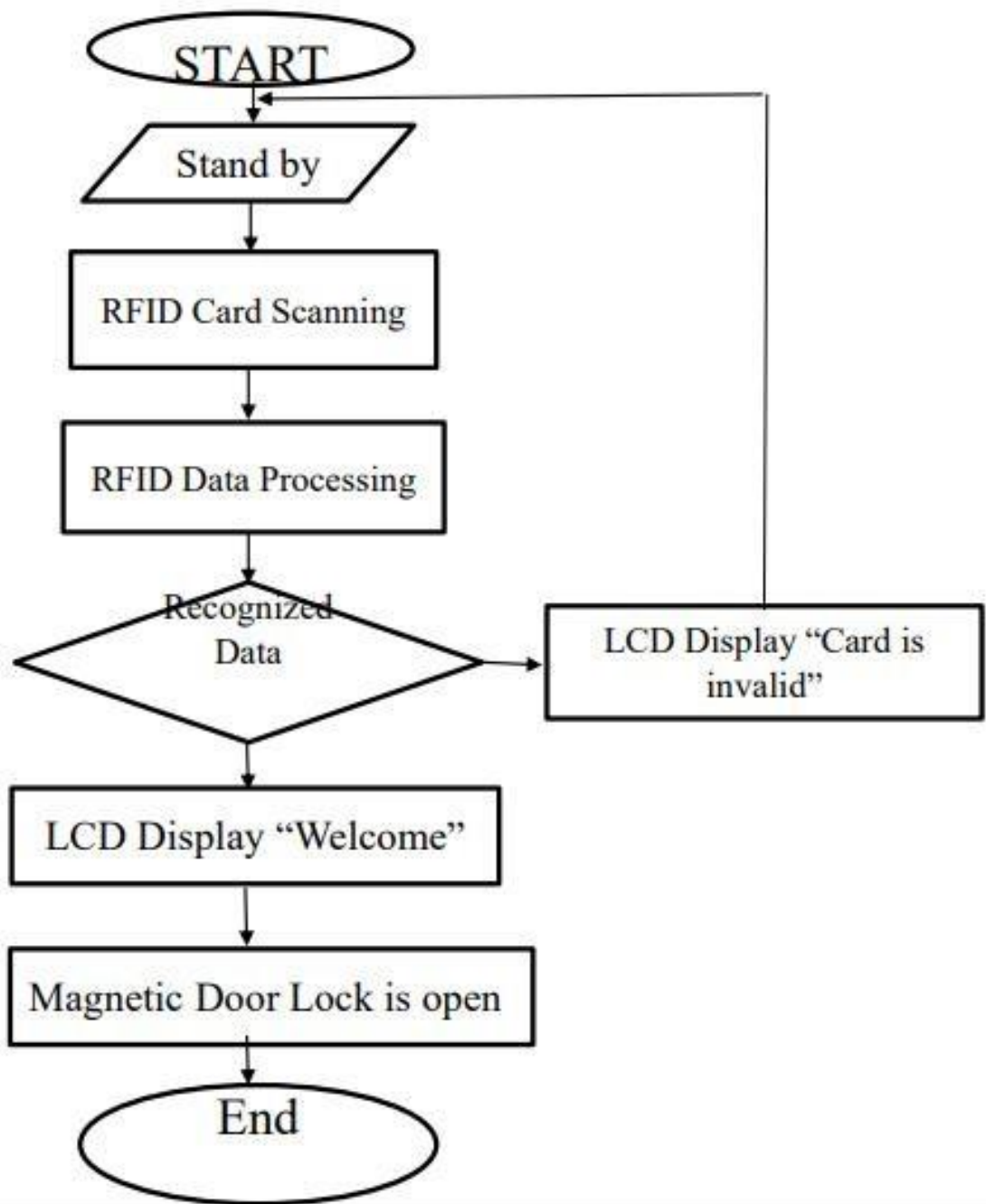
**Fig. 6.6 GSM Modem**

# CHAPTER VII

## WORKING

The system generates and sends an OTP to the admin through the text message. The generated OTP is sent to the door lock for immediate synchronization. When the synchronization is complete, the random keypad is activated to receive a password. When the visitor inputs the received OTP on the keypad, the password verification process checks whether the password input by the visitor is the same as the generated OTP. If the OTP is match, the door lock is set to open. If the OTP do not match, the lock won't open at all. The door will unlock until correct OTP is entered through the keyboard

# CHAPTER VIII

## SOFTWARE DETAILS

Arduino is an open hardware development board that can be used by tinkerers, hobbyists, and makers to design and build devices that interact with the real world. Programming languages get utilized to instruct a computer to perform certain tasks. Every programming language follows a set of rules and defines a vocabulary, just like a natural language. However, processors can't directly understand them, and a human-readable program needs to get converted into binary values that a computer can understand. C++ is an immensely popular and versatile language that usually requires a compiler which performs the translation.

```
                          START

                         Stand by

                    RFID Card Scanning

                    RFID Data Processing

              Recognized                    LCD Display "Card is
                 Data                             invalid"

              LCD Display "Welcome"

            Magnetic Door Lock is open

                          End
```

# CHAPTER IX

# PROGRAM

#include <Wire.h>

#include <LiquidCrystal_I2C.h>

// Set the LCD address to 0x27 for a 16 chars and 2 line display

LiquidCrystal_I2C lcd(0x27, 16, 2);

#include <SPI.h>

#include <MFRC522.h>

#define SS_PIN 10

#define RST_PIN 9

MFRC522 mfrc522(SS_PIN, RST_PIN);   // Create MFRC522 instance.

#include <Keypad.h>

```
const byte ROWS = 4;

 //four rows const byte COLS = 3; //four columns

//define the cymbols on the buttons of the keypadschar

hexaKeys[ROWS][COLS] = {

{'1','2','3'},

{'4','5','6'},

{'7','8','9'},

{'*','0','#'}

};

byte rowPins[ROWS] = {A0, A1, A2, A3}; //connect to the row pinouts
of the keypad

byte colPins[COLS] = {7, 6, 5}; //connect to the column pinouts of the
keypad


//initialize an instance of class NewKeypad

 Keypad customKeypad = Keypad( makeKeymap(hexaKeys), rowPins,
 colPins, ROWS, COLS);


char customKey;


#include <Servo.h>
```

```
Servo myservo;  // create servo object to control a servo

 // twelve servo objects can be created on most boards


int pos = 0;   // variable to store the servo position



void send_smd(long rN);


long randNumber;


char mob_no[] = "8121145834", q;


 char arr[10], key_cnt, keypad_flag = 0, door_flag = 0, end_flag = 0;


int key_num;


void setup()
{
```

```
Serial.begin(9600);   // Initiate a serial communication


// initialize the LCDlcd.begin();


// Turn on the blacklight and print a message.lcd.backlight();


lcd.setCursor(0, 0);

 lcd.print("OTP BASED"); lcd.setCursor(0, 1); lcd.print("DOOR
LOCK SYSTEM");



SPI.begin();

// Initiate SPI mfrc522.PCD_Init();      // Initiate MFRC522
  //Serial.println("Approximate your card to the reader...");
//Serial.println();


 myservo.attach(3);  // attaches the servo on pin 9 to the servo object


delay(2000);
```

```
lcd.clear();

}

void loop()

                                   {
lcd.setCursor(0, 0); lcd.print("Swipe ur card   ");


// 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) == "FB 73 E5 43") || (content.substring(1) ==
  "F7 CD 8C 43") ) //change here the UID of the card/cards that you want
  to give access

{

/* Serial.println("Authorized access");

Serial.println();delay(3000);

*/


lcd.setCursor(0, 0); lcd.print("Authorized acces");
```

```
randNumber = random(9999);

send_smd(randNumber);

key_cnt = 0; keypad_flag = 1;

lcd.clear();

lcd.setCursor(0, 0); lcd.print("Enter OTP:");
}

else
{
//Serial.println(" Access denied");
//delay(3000);

lcd.setCursor(0, 0); lcd.print("Access denied   ");

delay(2000);
```

```
}


if(keypad_flag == 1)

{

while(1)

{

customKey = customKeypad.getKey();


if(customKey)

{

//Serial.println(customKey);


lcd.write(customKey);


arr[key_cnt++] = customKey;

}


if(key_cnt >= 4)

{

delay(50);
```

```
key_num = (((long)arr[0]-48)*1000)+(((long)arr[1]-
48)*100)+(((long)arr[2]-48)*10)+(((long)arr[3]-48)*1);

//Serial.println(key_num);

door_flag = 1;

keypad_flag = 0;

delay(50);

break;
}
}
}

if(door_flag == 1)
{
delay(2000);
```

```
lcd.clear();

while(1)
{
if(key_num == randNumber)
{
lcd.setCursor(0, 0); lcd.print("Door open..");


for(pos = 90; pos <= 180; pos += 1)
{
myservo.write(pos);delay(15);
}


delay(2000);


lcd.clear();


lcd.setCursor(0, 0); lcd.print("Door close..");

for(pos = 180; pos >= 90; pos -= 1)
```

```
 {

myservo.write(pos);delay(15);

 }


end_flag = 1;

}

else

{

lcd.setCursor(0, 0); lcd.print("Wrong pin");


end_flag = 1;

}


if(end_flag == 1)

{

delay(50);

door_flag = 0;

end_flag = 0;
```

```
delay(2000);

lcd.clear();

break;

}

}

}


}


void send_smd(long rN)

{

Serial.print("AT\r\n"); delay(500);

Serial.print("AT+CMGF=1\r\n"); delay(500);
```

```
Serial.print("OTP:"); Serial.write(rN/1000%10+48);

Serial.write(rN/100%10+48);

Serial.write(rN/10%10+48);

Serial.write(rN/1%10+48); Serial.println();

delay(500);


Serial.write(26); delay(2000);

}
```

# CHAPTER X

## ADVANTAGES / DISADVANTAGES

### ADVANTAGES:

- No keys to be lost, stolen or occupied.

- Can be locked using keypad.

- Automatic door opening with OTP.

- Gives an indication for unauthorized entry

### DISADVANTAGES:

- Bypassing of OTP

- Weak Network signal can interrupt the OTP.

- It may not function properly in the case of poor electricity.

# CHAPTER XI

## CONCLUSION

This research paper explains about the locking system using the OTP. This is very effective, low cost and no tensions of loss of keys. This system is controlled by an Arduino applications and RFID. This smart locking system can generate a new random OTP every time you unlock it, which further enhance your security level.so there is no fear of forgetting the password. Furthermore, carrying many keys also a burden task the advanced version of key based locking system is OTP based locking system. So we can use this new advanced technology method to protect the things better.

# REFERENCES

| SL.NO. | TITLE | NAME OF JOURNAL/PUBLICATION | AUTHOR | YEAR |
|---|---|---|---|---|
| 1. | OTP Based Wireless Smart Lock System | Electronicsforu.co m | By Ashwini Kumar Sinha | February 13, 2 019 |
| 2. | OTP Based Smart Wireless Locking System Using Arduino | Elins International Journal of Science Engineering and Management | By SK Mahamma d Musthafa | December 29,2020 |
| 3. | Smart OTP Based Wireless Locking System | International Journal of Engineering Research &Technology (IJERT) | Anuj Kumar Singh | January 2017. |
| **4.** | https://www.youtube.com/watch?v=ZKc506OxQz0 5 | | | |
| **5.** | https://www.youtube.com/watch?v=47pPa8Q7Jv4&feature=youtu. be | | | |

# CHAPTER XIII

# LIST OF MODELS

**Carpentry :**

- Wooden window

- Sliding door

- Wheel chair

- Crank and slotted link

- Wooden Shelf

**Electronics :**

- Power supply board

- Portable mobile charger circuit

- Emergency light

- Relay Board

**Machine Shop :**

- Machine Vice
- Bolt and nut assembly

- Simple and compound Gear train

- Sheet metal tray

# 13.1 MODEL 1
## CARPENTRY : WOODEN WINDOW

**AIM**: To make the wooden window by using wooden pieces.

**APPARATUS :** wooden pieces, coping saw, Scissors, Super Glue and Hinges.

## PROCEDURE:

1. Take some wooden pieces and cut them into required sizes.
2. Attach some of the wooden pieces to form the frame
   and door of the window.
3. Now attach the hinges and window handle as
   showed in the below design.
4. Finally the wooden window in ready.

## DIAGRAM :



**Fig.13.1.1 Final Output of a Wooden Window**
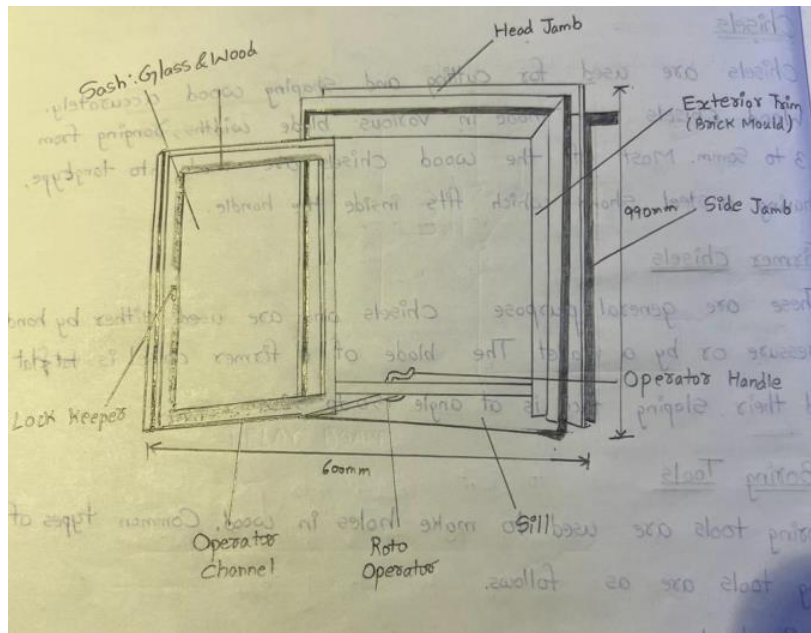
**Fig.13.1.2 Diagram of Wooden Window**

## RESULT :

Hence wooden window has been successfully completed.
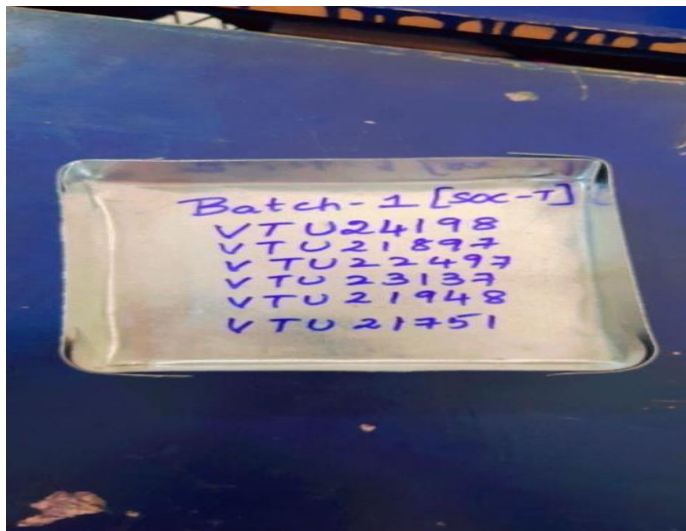
## 13.2 MODEL 2

### SHEET METAL TRAY

**AIM** : To make a relay board.
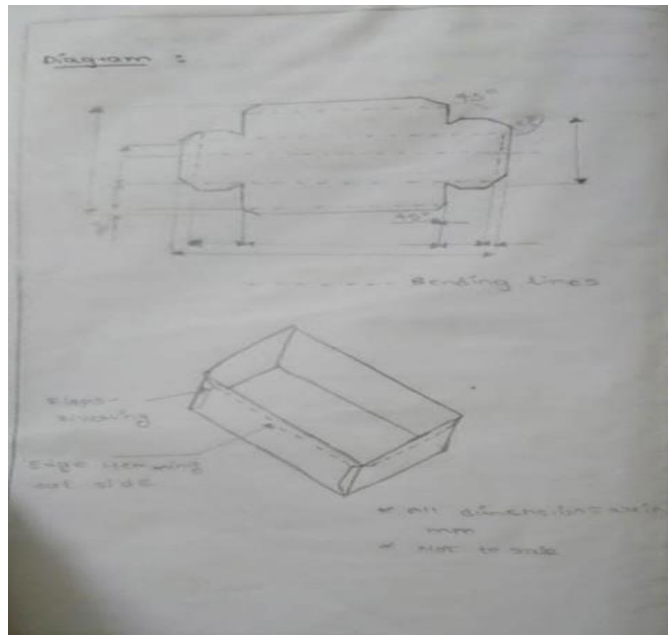
**APPARATUS :** Metal Sheet, Scissor, Hammers.

## PROCEDURE :

1. Take a Metal sheet and mark with correct measurement.
2. Cut with the help of scissors and bend with the help of hammers.
3. Make dimension correctly.
4. Make sure that the metal sheet should be in correct shape in final output.

## DIAGRAM :



**Fig.13.2.1 Final Output of Sheet metal tray**

**Fig.13.2.2 Diagram of sheet metal tray**

**RESULT :** Hence, metal sheet tray is successfully completed.

## 13.3 MODEL 3

## ELECTRONICS: RELAY BOARD

**AIM :** To make a sheet metal Dust Pan using sheet metal.

**APPARATUS :** Sheet metal, scissors, cutting plier and hammer.
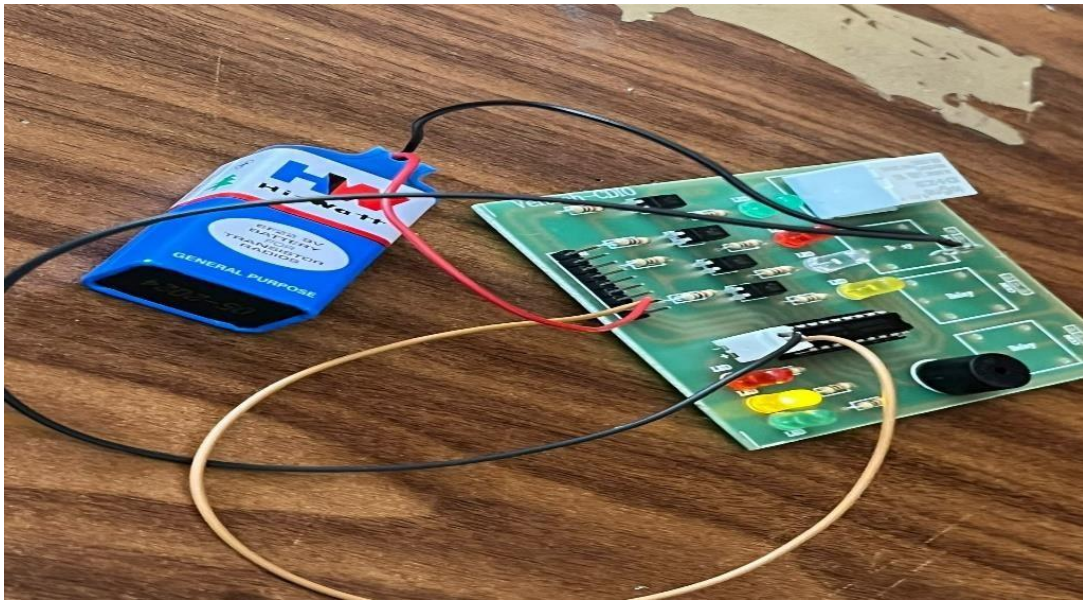
**PROCEDURE :**

1. Take the sheet metal and make the measurements as shown in the below design.
2. After taking the measurements cut the sheet metal using scissors carefully.
3. Now fold the sheet metal to obtain perfect shape as atray.
4. Finally the sheet metal tray is ready.

**DIAGRAM :**
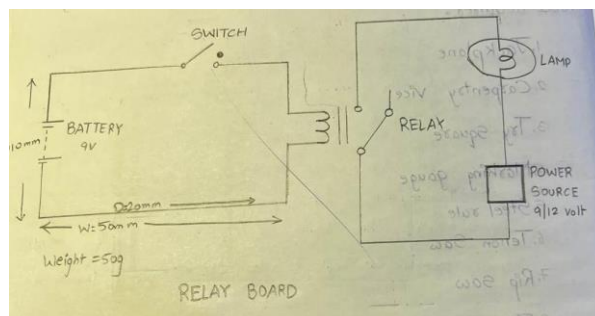


**Fig.13.3.1 Relay board**

**Fig.13.3.2 Final Output of Relay board**

**RESULT :** Hence sheet metal tray has been successfully completed