# VIVEKANAND EDUCATION SOCIETY'S

# POLYTECHNIC

## Chembur, Mumbai -71

**SINCE 1962**

## Smart Door Lock System

**A PROJECT REPORT**

*Submitted By*

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*In partial fulfillment for the award of the degree*

*Of*

**DIPLOMA**

**IN**

**ELECTRONICS & TELE-COMMUNICATION ENGINEERING**

**UNDER THE GUIDANCE OF**

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# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

## Certificate

This is to certify that Mr. **Pranjal Bhanushali** from **Vivekanand Education Society's Polytechnic** Institute having Enrolment No: **2000040222** has completed project of final year having Title **Smart Door Lock System** during the academic year 2022-2023. The project completed by individually consisting of **one** person under the guidance of the Faculty Guide. **Mr. Vikrant Joshi**.

Name & Signature of Guide: Mr. Vikrant Joshi

**External Examiner**        **Head of the Department**        **Principal**

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# ABSTRACT

As by seeing today's scenario the number of crime rate is increasing so to avoid this 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.

A smart door lock system is an advanced and convenient way to secure homes or offices. It utilizes digital authentication, such as PIN codes or biometric authentication, instead of traditional keys, and can be controlled remotely through a smartphone app. The system can integrate with other devices, such as security cameras and alarms, for a comprehensive home security system. While the system offers increased security and convenience, potential issues include reliability, security vulnerabilities, compatibility, cost, and user error. As such, careful consideration must be given to the system's design and implementation to ensure optimal performance and security.

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# CHAPTER 1

## *INTRODUCTION*

## 1.1 Introduction

A smart door lock system is an electronic lock that uses wireless technology to communicate with other devices and can be controlled remotely. It is a highly advanced and convenient way to secure homes or offices, providing keyless entry through digital authentication such as PIN codes or biometric identification. Smart door locks can be integrated with other devices such as security cameras and alarms to create a comprehensive home security system. The ability to control the lock remotely through a smartphone app allows for increased flexibility and convenience, enabling homeowners to provide access to family members or visitors even when they are not physically present. However, there are potential issues with reliability, security vulnerabilities, compatibility, cost, and user error that must be taken into consideration when implementing a smart door lock system. Overall, smart door lock systems represent an innovative and evolving technology that can offer significant benefits to home and office security.

The main objective of this project is to provide security to the user. Also, this project should be lightweight, easy to use, and it should be de-attachable. The system consists of components like Arduino Nano, LCD, Relay esp8266W module etc. [1].



**Figure1.1: Smart Door Lock System**

## 1.2 Background of User based problem

The development of smart door lock systems began in the early 2000s, with the introduction of early electronic lock systems that used a keypad or card reader for entry. In 2007, the first Bluetooth-enabled smart lock was introduced, which allowed users to unlock their doors using a smartphone app. The technology continued to evolve, with the introduction of Wi-Fi-enabled smart locks that allowed for remote access and control. In 2013, August, a smart lock startup, launched its first smart lock, which was controlled using a smartphone app and could be integrated with other smart home devices. The following year, Nest, a smart home company, acquired the company.

The current trend in smart door lock systems is towards increased integration with other smart home devices and improved security features. Some of the key trends in the smart door lock market include Integration with voice assistants, Biometric authentication, Increased security features, Integration with other smart home devices.

The future of smart door lock systems is bright, as the technology continues to evolve and improve [2].



**Figure1.2: Smart Door Lock System**

# CHAPTER 2

## *LITERATURE SURVEY*

## 2.1  Literature survey

A smart lock is an electromechanical lock that is designed to perform locking and unlocking operations on a door when it receives a prompt via Wi-Fi from a registered mobile device. These locks are called smart locks because they use advanced technology and Internet communication to enable easier access for users and enhanced security from intruders. The main components of the smart lock include the physical lock, the key (which can be electronic, digitally encrypted, or a virtual key to provide keyless entry), a secure Wi-Fi connection, and a management mobile app. Smart lock  may also monitor access and send alerts in response to the different events it monitors as well as other critical events related to the status of the device. Smart locks can be considered part of a smart home.

Smart locks, like the traditional locks, need two main parts to work: the lock and the key. In the case of these electronic locks, the key is not a physical key but a smartphone configured explicitly for this purpose which wirelessly performs the authentication needed to automatically unlock the door.

Smart locks allow users to grant access to a third party by means of a virtual key. This key can be sent to the recipient smartphone over standard messaging protocols on Telegram. Once this key is received the recipient will be able to unlock the smart lock using their mobile device during the timeframe previously specified by the sender [1].

Table 1. Component Required

| Sr. No | Components | Specifications | Quantity |
|--------|------------|----------------|----------|
| 1 | Arduino NANO | ATmega328P | 1 |
| 2 | LCD | 20*4 | 1 |
| 3 | Relay | 5v | 2 |
| 4 | Solenoid Lock | 12v | 1 |
| 5 | Buzzer | 6v | 1 |
| 6 | ESP8266 | VMOS | 1 |
| 7 | Vibration Sensor | SW- 420 | 1 |
| 8 | Voltage Convertor | 12v to 5v | 1 |
| 9 | Keypad Matrix | 4*4 | 1 |
| 10 | Adaptor | 12v | 1 |

## 2.2  Components Description

### 2.2.1 Arduino Nano
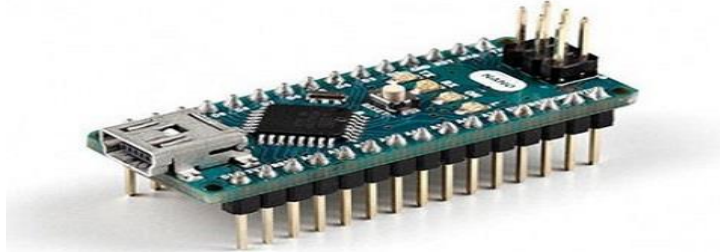


Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board[5].
The features of an Arduino nano mainly include the following.

- ATmega328P Microcontroller is from 8-bit AVR family
- Operating voltage is 5V
- Input voltage (Vin) is 7V to 12V
- Input/Output Pins are 22

### 2.2.2 Solenoid Lock



The solenoid lock denotes a latch for electrical locking and unlocking. It is available in unlocking in the power-on mode type, and locking and keeping in the power-on mode type, which can be used selectively for situations. The power-on unlocking type enables unlocking only while the solenoid is powered on. A door with this type is locked and not opened in case of power failure or wire disconnection, ensuring excellent safety. This type is used mainly for places requiring crime prevention. The power-on locking type can lock a door while the solenoid is powered on. If the power is disconnected, the door is unlocked. This type unlocks the door in case of wire disconnection due to a fire or accident, and it is used for emergency exits through which fire-fighting activity or evacuation should preferentially be made rather than safety for crime prevention. The keeping type performs two operations, locking and unlocking by applying a positive or negative pulse voltage to the solenoid, and keeps the no-power state in each position. This type features energy saving because it is unnecessary to always power the solenoid on. For the continuous rating and the intermittent rating, the continuous rating is

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designed to be able to feed a rated voltage power continuously for hours without exceeding a specified temperature rise limit, and the intermittent rating is designed to be able to feed a specified voltage only for a specified time duration without exceeding a specified temperature rise limit[6].

### 2.2.3 20*4 LCD
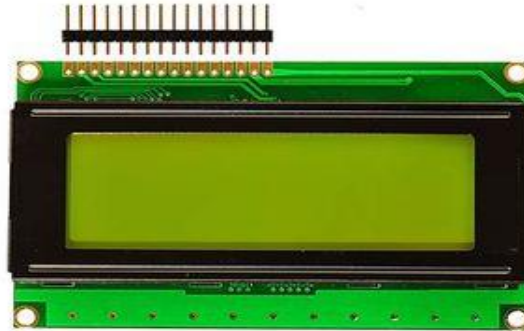


In a 20x4 LCD module, there are four rows in display and in one row twenty character can be displayed and in one display eighty characters can be shown.
The liquid crystal display interfacing code is easily accessible. We just required eleven input and output pinouts for the interfacing of the LCD screen.The input supply for this module is three volts or five volts, with that module other components like PIC, Raspberry PI, Arduino[8].

### 2.2.4 Buzzer



An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.
It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '- 'symbol or short terminal and it is connected to the GND terminal[3].

## 2.2.5 I2C LCD Convertor
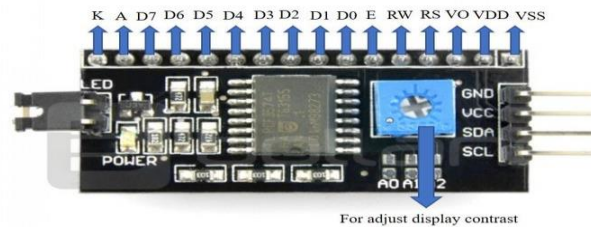


I2C lcd adapter is a device containing a micro-controller PCF8574 chip. This micro-controller is a I/O expander, which communicates with other micro-controller chip with two wire communication protocol. Using this adapter anyone can control an 20x4 LCD with only two wires (SDA, SCL). It saves many pins of Arduino or other micro-controller. It has a built-in potentiometer for control lcd contrast. The default I2C address is 0x27. You can change this address by connecting A0, A1, A2[4].

## 2.2.6 Vibration Sensor



A vibration sensor is a device that measures the amount and frequency of vibration in a given system, machine, or piece of equipment. Those measurements can be used to detect imbalances or other issues in the asset and predict future breakdowns. A vibration sensor either connects directly to an asset or monitors it wirelessly. Once placed, it will detect vibrations from the asset through various means, depending on the type of sensor [7].

## 2.3 Definition of problem statement

The problem statement of a smart door lock system can vary depending on the specific context and application, but some common issues that can arise include:

- Reliability: Smart door locks rely on electronic components and wireless communication, which can be prone to malfunctions or interference.
- Security: While smart door locks can offer increased security compared to traditional locks, they are still vulnerable to hacking and other cyber threats.
- Compatibility: Smart door locks may not be compatible with all types of doors or door frames, which can limit their effectiveness in certain applications.
- Cost: Smart door locks can be significantly more expensive than traditional locks, which can make them less accessible to some users.
- User error: Smart door locks require users to follow specific procedures for setup and use, which can be confusing or difficult for some users [2].

# CHAPTER 3

## *SCOPE OF PROJECT*

### 3.1 Boundaries of this project:

Boundaries of the project is that as we can control the system through Mobile app but in case if there is no internet connection in our mobile phone to operate the application the opening of the door is not possible.

### 3.2 Expectation of this project:

This system is operated by Arduino Nano and ESP8266 Wi-Fi module through Telegram App.

The system is useful for us as sometime we forget keys of door and get panicked but with the help of this system, we can unlock the Door from anywhere.

### 3.3 Impact of Project on the society:

Smart Door Lock is a system where we can operate our door lock from anywhere. The primary point of Smart Door Lock System is to reduce the panic when there is no one at home and we forget door lock keys. With improvement in technology, things are getting to be easier and simpler for everybody around the world today.

### 3.4 Goal of the Project:

The main purpose of this project "Smart Door Lock System" is to provide a more secure, convenient, and connected way for users to control access to their homes.

### 3.5 Achievement of the Project:

We achieved much easier system for our home access and make it safer and easier system for those people who forget their door lock keys when they go out.

## 3.6  Total cost of the components:

Table No: 2

| Sr. No | Components | Specifications | Quantity | Cost of the Components |
|--------|------------|----------------|----------|------------------------|
| 1 | Arduino NANO | ATmega328P | 1 | 490 |
| 2 | LCD | 20*4 | 1 | 699 |
| 3 | Relay | 5v | 2 | 182 |
| 4 | Solenoid Lock | 12v | 1 | 481 |
| 5 | Buzzer | 6v | 1 | 38 |
| 6 | ESP8266 | VMOS | 1 | 349 |
| 7 | Vibration Sensor | SW- 420 | 1 | 105 |
| 8 | Voltage Convertor | 12v to 5v | 1 | 150 |
| 9 | Keypad Matrix | 4*4 | 1 | 85 |
| 10 | Adaptor | 12v | 1 | 250 |
| Total | | | | 2,888/ |

# CHAPTER 4

## *METHODOLOGY*

## 4.1 Proposed methodology

There are methods for achieving the objective, following are some proposed methodologies
of this project i.e., Smart Door Lock System.

## 4.1.1 Automatic Solenoid Door Lock connected to Relay switch through Arduino Nano
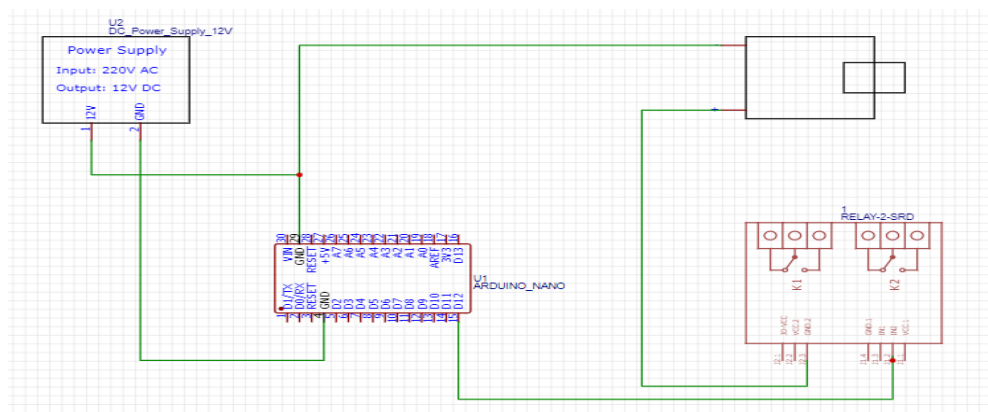


In the above figure we can see Arduino Nano is connected to relay switch which is further
connected to Solenoid door lock system. As we know now days smart door locks are
available but this solenoid door lock is device which can be controlled automatically through
Telegram just by clicking one button from anywhere. Solenoid door is low cost and
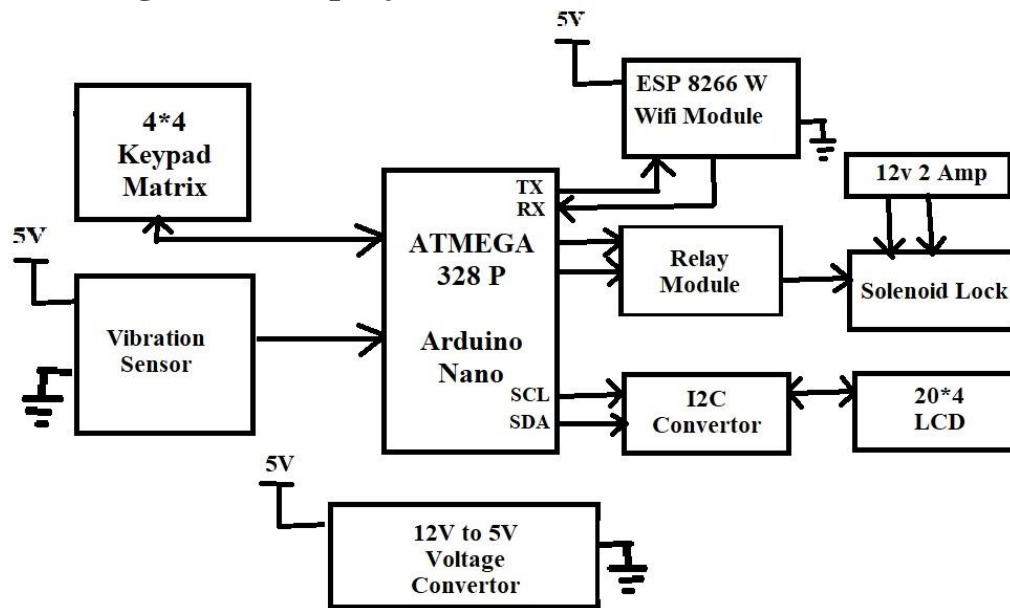efficient.

## 4.2 Block diagram of the project



**Figure 4.2.1: Block diagram of the project**

## 4.3 Block diagram explanation

The circuit consists components such as Arduino Nano which is the main controller, ESP8266W wi-fi module, Vibration Sensor, 4*4 Keypad Matrix, Relay Module, 20*4 LCD, Solenoid Lock, Voltage Convertor, and 12v adaptors. As the Solenoid lock works on 12v so we had used 12v adaptor and voltage convertor along with to convert 12v into 5v as the remaining components works on 5v. When power supply turns on the project starts and it will ask to select your account out of A, B, C, D.

When the user selects him/her account out of A, B, C, D then the Arduino nano will select the Telegram ID which was written in the code for respective account A, B, C, D. After this the Arduino nano will generate the package of OTP and Telegram ID and it sends this package to ESP8266w. As ESP8266W module is connected to the Wi-Fi it will send that OTP on respective Telegram ID and it will communicate with the Arduino that the given OTP has been sent. After this Arduino will wait by showing 'Enter the OTP' on LCD.

As the Arduino know what has been sent to the Telegram ID so as the user types the OTP the Arduino will compare the typed OTP with OTP that has been sent. If the comparison between OTP is correct then it will open the door lock if the comparison is incorrect then it will not open the lock. As there is one more feature in this and that is Alert Alarm. In this feature if any other person tries to open the door or to break the door lock then the vibration sensor become active. When the sensor become active the Arduino will send the message of 'CODERED' to ESP8266W module and the module will send this message to the user's Telegram ID.

## 4.4 Program for Smart Door Lock System

```
#include <Wire.h>
#include <Keypad.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 20, 4);

#define Buzzer       13
#define DoorLock     12
#define DoorS        11

String input_password;
String password;
int keyCount = 0;
const int ROW_NUM = 4; //four rows
const int COLUMN_NUM = 4; //four columns
int OTPflag = 0;
int flag3 = 0;
int PassCode = 0;
String ID = "";
char keys[ROW_NUM][COLUMN_NUM] = {
  {'1', '2', '3', 'A'},
  {'4', '5', '6', 'B'},
  {'7', '8', '9', 'C'},
  {'*', '0', '#', 'D'}
};

byte pin_rows[ROW_NUM] = {9, 8, 7, 6}; //connect to the row pinouts of the keypad
byte pin_column[COLUMN_NUM] = {5, 4, 3, 2}; //connect to the column pinouts of the keypad
Keypad keypad = Keypad( makeKeymap(keys), pin_rows, pin_column, ROW_NUM,
COLUMN_NUM );
String numbers[10] = {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9"};

void setup()
{
  Serial.begin(9600);
  lcd.init();
  lcd.backlight();
  lcd.clear();
  pinMode(DoorS, INPUT);
  pinMode(DoorLock, OUTPUT);
  digitalWrite(DoorLock, HIGH);
  pinMode(Buzzer, OUTPUT);
  digitalWrite(Buzzer, HIGH);

  input_password.reserve(32); // maximum input characters is 33, change if needed

  lcd.setCursor(0, 0);
  lcd.print("  Smart Door Lock   ");
  lcd.setCursor(0, 1);
```

```
  lcd.print("      System      ");
  lcd.setCursor(0, 3);
  lcd.print("     Project by - ");
  delay(5000);
  lcd.clear();

  lcd.setCursor(0, 1);
  lcd.print(" Pranjal Bhanushali ");
  lcd.setCursor(0, 3);
  lcd.print("    Roll No. : 7    ");
  delay(5000);
  lcd.clear();
}

void keypress()
{
 digitalWrite(Buzzer, LOW);
 delay(50);
 digitalWrite(Buzzer, HIGH);
}

void correctPass()
{
 digitalWrite(Buzzer, LOW);
 delay(1000);
 digitalWrite(Buzzer, HIGH);
}

void GetPW()
{
 char key = keypad.getKey();
 if (key)
 {
  keyCount++;
  //Serial.println(key);
  lcd.setCursor((0 + keyCount), 1);
  lcd.print(key);
  lcd.setCursor((1 + keyCount), 1);
  //lcd.print("    ");
  keypress();

  if (key == '*')
  {
   OTPflag = 1;
   flag3 = 0;
   keyCount = 0;
   input_password = ""; // clear input password
  }
  else if (key == '#')
  {
```

```
     OTPflag = 1;
     if (password == input_password)
     {
      lcd.setCursor(0, 0);
      lcd.print("   OTP ACCEPTED    ");
      correctPass();
      digitalWrite(DoorLock, LOW);
      delay(5000);
      digitalWrite(DoorLock, HIGH);
      keypress();delay(50);keypress();delay(50);keypress();
      input_password = "";
      PassCode = 0;
      password = "";
      keyCount = 0;
      flag3 = 0;
      OTPflag = 0;
      delay(5000);
     }
     else
     {
      lcd.setCursor(0, 0);
      lcd.print("   OTP INCORRECT   ");
      keypress();delay(50);keypress();delay(50);keypress();
      OTPflag = 0;
      delay(1000);
      input_password = ""; // clear input password
      PassCode = 0;
      keyCount = 0;
      flag3 = 0;
      delay(5000);
     }
     input_password = ""; // clear input password
    }
   else
   {
    input_password += key; // append new character to input password string
   }
  }
}

void GetPWC()
{
 char key = keypad.getKey();
 if (key)
 {

   lcd.setCursor(0, 3);
   lcd.print("Selected Code: ");
   lcd.print(key);
   lcd.print("    ");
```

```
   keypress();

   if (key == 'A')
   {
    delay(1000);
    ID = "@Pranjalbhanushali";
    PassCode = 1;
    key = "";
   }
   else if (key == 'B')
   {
    delay(1000);
    ID = "@Pranjalbhanushali";
    PassCode = 1;
    key = "";
   }
   else if (key == 'C')
   {
    delay(1000);
    ID = "@Pranjalbhanushali";
    PassCode = 1;
    key = "";
   }
   else if (key == 'D')
   {
    delay(1000);
    ID = "@Pranjalbhanushali";
    PassCode = 1;
    key = "";
   }
   else
   {
    lcd.setCursor(15, 3);
    lcd.print("     ");
    key = "";
   }
  }
}

void loop()
{
 lcd.setCursor(0, 0);
 lcd.print(" Please Select Code ");
 lcd.setCursor(0, 1);
 lcd.print(" A  B  C  D  ");
 lcd.setCursor(0, 2);
 lcd.print("              ");
 lcd.setCursor(0, 3);
 lcd.print("              ");
 correctPass();
```

```
       delay(3000);
       while (PassCode == 0)
       {
        int DoorS_In = digitalRead(DoorS);
        //Serial.println(DoorS_In);
        if(DoorS_In == HIGH)
        {
         keypress();delay(50);keypress();
         Serial.print("@Pranjalbhanushali"); Serial.print(","); Serial.println("CodeRED");
        }
        GetPWC();
       }
       lcd.clear();
       keypress();delay(50);keypress();
       lcd.setCursor(0, 0);
       lcd.print("   Sending OTP to   ");
       lcd.setCursor(0, 1);
       lcd.print(" Telegram Account  ");
       lcd.setCursor(0, 2);
       lcd.print(" :");lcd.print(ID);
       delay(3000);
       password = numbers[random(0, 10)] + numbers[random(0, 10)] + numbers[random(0, 10)] +
      numbers[random(0, 10)] + numbers[random(0, 10)] + numbers[random(0, 10)];
       Serial.print(ID); Serial.print(","); Serial.println(password);
       lcd.clear();
       lcd.setCursor(0, 2);
       lcd.print("     OTP Sent      ");
       correctPass();
       delay(3000);
       lcd.clear();
       OTPflag = 1;
       while (OTPflag == 1)
       {
        lcd.setCursor(0, 0);
        lcd.print("  : Enter  OTP :  ");
        lcd.setCursor(0, 3);
        lcd.print(" *:Clear  #:Enter  ");
        if (flag3 == 0)
        {
         lcd.setCursor(0, 1);
         lcd.print(":_____");
         flag3 = 1;
        }
        GetPW();
       }
      }
```

**Code to send OTP**

```
#include <ESP8266WiFi.h>
const char* ssid = "VIRUS";
const char* password = "pssssbbb";

const char* host = "api.callmebot.com";
const int httpsPort = 443;

WiFiClient client;

int F = 0;
String passW = "";
String ID = "";

void setup()
{
 Serial.begin(9600);

 WiFi.begin(ssid, password);
 while (WiFi.status() != WL_CONNECTED)
 {
  delay(500);
  Serial.print(".");
 }
 Serial.println("");
 Serial.println("WiFi connected");
 Serial.println(WiFi.localIP());
}

void SendData()
{
 // Sending data over telegram
 WiFiClientSecure client;
 //client.setInsecure(); //
 Serial.print("connecting to ");
 Serial.println(host);
 if (!client.connect(host, httpsPort))
 {
  Serial.println("connection failed");
  return;
 }

//  String url = "/text.php?user=@Kirannaik92&text=OTP+for+ATM+System+is+:"; // -> For
Telegram app
 String url = "/text.php?user=";
 url += ID;
 url += "&text=OTP+for+ATM+System+is:+";
 url += passW;
 Serial.print("requesting URL: ");
 Serial.println(url);
```

```
  client.print(String("GET ") + url + " HTTP/1.1\r\n" +
          "Host: " + host + "\r\n" +
          "User-Agent: BuildFailureDetectorESP8266\r\n" +
          "Connection: close\r\n\r\n");

 Serial.println("request sent");
 while (client.connected())
 {
  String line = client.readStringUntil('y'); //checking for a not relevant character, apparently some
timing issue
  if (line == "\r")
  {
   Serial.println("headers received");
   break;
  }
 }
 String line = client.readStringUntil('\n');
 if (line.startsWith("Apikey"))
 {
  Serial.println("esp8266/Arduino CI successfull!");//irrelevant
 }
 else
 {
  Serial.println("esp8266/Arduino CI has failed");//irrelevant
 }
 Serial.println("reply was:");
 Serial.println("=========");
 Serial.println(line);
 Serial.println("=========");
 Serial.println("closing connection");
 F = 1;
}
void loop()
{
 if(Serial.available() > 0)
 {
  String InData = Serial.readString();
  delay(500);

  int InDataL = InData.length();
  char val = ',';
  int firstIndex = InData.indexOf(val);

  ID = InData.substring(0, firstIndex);
  passW = InData.substring(firstIndex + 1, InDataL);
  Serial.print("ID:");Serial.println(ID);
  Serial.print("passW:");Serial.println(passW);
  SendData();
 }
}
```

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# CHAPTER 5

## *DETAILS OF DESIGN, WORKING AND PROCESSES*

## 5.1 Introduction:

A smart door lock system is an electronic lock that uses wireless technology to communicate with other devices and can be controlled remotely. It is a highly advanced and convenient way to secure homes or offices, providing keyless entry through digital authentication such as PIN codes or biometric identification. Smart door locks can be integrated with other devices such as security cameras and alarms to create a comprehensive home security system. The ability to control the lock remotely through a smartphone app allows for increased flexibility and convenience, enabling homeowners to provide access to family members or visitors even when they are not physically present. However, there are potential issues with reliability, security vulnerabilities, compatibility, cost, and user error that must be taken into consideration when implementing a smart door lock system. Overall, smart door lock systems represent an innovative and evolving technology that can offer significant benefits to home and office security.

The main objective of this project is to provide security to the user. Also, this project should be lightweight, easy to use, and it should be de-attachable. The system consists of components like Arduino Nano, LCD, Relay esp8266W module etc. [1].
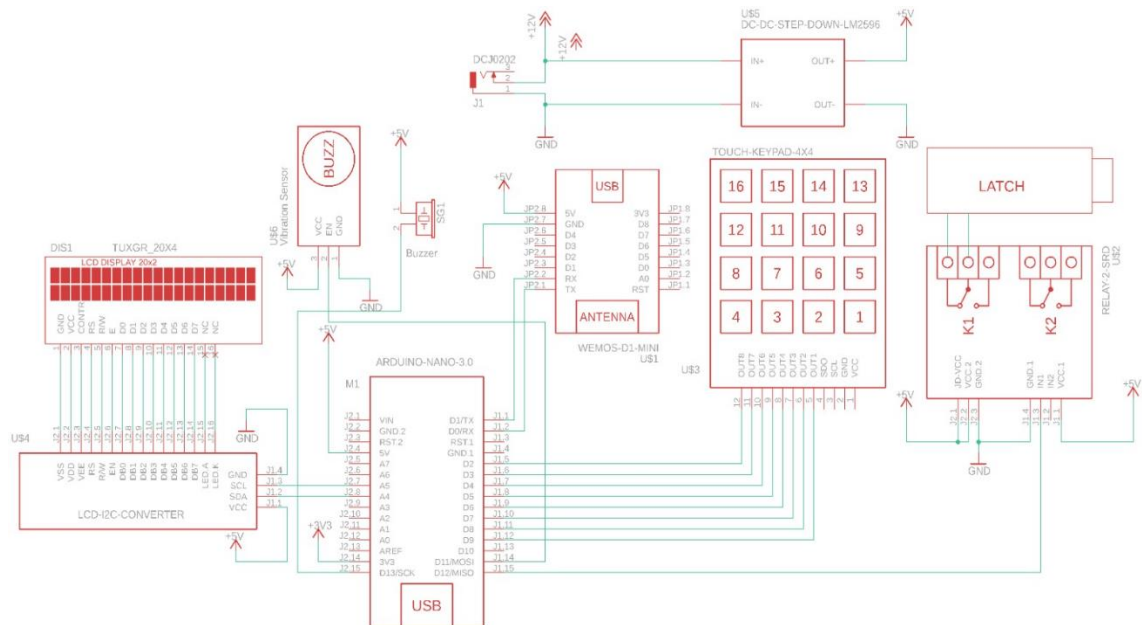
## 5.2 Circuit Diagram of Smart Door Lock System



**Figure 5.2.1: Circuit Diagram**

## 5.3 Circuit Explanation

**Explanation:**

1. The main function of we can see model of Smart Door Lock System. The working of this project is that we can control our Door Lock from anywhere. In this system we had used Arduino Nano as microcontroller and it does not have in built Wi-Fi module used ESP8266 Wi-Fi module. For this we have used ESP8266 Wi-Fi module a device that has a Wi-Fi connectivity.

2. First of all, the components required for this project are relay switches, Arduino Nano, 20*4 LCD Display, Vibration Sensor, buzzer, ESP8266 Wi-Fi module, Voltage Convertor, Keypad Matrix, Adaptor and a software called Telegram App to control the relay switches, solenoid door lock.

3. When power supply turns on the project starts and it will ask to select your account out of A,B,C,D. When the user selects him/her account out of A,B,C,D then the Arduino nano will select the Telegram ID which was written in the code for respective account A,B,C,D.

4. After this the Arduino nano will generate the package of OTP and Telegram ID and it sends this package to ESP8266w. As ESP8266W module is connected to the Wi-Fi it will send that OTP on respective Telegram ID and it will communicate with the Arduino that the given OTP has been sent.

5. When the OTP has sent Arduino will wait by showing 'Enter the OTP' on LCD. As the Arduino know what has been sent to the Telegram ID so as the user types the OTP the Arduino will compare the typed OTP with OTP that has been sent. If the comparison between OTP is correct then it will open the door lock if the comparison is incorrect then it will not open the lock.

6. As there is one more feature in this and that is Alert Alarm. For this feature we had used Vibration Sensor. In this feature if any other person tries to open the door or to break the door lock then the vibration sensor become active. When the sensor become active the Arduino will send the message of 'CODERED' to ESP8266W module and the module will send this message to the user's Telegram ID.
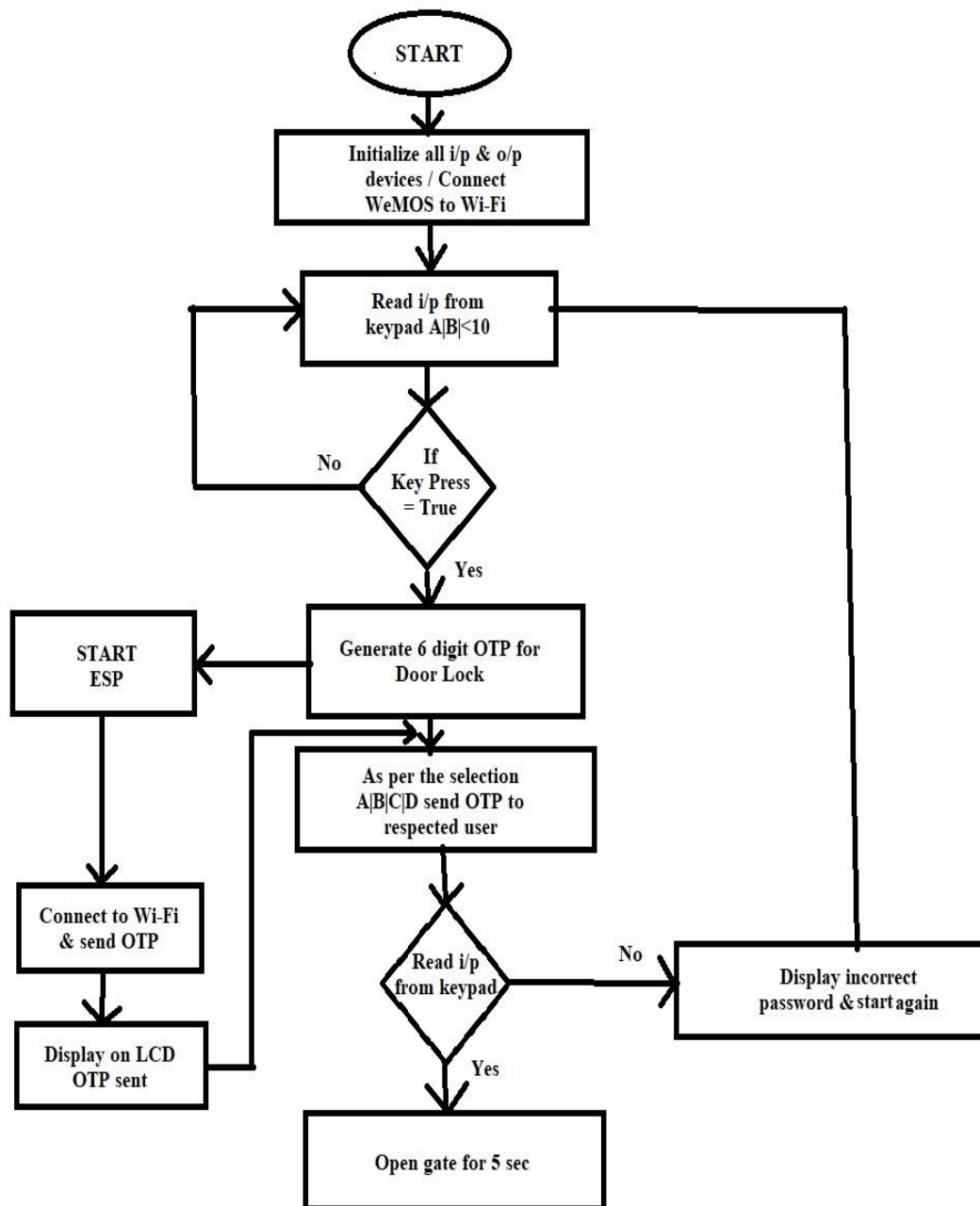
## 5.4 Flow Chart



**Figure 5.4.1: Flow Chart**

# CHAPTER 6

## *RESULTS AND APPLICATION*

### 6.1 Result:

In this design, more advancement and upgrades can be done. As this system is OTP based thus the OTP will be sent on Telegram ID which is written in the code. The Telegram ID'S can only be edited by an authorized person. Another advantage is that it provides security since it uses an OTP. This project elaborates the drawbacks of manually opening of door lock. This Smart Door Lock System not only used at home but also in school, colleges, banks and at many other places. Thus, our smart door lock system project have been positive, and the system has demonstrated its capabilities in providing a secure and convenient access control solution for various applications.

### 6.2 Application:

Applications of Smart Door Lock System can be as follows:-

- It can be used in residential buildings, such as apartments, homes, and gated communities

- It can be used in commercial settings, such as offices, retail stores, and restaurants

- It can be used in industrial settings, such as factories and warehouses.

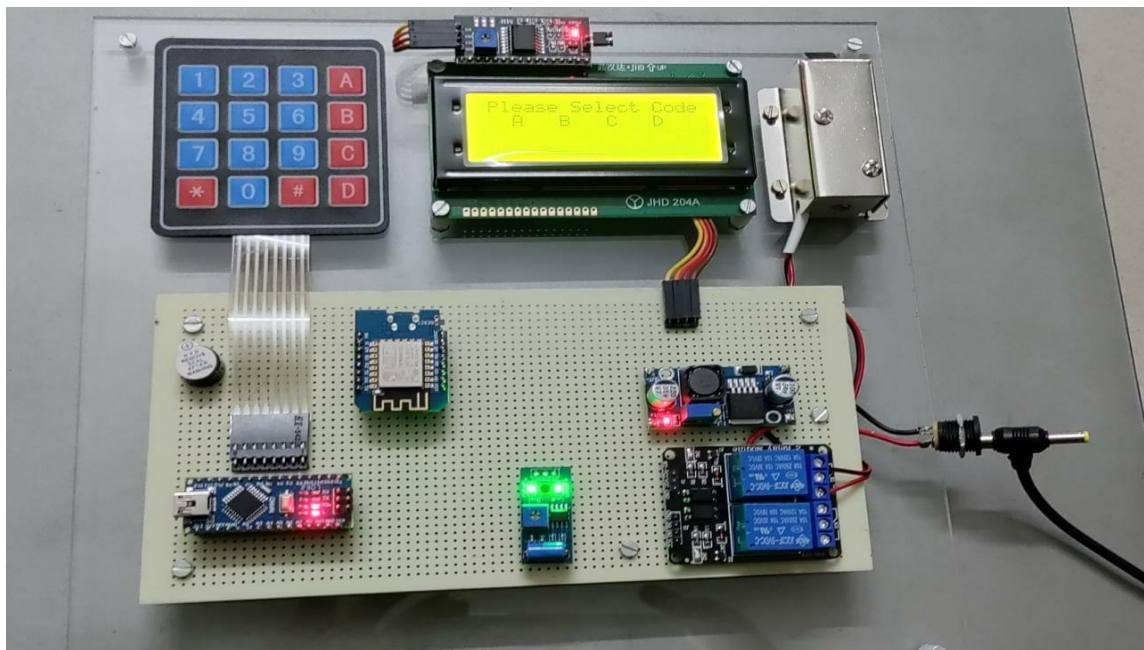- Can be used in healthcare settings, such as hospitals and clinics.



**Figure 6.2.1: Project Demo Model**

# CHAPTER 7

## *CONCLUSION AND FUTURE SCOPE*

## 7.1 Conclusion:

Smart Door Lock System is still one of those areas that are very new, with various features and options, and growing user demands. Smart Door Lock Systems industries are trying to evolve and offer a great user experience to the customer. Either you are opting for full automation system or plug n play or DIY solutions, with a little programming background or some familiarity with electronics can help you create awesome Smart Door Lock systems as per your needs.

## 7.2 Future Scope:

Based on the latest micro-controller technology. Smart Door Lock System is an elegant device, especially designed to provide security. As this works on OTP based, OTP comes on the Telegram account which was written in the program. So in this we can add the other person Telegram ID. In this we can also add some other features like we can add camera to detect the person standing in front of door.

# Reference and bibliography

1. Smart lock - Wikipedia

2. Security Lock systems: From Problem Statement to System Design Name of the Author (researchgate.net)

3. https://www.elprocus.com/buzzer-working-applications/

4. https://www.instructables.com/I2C-LCD-Adapter/

5. Arduino Nano - Wikipedia

6. Arduino - Solenoid Lock | Arduino Tutorial (arduinogetstarted.com)

7. https://components101.com/sensors/sw-420-vibration-sensor module#:~:text=The%20vibration%20sensor%20module%20based,the%20sensor%20provides%20Logic%20High

8. Using a 20x4 I2C Character LCD display with Arduino Uno - Electronics-Lab.com

# Appendix-B

## Evaluation Sheet (ESE)
### For
## Capstone project execution

**Name of student**: Pranjal Bhanushali.

**Name of program:** Electronics & Tele-communication engg     **Semester**: 6th

**Course title:** Capstone Project: Execution and Report Writing.    **Code:** 22060

**Title of the Capstone Project**: Smart Door Lock System.

## A. POS addressed by the Capstone Project (Mention only those predominant POS)

**PO1. Basic and discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering specialization to solve the engineering problems.

**PO2. Problem analysis:** Identify and analyze well- defined engineering problems using codified standard methods.

**PO3. Design / development of solutions:** Design solutions for well- defined technical problems and assist with the design of systems components or processes to meet specified needs.

**PO4. Engineering Tools, experimentation and testing :** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

**PO5. Engineering practices for society , sustainability and environment:** Apply appropriate technology in context of society ,sustainability, environment and ethical practices.

**PO6. Project management:** Use engineering management principles individually , as a team member or a leader to manage project and effectively communicate about well - defined engineering activities

**PO7. Life - long learning:** Ability to analyze individual needs and engage in updating in the context of technological changes.

## B. Program Specific Outcomes (PSO) addressed by the Capstone Project

**PSO1. EDA Tools Usage:** Use EDA tools to develop simple Electronics and Telecommunication engineering related circuits.

**PSO2. Electronics and Telecommunication System:** Maintain various types of Electronics and Telecommunication engineering specific industry soon after the diploma program.

## C. COS addressed by the Capstone Project (Mention only those predominant COS)

1. Implement the planned activity individually.
2. Select, collect and use required information/knowledge to solve the identified problem information.
3. Take appropriate decisions based on collected and analyzed information.
4. Ensure quality in product.
5. Consider the ethical issues related to the project.
6. Assess the impact of the project on society.
7. Communicate effectively and confidently as a member and leader of team.

## D. Other learning outcomes achieved through this project
### 1. Unit Outcomes (Cognitive Domain)

a) Select the relevant microcontroller for various industrial application.

b) Develop the algorithm, flowchart, and 'C' code for the given programs used in serial communication with microcontroller.

c) Select the relevant wireless technology for the given application.

### 2. Practical Outcomes (in Psychomotor Domain)

a) Build the circuit on breadboard.

b) Use Integrated development environmental tool for developing embedded system.

## 3. Affective Domain Outcomes

    a) Follow safe Practices.

    b) Demonstrate Working as a leader.

    c) Maintain tools and equipment.

    d) Follow ethical practices.

| Sr. No. | Criteria | Marks |
|---|---|---|
| **PROGRESSIVE ASSESSMENT (PA) SHEET** | | |
| 1 | Project Proposal / Identification | 10 |
| 2 | Punctuality and overall contribution | |
| 3 | Project Diary | |
| 4 | Execution of Plan during sixth semester | 20 |
| 5 | Project Report Including documentation | 15 |
| 6 | Presentation | 05 |
| Total | | 50 |

| Name of student | Roll no. | Project Proposal / Identification (2) | Punctuality and Overall Contribution (2) | Project Diary (6) | Industrial survey/Literature review (20) | Report Writing (15) | Presen Tation(05) | Total (50) |
|---|---|---|---|---|---|---|---|---|
| **PROGRESSIVE ASSESSMENT SHEET (PA)** | | | | | | | | |
| Pranjal Bhanushali | 07 | | | | | | | |

**Name and designation of the Faculty Member**: Mr. Vikrant Joshi

**Signature**

# APPENDIX – C

**Suggested Rubric for Capstone Project – Execution and Report Writing**

| S. No. | Characteristic to be assessed | Poor | Average | Good | Excellent |
|---|---|---|---|---|---|
| 1 | Problem/Task Identification (Project Title) | Relate to very few POs Scope of Problem not clear at all | i. Related to some POs ii. Scope of Problem/Task vague | i. Take care of at-least Three POs ii. Scope of Problem/task not very specific | • Take care of more than three POs ii. Scope of problem/task very clear |
| 2 | Literature Survey /Industrial Survey | Not more than ten sources (primary and secondary), very old reference | At-least 10 relevant sources, at least 5 latest | At –least 15 relevant sources, most latest | About 20 relevant sources, most latest |
| 3 | Project proposal | Methods are not appropriate, All steps not mentioned, Design of prototype not started (if applicable). | Appropriate plan but not in much detail. Plan B for critical activities not mentioned. Time line is not developed. Design of Prototype is not complete. (if applicable) | Appropriate and detailed plan with Plan B for critical activities mentioned, but clarity is not there in methods, time line is given but not appropriate. Design of prototype is not detailed (if applicable) | Appropriate and detailed plan with Plan B for critical activities mentioned, clarity in methods with time line, Detailed design of prototype (if applicable) |
| 4 | Project Diary | Entries for most weeks are missing. There is no proper sequence and details are not correct. | Entries for some weeks are missing, details are not appropriate, not signed regularly by the guide. | Entries were made every week but are not in detail. Signed and approved by guide every week | Entries were made every week in detail, signed and approved by guide every week |
| 5 | Final Report Preparation | Very short, poor quality sketches, Details about methods, material, precaution and conclusions omitted, some details are wrong | Detailed, correct and clear description of methods, materials, precautions and | Conclusions. Sufficient Graphic Description. | Very detailed, correct, clear description of methods, materials, precautions and conclusions. Enough tables, charts and sketches |
| 6 | Presentation | Major information is not included, information is not well organized . | Includes major information but not well organized and not presented well | Includes major information and well organized but not presented well | Well organized, includes major information ,well presented |
| 7 | Defense | Could not reply to considerable number of question. | Replied to considerable number of questions but not very properly | Replied properly to considerable number of question. | Replied to most of the questions properly |