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## **SWE2010-EMBEDDED SYSTEM**

### **Project Report**

**Topic:**

**KEYPAD BASED DOOR UNLOCK SYSTEM**

**Guided by:**

**Prof.Kumaresan.P**

**Slot:G2**

**Team Members:**

<b>Name</b>	<b>Reg No.</b>
Arvinth K	16MIS0076
DineshKumar.R	16MIS0081
NaveenKumar.B	16MIS0501
BalaMurali.T	16MIS0507
Mohan.V	16MIS0522



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## **TITLE: KEYPAD BASED DOOR UNLOCK SYSTEM**

### **ABSTRACT:**

The need of safety can be achieved by making locks which can be electrical or mechanical with one or a few keys, but for locking a big area many locks are required. As everyone knows old fashioned locks are heavy weight and fragile also depending on the tools therefore electronic locks are given more value than those of mechanical locks. Nowadays every device's operation is based on digital technology. For example, technology based identity devices are used for automatic door unlocking or locking. These locking systems are used to control the movement of door and are functional without requiring a key to lock or unlock the door. These locking systems are controlled by a keypad and are installed at the side hedge of the door. The main objective of this project is to give safety at every common places like home, public places. In this user would give a known password. The information will be stored in database. When the correct password will be entered, the microcontroller will give instruction to servo motor. Servo motor will perform the action on door unlocking. Thus, what we want is digital technology to construct an integrated and well customized safety system at a price which is reasonable.

Main idea behind this project is of a door-latch opening using a password entered through keypad. As well as turning on the Buzzer when password is entered wrong for multiple times. User can modify this password anytime he/she wishes using a keypad. The main component in the circuit is Arduino UNO which is basically used to send a text message to owner of the house about the breach of security. 4\*4 keypad is used to enter the password. The entered password is compared with the known password. If it is correct password, the system opens the door by servo motor and displays the status of door on LCD. If the password is wrong then door remains closed and displays "WRONG PASSWORD" on LCD.

### **Keywords:**

Door unlocking, Security, Safety, Servo motor, Arduino, LCD, keypad, Buzzer

## **LITERATURE SURVEY**

### **I.Research Paper:**A Review of Intelligent Lock System

**Author:**S. O. Anaza , J. D. Jiya and Y. S. Haruna

#### **Abstract:**

Threat to life and property necessitate the need for security (lock) systems which has evolved with technological advancement. Existing literature does not present first hand information to researcher to ascertain the research gap. This paper presents a review of some literatures in intelligent security lock systems, by presenting their concepts, the advantages and the drawback of such concept and the possible modification. Each of the literature reviewed is categorized into either single or multiple protocols depending on the number of security feature in the lock system. A single protocol system has one security feature while the multiple protocols have several security features. The approach produces a unique result which solves the problem of laborious literature survey. Keywords: Security, Technology.

### **II.Research Paper:** Automatic Door Locking System

**Author:**Neelam Majgaonkar, Ruhina Hodekar, Priyanka Bandagale

#### **Abstract:**

Our main objective is to utilize the different electronic parts available in the market and build an integrated home security system by using Bluetooth device and Microcontroller technology. This system gives service at low cost compared to the cost of the available security system. We want to make a system that will give 24 into 7 service By using registered password in this system we can unlock the door by which it increases the security level to prevent an unauthorized unlocking. If the user forgets the combination of password this system gives the flexibility to the user to change or reset the password. Security measure is very high as provided in two ways. First we have to enter password for blue-tooth connection and second is for unlocking the door in application. Both passwords can be changed as and when required.This automatic password based lock system will give user more secure and low cost way of locking-unlocking system.

### **III.Research Paper:** Smart digital door lock for the home automation

**Author:** Pranesh sthapit, Yong Tae Park,Jae Joung-Pyun

#### **Abstract:**

In this paper, they propose a smart digital door lock system for home automation. A digital door lock system is equipment that uses the digital information such as a secret code, semi-conductors, smart card, and finger prints as the method for authentication instead of the legacy key system. In our proposed system, a ZigBee module is embedded in digital door lock and the door lock acts as a central main controller of the overall home automation system. Technically, our proposed system is the network of sensor nodes and actuators with digital door lock as base

## Architecture of Project:



- Pin 8 of keypad connected to pin 1 of arduino
- Pin 7 of keypad connected to pin 2 of arduino
- Pin 6 of keypad connected to pin 3 of arduino
- Pin 5 of keypad connected to pin 4 of arduino
- Pin 4 of keypad connected to pin 5 of arduino
- Pin 3 of keypad connected to pin 6 of arduino
- Pin 2 of keypad connected to pin 7 of arduino
- Pin 1 of keypad connected to pin 13 of arduino

- Orange pin of servo connected to pin 9 of arduino
- Red pin of servo connected to VCC 5V of arduino connected in breadboard
- Brown pin of servo connected to Ground of arduino connected in breadboard

### **Interfacing Buzzer to arduino**

- Red Pin of Buzzer connected to pin 8 of arduino
- Black pin of Buzzer connected to Ground of arduino connected in breadboard

### **Interfacing LCD to arduino**

- VSS of LCD connected to ground
- VDD of LCD connected to 5v through arduino
- VO of LCD connected to ground
- RS of LCD connected to A0 of Arduino
- RW of LCD connected to ground
- E of LCD connected to A1 of Arduino
- D4 of LCD connected to A2 of Arduino
- D5 of LCD connected to A3 of Arduino
- D6 of LCD connected to A4 of Arduino
- D7 of LCD connected to A5 of Arduino
- A of LCD connected to 5v through arduino
- K of LCD connected to ground

### **Powersupply**

- For powersupply we can use 9v Battery or from laptop through cable for arduino

### **Hardware Components Description:**

S.NO	Component Name	Description	Quantity
1	Arduino Board	Arduino UNO R3 Development Board	1
2	Keypad	4*4	1
3	LCD Display	RG1602A 16x2 LCD Display	1
4	Servo Motor	SG90 Servo Motor	1
5	Buzzer	12V Active Buzzer	1
6	Connecting Wires	Jumper Wires	27
7	Breadboard	Breadboard for connection	1
8	Cable wire	To connect with laptop	1
9	9v Battery	For power supply	1

## **Source Code:**

```
#include <Keypad.h>

#include <LiquidCrystal.h>

#include <Servo.h>

Servo myservo;

int pos=0; // LCD Connections

LiquidCrystal lcd(A0,A1,A2,A3,A4,A5);

const byte rows=4;

const byte cols=4;


char key[rows][cols]={

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

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

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

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

};

byte rowPins[rows]={1,2,3,4};

byte colPins[cols]={5,6,7,10};

Keypad keypad= Keypad(makeKeymap(key),rowPins,colPins,rows,cols);

char* password="C*D5";

int currentposition=0;

int redled=10;

int greenled=11;

int buzz=8;

int invalidcount=0;


void setup()

{

  displayscreen();

  Serial.begin(9600);

  pinMode(redled, OUTPUT);
```

```

pinMode(greenled, OUTPUT);
pinMode(buzz, OUTPUT);
myservo.attach(9); //SERVO ATTACHED//

lcd.begin(16,2);

}

void loop()
{
if( currentposition==0)
{
displayscreen();

}
int l ;
char code=keypad.getKey();
if(code!=NO_KEY)
{
lcd.clear();
lcd.setCursor(0,0);
lcd.print("PASSWORD:");

lcd.setCursor(7,1);
lcd.print(" ");

lcd.setCursor(7,1);
for(l=0;l<=currentposition;++l)
{
lcd.print("*");
keypress();
}

if (code==password[currentposition])

```



```
{
++currentposition;
if(currentposition==4)
{

unlockdoor();
currentposition=0;

}

}

else
{
++invalidcount;
incorrect();
currentposition=0;

}
if(invalidcount==5)
{

++invalidcount;
torture1();

}
if(invalidcount==8)
{
torture2();
}

}
// LOOP ENDS!!!!
}
```

```

//*****OPEN THE DOOR FUNCTION!!!!*****//

void unlockdoor()
{
  delay(900);

  lcd.setCursor(0,0);
  lcd.println(" ");
  lcd.setCursor(1,0);
  lcd.print("Access Granted");
  Serial.println("Access Granted");
  Serial.println("");
  lcd.setCursor(4,1);
  lcd.println("WELCOME!!");
  Serial.println("WELCOME!!");
  lcd.setCursor(15,1);
  lcd.println(" ");
  lcd.setCursor(16,1);
  lcd.println(" ");
  lcd.setCursor(14,1);
  lcd.println(" ");
  lcd.setCursor(13,1);
  lcd.println(" ");
  unlockbuzz();

  for(pos = 180; pos>=0; pos-=5) // goes from 180 degrees to 0 degrees
  {
    myservo.write(pos); // tell servo to go to position in variable 'pos'
    delay(5); // waits 15ms for the servo to reach the position
  }
  delay(2000);
}

```

```

delay(1000);
counterbeep();

delay(1000);

for(pos = 0; pos <= 180; pos +=5) // goes from 0 degrees to 180 degrees
{ // in steps of 1 degree
myservo.write(pos); // tell servo to go to position in variable 'pos'
delay(15);

currentposition=0;

lcd.clear();
displayscreen();

}

}

//*****WRONG CODE FUNCTION*****//

void incorrect()
{
delay(500);
lcd.clear();
lcd.setCursor(1,0);
lcd.print("CODE");
Serial.println("CODE");
lcd.setCursor(6,0);
lcd.print("INCORRECT");
Serial.println("INCORRECT");
lcd.setCursor(15,1);
lcd.println(" ");

```

```

lcd.setCursor(4,1);
lcd.println("GET AWAY!!!");
Serial.println("GET AWAY!!!");

lcd.setCursor(13,1);
lcd.println(" ");
Serial.println("CODE INCORRECT YOU ARE UNAUTHORIZED");
digitalWrite(redled, HIGH);
digitalWrite(buzz, HIGH);
delay(3000);
lcd.clear();
digitalWrite(redled, LOW);
digitalWrite(buzz, LOW);
displayScreen();
}

//***** CLEAR THE SCREEN!!!*****//
void clearScreen()
{
  lcd.setCursor(0,0);
  lcd.println(" ");
  lcd.setCursor(0,1);
  lcd.println(" ");
  lcd.setCursor(0,2);
  lcd.println(" ");
  lcd.setCursor(0,3);
  lcd.println(" ");
}

//*****KEYPRESS*****//
void keypress()
{
  digitalWrite(buzz, HIGH);
  delay(50);
  digitalWrite(buzz, LOW);
}

```

```

//*****DISPALAY FUNCTION!!!*****//
void displayscreen()
{

  lcd.setCursor(0,0);
  lcd.println("*ENTER THE CODE*");
  lcd.setCursor(1 ,1);

  lcd.println("TO _/_ (OPEN)!!");

}
//***** ARM SERVO*****//
void armservo()
{

  for (pos=180;pos<=180;pos+=50)
  {
    myservo.write(pos);
    delay(5);
  }
  delay(5000);

  for(pos=180;pos>=0;pos-=50)
  {
    myservo.write(pos);
  }

}
//*****UNLOCK BUZZ*****//
void unlockbuzz()
{

  digitalWrite(buzz, HIGH);
  delay(80);

```

```

digitalWrite(buzz, LOW);
delay(80);
digitalWrite(buzz, HIGH);
delay(80);
digitalWrite(buzz, LOW);
delay(200);
digitalWrite(buzz, HIGH);
delay(80);
digitalWrite(buzz, LOW);
delay(80);
digitalWrite(buzz, HIGH);
delay(80);
digitalWrite(buzz, LOW);
delay(80);
}

//*****COUNTER BEEP*****//
void counterbeep()
{
delay(1200);

lcd.clear();
digitalWrite(buzz, HIGH);

lcd.setCursor(2,15);
lcd.println(" ");
lcd.setCursor(2,14);
lcd.println(" ");
lcd.setCursor(2,0);
delay(200);
lcd.println("GET IN WITHIN::");
Serial.println("GET IN WITHIN::");
lcd.setCursor(4,1);

```

```

lcd.print("5");
Serial.println("5");
delay(200);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
digitalWrite(buzz,LOW);
delay(1000);

//2
digitalWrite(buzz, HIGH);
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
lcd.setCursor(4,1); //2
lcd.print("4");
Serial.println("4");
delay(100);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
digitalWrite(buzz,LOW);
delay(1000);

//3
digitalWrite(buzz, HIGH);
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
lcd.setCursor(4,1); //3
lcd.print("3");
Serial.println("3");
delay(100);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
digitalWrite(buzz,LOW);
delay(1000);

```

```

//4
digitalWrite(buzz, HIGH);
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
lcd.setCursor(4,1); //4
lcd.print("2");
Serial.println("2");
delay(100);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
digitalWrite(buzz,LOW);
delay(1000);
//
digitalWrite(buzz, HIGH);
lcd.setCursor(4,1);
lcd.print("1");
Serial.println("1");
delay(100);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
digitalWrite(buzz,LOW);
delay(1000);
//5
digitalWrite(buzz, HIGH);
delay(40);
digitalWrite(buzz,LOW);
delay(40);
digitalWrite(buzz, HIGH);
delay(40);
digitalWrite(buzz,LOW);
delay(40);
digitalWrite(buzz, HIGH);

```



```

delay(40);
digitalWrite(buzz,LOW);
delay(40);
digitalWrite(buzz, HIGH);
delay(40);
digitalWrite(buzz,LOW);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("RE-LOCKING");
Serial.println("RE-LOCKING");
delay(500);
lcd.setCursor(12,0);
lcd.print(".");
Serial.println(".");
delay(500);
lcd.setCursor(13,0);
lcd.print(".");
delay(500);
lcd.setCursor(14,0);
lcd.print(".");
delay(400);
lcd.clear();
lcd.setCursor(4,0);
lcd.print("LOCKED!");
Serial.println("LOCKED!");
delay(440);
}
//*****TORTURE1*****//
void torture1()
{
delay(1000);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("WAIT FOR ");

```

```

Serial.println("WAIT FOR");
lcd.setCursor(5,1);
lcd.print("15 SECONDS");
Serial.println("15 SECONDS");
digitalWrite(buzz, HIGH);
delay(15000);
digitalWrite(buzz, LOW);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("LOL..");
Serial.println("LOL...");
lcd.setCursor(1,1);
lcd.print(" HOW WAS THAT??");
Serial.println("HOW WAS THAT???");
delay(3500);
lcd.clear();

}

//*****TORTURE2*****//
void torture2()
{
delay(1000);
lcd.setCursor(1,0);
lcd.print(" ");
Serial.println(" ");
lcd.setCursor(2,0);
lcd.print("EAR DRUMS ARE");
Serial.println("EAR DRUMS ARE");
lcd.setCursor(0,1);
lcd.print(" PRECIOUS!! ");
Serial.println(" PRECIOUS! ");
delay(1500);
lcd.clear();
lcd.setCursor(1,0);

```

```

lcd.print(" WAIT FOR");
Serial.println("WAIT FOR");
lcd.setCursor(4,1);
lcd.print(" 1 MINUTE");
Serial.println(" 1 MINUTE");
digitalWrite(buzz, HIGH);
delay(55000);
counterbeep();
lcd.clear();
digitalWrite(buzz, LOW);
lcd.setCursor(2,0);
lcd.print("WANT ME TO");
Serial.println("WANT ME TO");
lcd.setCursor(1,1);
lcd.print("REDICULE MORE??");
Serial.println("REDICULE MORE??");
delay(2500);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("Ha Ha Ha Ha");
Serial.println("Ha Ha Ha Ha");
delay(1700);
lcd.clear();
}

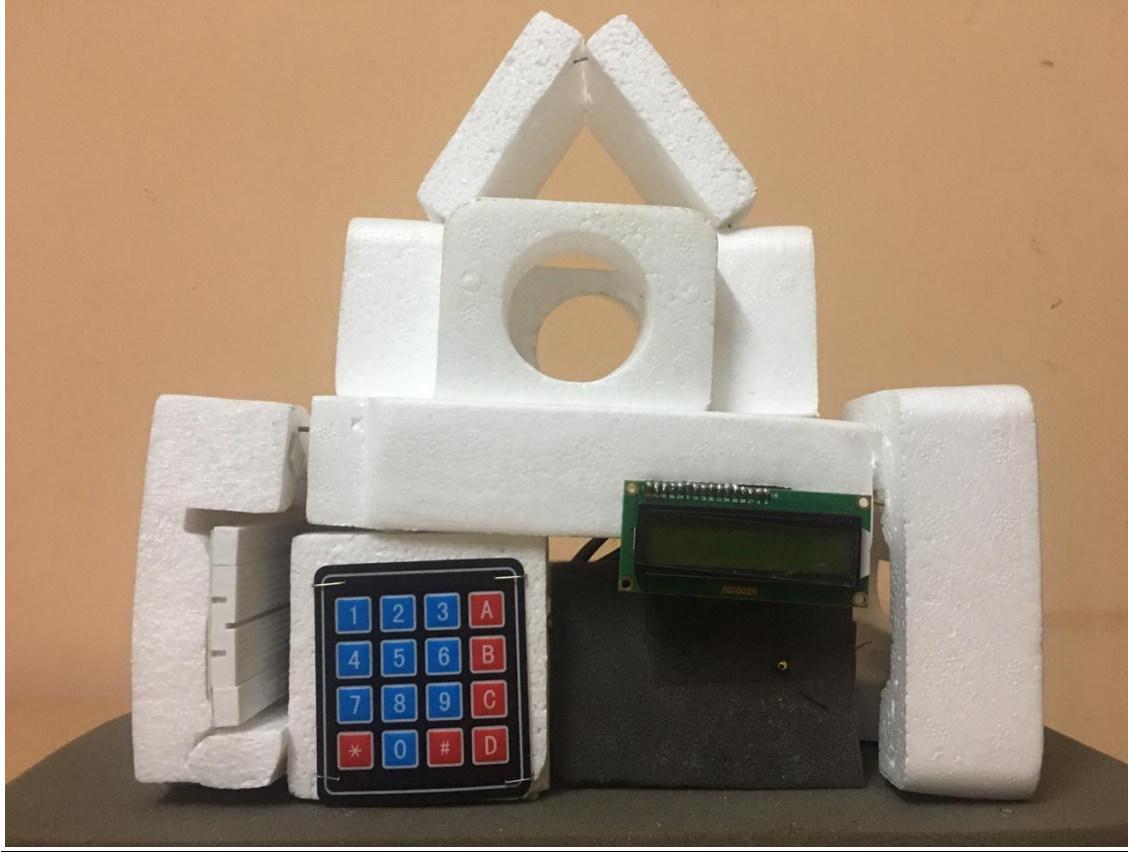
```

## **Implementation – Snapshots:**

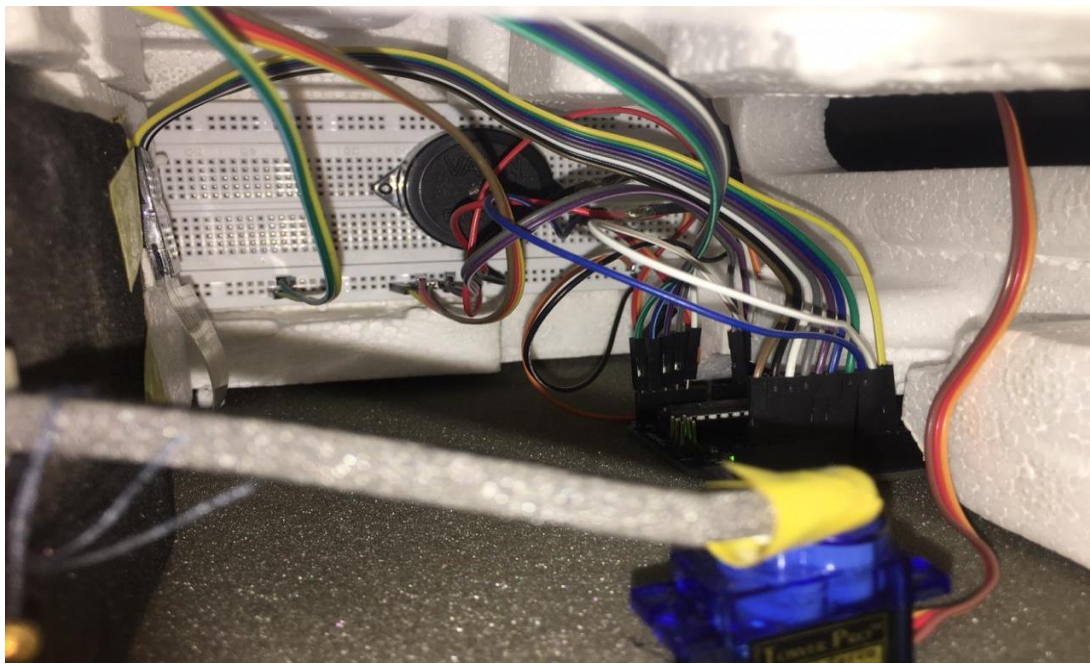
### **Working :**

In this project, we have defined the default password “4567” in the Arduino. You can change it via coding. When we enter a password, it will match it with the password stored in the Arduino. If it is correct, then it will show ‘Access Granted, Welcome’ and then rotate servo motor to 180 doors as the door is opened. It will then give 5 seconds time for entering via the door. Once 5 seconds is completed, the door will get locked automatically. If the password is wrong, then it will show ‘Code Incorrect, Go Away’. The buzzer will also beep once when any key is pressed.

## Snapshots:



## Setup



## OUTPUT



## ACCESS GRANTED

```
14:11:33.137 -> Access Granted
14:11:33.171 ->
14:11:33.171 -> WELCOME!!
14:11:38.503 -> GET IN WITHIN::
14:11:38.537 -> 5
14:11:39.726 -> 4
14:11:40.847 -> 3
14:11:41.968 -> 2
14:11:43.056 -> 1
14:11:44.450 -> RE-LOCKING
14:11:44.960 -> .
14:11:46.353 -> LOCKED!
```

## Incorrect Password

```
14:18:37.701 -> CODE
14:18:37.701 -> INCORRECT
14:18:37.701 -> GET AWAY!!
14:18:37.735 -> CODE INCORRECT YOU ARE UNAUTHORIZED
14:18:46.945 -> CODE
14:18:46.945 -> INCORRECT
14:18:46.945 -> GET AWAY!!
14:18:46.979 -> CODE INCORRECT YOU ARE UNAUTHORIZED
```

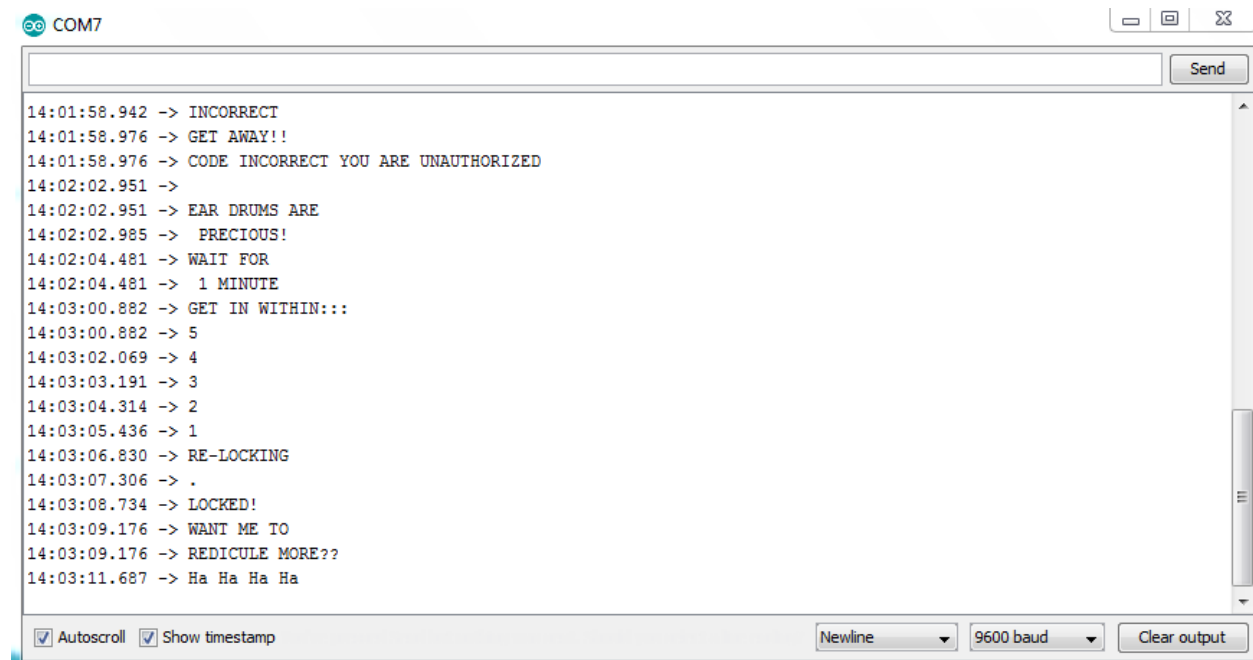
---

## Torture 1

```
14:00:04.846 -> CODE INCORRECT YOU ARE UNAUTHORIZED
14:00:08.824 -> WAIT FOR
14:00:08.858 -> 15 SECONDS
14:00:23.846 -> LOL...
14:00:23.846 -> HOW WAS THAT???
```

---

## Torture 2



## **Applications**

- House
- Educational Institute
- Bank
- Office
- Labs

## **Conclusion:**

The Keypad Based Door unlock system is a secure and modern way of providing security to the places to avoid unauthorized access, In future we can extend this project in such a way after certain invalid count it will message the owner using GSM module and improve the security.

## **References**

[https://www.researchgate.net/publication/224107049\\_Smart\\_digital\\_door\\_lock\\_for\\_the\\_home\\_automation](https://www.researchgate.net/publication/224107049_Smart_digital_door_lock_for_the_home_automation)

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<https://www.ijedr.org/papers/IJEDR1601082.pdf>