

Digital Code Lock Using Arduino

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Abstract

Keypad lock using arduino which contained Arduino, , buzzer ,breadboard ,wires , keypad module and resistors, and servo motor. Arduino is used for controlling the complete processes which includes taking password from module of keypads, comparing different passwords, sending buzzer and sending the required status at display. In this password was taken from keypad. Buzzer was used for displaying indications and LCD was used for displaying messages .Buzzer was driven by a NPN transistor. A program having different modules like setup, loop and lock were used. In main loop pressed keys in array "code" was taken. As the four digits were entered it stops accepting the keys. If password is correct then door was kept unlocked for few seconds but if it was incorrect a message displayed. It was based on the principle of to store the password in it and unlock it. The default password stored in it was '1234'. When we enter a password, it matches it with the password stored in the Arduino. If it was correct, then it displays 'Passkey Accepted' and the servo motor will come in state called Door Unlocked. If the password was incorrect, then it will show 'Access Denied'. During this condition the buzzer starts beeping and the push pull solenoid remained in the state Door Locked. The buzzer will also beep once when any key was pressed. For changing the passkey, one has to press '#'key. When we press '#'key, it will ask for current passkey. If one enter the correct password it will ask for new passkey and save it in the Arduino. Then it will initialize the library for display and defines pins on which the display is connected. This code will read pressed keys from the keypad and show it on display. Arduino will read keys one by one and make a beep sound as key is pressed. The code will compare the entered key with the password stored in the Arduino. If the password is correct, then it will display 'Passkey Accepted' otherwise it will show 'Access Denied'. The one has to press the '#' key to change the password. Then it will ask to enter the current password and if it is correct then it will ask to enter the new password. Then it will store this new password.

KEYWORDS: Arduino, Digital code, Access ,Password, Keypad

Literature review

LiaKameliaetal This paper gives idea of how to control home security for smart homes especially for door key locks. They used android based door lock system for indoor and outdoor key lock system. It also provides a secure system for Android phone users.

Shilpi Banerjeeetal This paper gives detail information about system in which we can unlock the door by using pre-decided password. It increases the security level to prevent an unauthorized unlocking done by attacker. In case the user forgets the both passwords, this system gives the flexibility to the user to change or reset the password. This automatic password based lock system will give user more secure way of locking-unlocking system.

Arpita Mishra et.al This paper proposed idea that in day to day life security of any

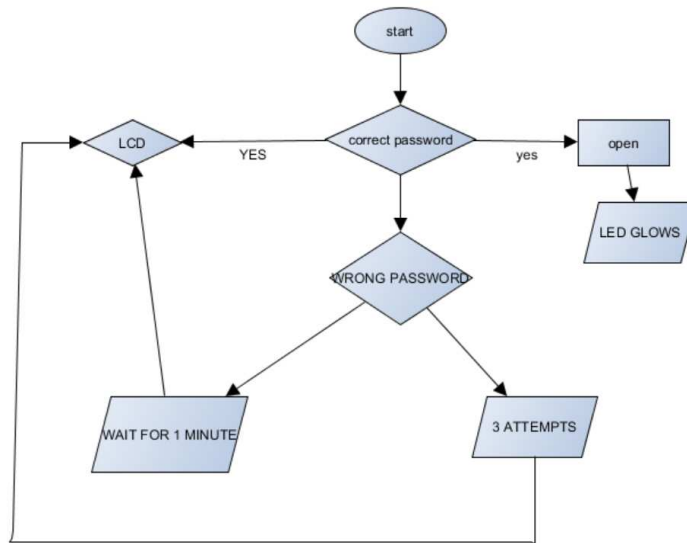
object or place password based system plays a major role. This paper has considered about this and created a secure access for a door which needs a password to unlock the door.

R. Piya et al This paper has proposed design and implementation of a low cost, flexible and wireless solution for home automation, especially or on/off the lamp and to on/off the television automatically. However, this is a basic system without advanced features like integration of RTOS, and also not has light sensors that are used to intelligently control the home appliances without human intervention. This system is designed to improve the standard living in home.

Methodology:

In this various components like Arduino, Buzzer, Servo motor, keypad, screen, LED -green and black, Breadboard, Wires and Resistors were used. Coding was developed using Embedded C language. The system was checked and verified and executed in right manner.

Flow chart:



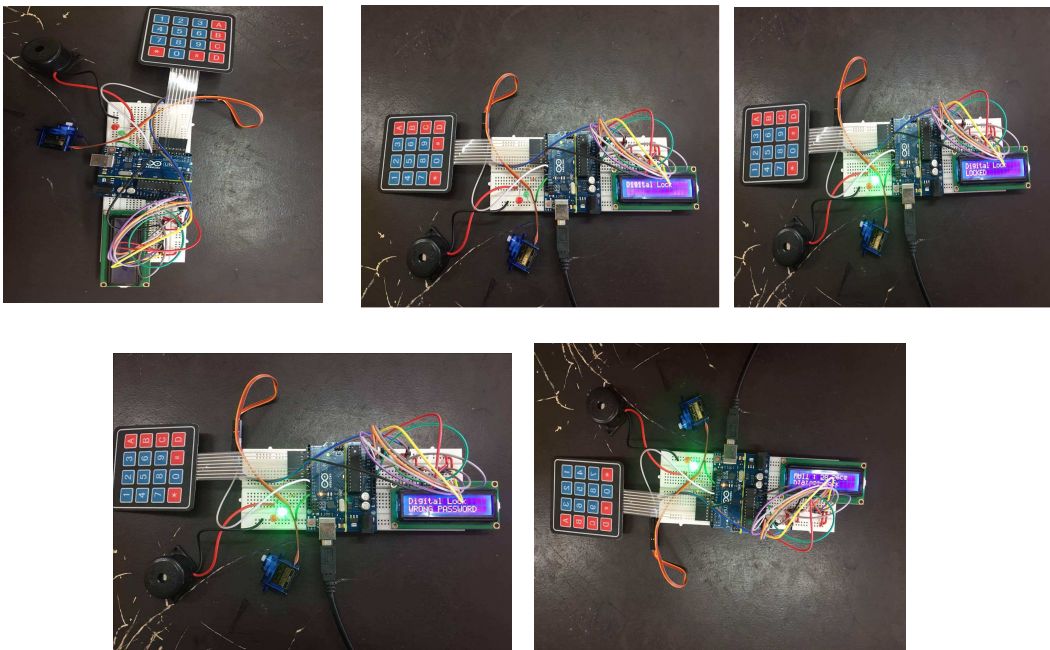
Advantages:

- It is safe as keys could not be lost or stolen.
- It can be locked using keypad.
- It has facility of automatic door opening.
- It gives an indication when an unauthorized entry is done.
- It is totally cost effective.

Disadvantages:

- In case the personal identification number is forgotten, the system will not be accessed.
- In case of power failure it will not function.

Circuit diagram:



Arduino code:

```
#include <Keypad.h>
#include<LiquidCrystal.h>
#include<EEPROM.h>
LiquidCrystal lcd(9,8,7,6,5,4);
char password[4];
char pass[4],pass1[4];
int i=0;
char customKey=0;
const byte ROWS = 4; //four rows
const byte COLS = 4; //four columns
char hexaKeys[ROWS][COLS] = {
  {'1','2','3','A'},
  {'4','5','6','B'},
  {'7','8','9','C'},
```

```

{'*', '0', '#', 'D'}
};
byte rowPins[ROWS] = {A0,A1,A2,A3}; //connect to the row pinouts of the keypad
byte colPins[COLS] = {A4,A5,3,2}; //connect to the column pinouts of the keypad
//initialize an instance of class NewKeypad
Keypad customKeypad = Keypad( makeKeymap(hexaKeys), rowPins, colPins, ROWS,
COLS);
int led;
int buzzer = 10;
int m11;
int m12;
void setup()
{
  Serial.begin(9600);
  pinMode(11, OUTPUT);
  lcd.begin(16,2);
  pinMode(led, OUTPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(m11, OUTPUT);
  pinMode(m12, OUTPUT);
  lcd.print(" Electronic ");
  Serial.print(" Electronic ");
  lcd.setCursor(0,1);
  lcd.print(" Keypad Lock ");
  Serial.print(" Keypad Lock ");
  delay(2000);
  lcd.clear();
  lcd.print("Enter Ur Passkey:");
  Serial.println("Enter Ur Passkey:");
  lcd.setCursor(0,1);
  for(int j=0;j<4;j++)
    EEPROM.write(j, j+49);
  for(int j=0;j<4;j++)
    pass[j]=EEPROM.read(j);
}
void loop()
{
  digitalWrite(11, HIGH);
  customKey = customKeypad.getKey();
  if(customKey=='#')
  change();
  if (customKey)
  {
    password[i++]=customKey;
    lcd.print(customKey);
    Serial.print(customKey);
  }
}

```

```
    beep();
  }
  if(i==4)
  {
    delay(200);
    for(int j=0;j<4;j++)
      pass[j]=EEPROM.read(j);
    if(!(strcmp(password, pass,4)))
    {
      digitalWrite(led, HIGH);
      beep();
      lcd.clear();
      lcd.print("Passkey Accepted");
      Serial.println("Passkey Accepted");
      digitalWrite(11, LOW);
      delay(2000);
      lcd.setCursor(0,1);
      lcd.print("#.Change Passkey");
      Serial.println("#.Change Passkey");
      delay(2000);
      lcd.clear();
      lcd.print("Enter Passkey:");
      Serial.println("Enter Passkey:");
      lcd.setCursor(0,1);
      i=0;
      digitalWrite(led, LOW);
    }
    else
    {
      digitalWrite(11, HIGH);
      digitalWrite(buzzer, HIGH);
      lcd.clear();
      lcd.print("Access Denied...");
      Serial.println("Access Denied...");
      lcd.setCursor(0,1);
      lcd.print("#.Change Passkey");
      Serial.println("#.Change Passkey");
      delay(2000);
      lcd.clear();
      lcd.print("Enter Passkey:");
      Serial.println("Enter Passkey:");
      lcd.setCursor(0,1);
      i=0;
      digitalWrite(buzzer, LOW);
    }
  }
}
```

```
}  
void change()  
{  
  int j=0;  
  lcd.clear();  
  lcd.print("UR Current Passk");  
  Serial.println("UR Current Passk");  
  lcd.setCursor(0,1);  
  while(j<4)  
  {  
    char key=customKeypad.getKey();  
    if(key)  
    {  
      pass1[j++]=key;  
      lcd.print(key);  
      Serial.print(key);  
      beep();  
    }  
    key=0;  
  }  
  delay(500);  
  
  if((strcmp(pass1, pass, 4)))  
  {  
    lcd.clear();  
    lcd.print("Wrong Passkey...");  
    Serial.println("Wrong Passkey...");  
    lcd.setCursor(0,1);  
    lcd.print("Better Luck Again");  
    Serial.println("Better Luck Again");  
    delay(1000);  
  }  
  else  
  {  
    j=0;  
    lcd.clear();  
    lcd.print("Enter New Passk:");  
    Serial.println("Enter New Passk:");  
    lcd.setCursor(0,1);  
    while(j<4)  
    {  
      char key=customKeypad.getKey();  
      if(key)  
      {  
        pass[j]=key;  
        lcd.print(key);  
      }  
    }  
  }  
}
```

```

    Serial.print(key);
    EEPROM.write(j,key);
    j++;
    beep();
  }
}
lcd.print(" Done.....");
Serial.println(" Done.....");
delay(1000);
}
lcd.clear();
lcd.print("Enter Ur Passk:");
Serial.println("Enter Ur Passk:");
lcd.setCursor(0,1);
customKey=0;
}
void beep()
{
  digitalWrite(buzzer, HIGH);
  delay(20);
  digitalWrite(buzzer, LOW);
}

```

Results: The working was being tested in protous and in bread board and it has shown proper working. It has various applications like we can use it in home and offices for door security, lockers lock, ATM security, and anywhere where security is needed. In this one can easily change the password and if wrong password is entered more than three times it will be locked until reset button is not pressed. This is used on very less component so it is cost effective and it is less complicated as compared to micro controller based code lock system. One can monitor parameters like fire and overheating. One can also attach voice feedback system. One can interface GSM modem which will send SMS if an invalid attempt is made to open the lock. One can add fingerprint to give access to authorized person only.

Conclusion: Password security system can be used in the places where we need security. It can be used to secure lockers and doors. The microcontroller helps to monitor keypad and if someone enters the password it will match the entered password with the password stored in the memory and if it they are matched then microcontroller will switch on the corresponding device. The system will allow only the person who knows the password and will not allow those whom it does not know. Thus the system is secured and protective and useful.

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