Password Based Door Lock System
Using 8051/ PIC Microcontroller

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• **Project Type:** Guided

• **Project Title:** Password based Door locked system using 8051/ PIC Microcontroller

Objective

We are always concern about our security. That is why people created mechanical lock and key system almost 6000 years ago. But nowadays the technology has changed a lot. The objective of this project is to replace the conventional mechanical lock and key system with digital technology. Instead of keys we will use password. There once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area.

Applications

The password-based door lock system can be installed on any hutch or doors of rooms to secure some certain area in a digital way. This system will take a 5-digit code as input and will verify if the password is correct or otherwise. If the given code is correct then the lock will open otherwise not. This system can be used in residential areas for better safety with efficiency. It can also be used at organization for purpose of authorized access.

Block Diagram:

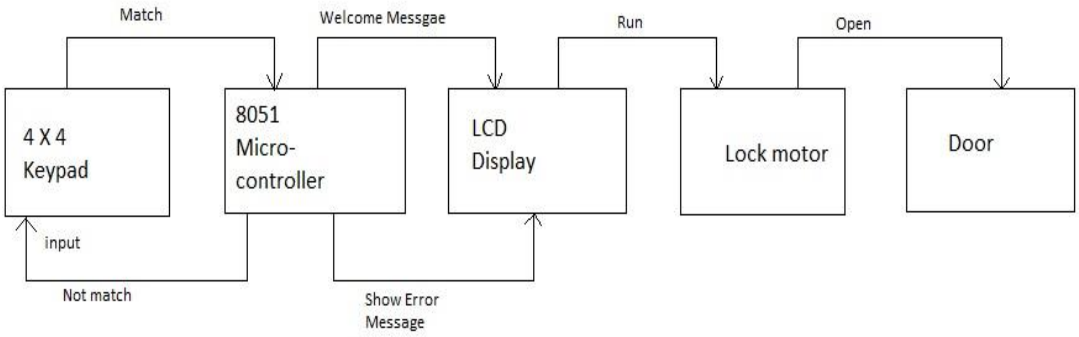


Fig: Password based door lock system using Microcontroller 8051

Working Procedures:

1. The main component of the circuit is microcontroller 8051. This controls everything in the device.

2. We have connected a phone keypad with the microcontroller. Which is 4x3 in configuration. In the keypad there is 4 rows which are indicated with the letters A-D and the 3 columns which are indicated the number (1-3).

3. Then microcontroller pin P2.0 to P2.3 are connected with the keypad rows and pin P3.0 to P3.2 are connected to the keypad columns.

4. Then we connect the motor pins in the P3.3 and P3.4. The motor is used for locking and unlocking the door. This motor only works when the password is right.

5. LCD's rw, rs and en pins are connected with P3.5 to P3.7. LCD help us to show the inputs and error messages.

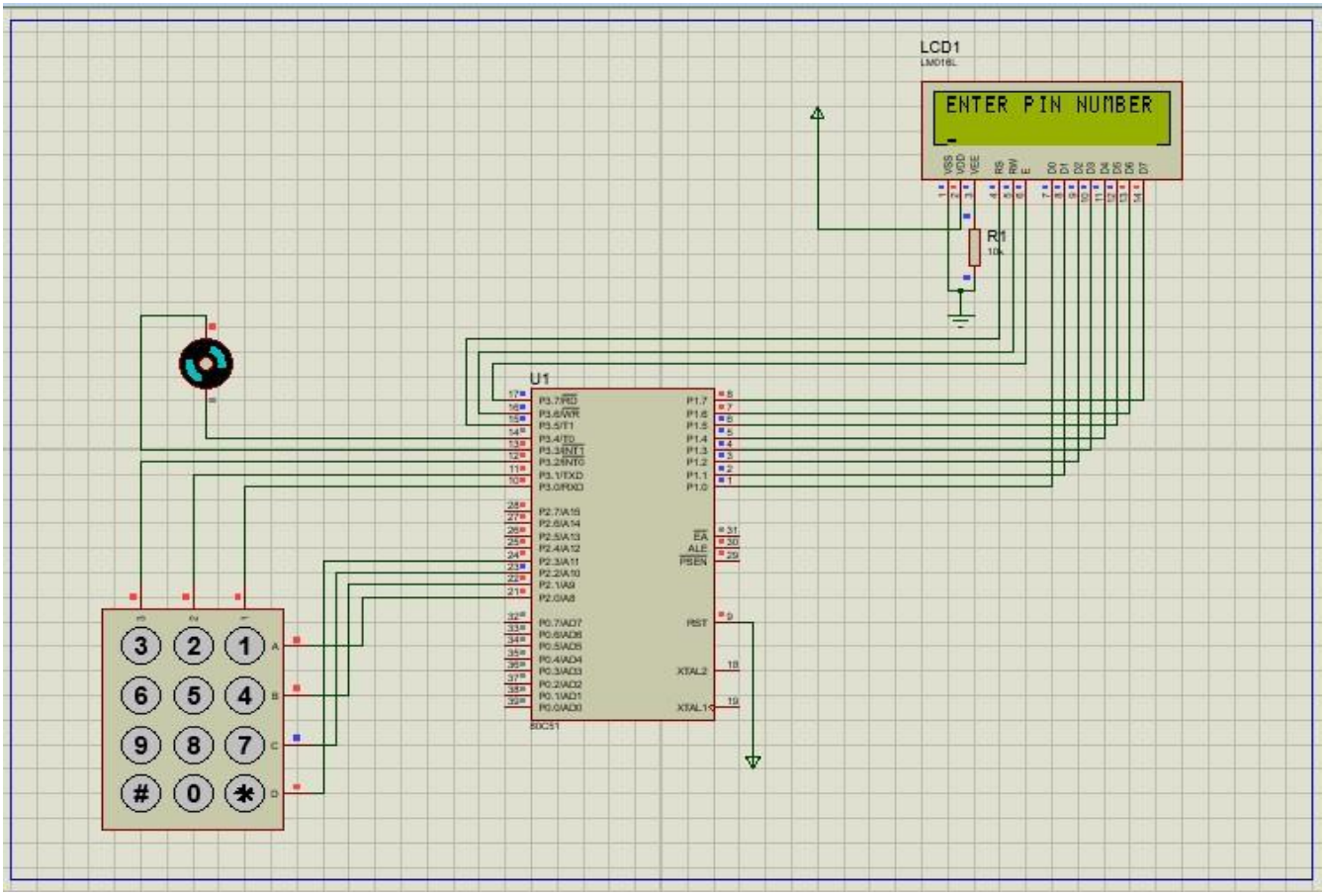
6. The MCU connects all the component to build the circuit. In the simulation we use the hex code to run the program. The hex code is generated from the C code. This code only works on 8051-microcontroller system.

7. To run the simulation, we set the clock frequency at 12 MHZ for 8051.

8. We set a 5-digit password for the lock. Which is 12345.

9. If user input wrong password it will give another chance to input the password again with an error message. When the password is right it will show the welcome message and motor will move to open the door.

Schematic Circuit:



Code:

```
// password based door lock system in 8051 microprocessor

#include <reg51.h>

// connected pins
// keypad rows
sbit keyrow1 = P2 ^ 0;
sbit keyrow2 = P2 ^ 1;
sbit keyrow3 = P2 ^ 2;
sbit keyrow4 = P2 ^ 3;
//keypad column
sbit keycolumn1 = P3 ^ 0;
sbit keycolumn2 = P3 ^ 1;
sbit keycolumn3 = P3 ^ 2;

// motor pins
sbit motorpin1 = P3 ^ 3;
sbit motorpin2 = P3 ^ 4;

// led pins
sbit rs = P3 ^ 5;
sbit rw = P3 ^ 6;
sbit en = P3 ^ 7;

//functions
void lcdcmd(unsigned char);
void lcddat(unsigned char);
void lcddisplay(unsigned char *q);
```

```
char keypad();
void check();
void delay(unsigned int);
unsigned char pin[] = {"12345"};
unsigned char Epin[5];

// main function
void main()
{
   lcdcmd(0x0F); //decimal value: 15
   lcdcmd(0x38); //decimal value: 56
   lcdcmd(0x01); //decimal value: 1

   while (1)
   {
      unsigned int i = 0;
      lcdcmd(0x80); //decimal value: 128
      lcddisplay("ENTER PIN");
      delay(1000);
      lcdcmd(0xc0); //decimal value: 192
      while (pin[i] != '\0')
      {
         Epin[i] = keypad();
         delay(1000);
         i++;
      }
      check();
   }
}
```

```
//delay function
void delay(unsigned int j)
{
   int a, b;
   for (a = 0; a < j; a++)
   {
      for (b = 0; b < 10; b++)
         ;
   }
}

// lcd commands functions
void lcdcmd(unsigned char A)
{
   P1 = A;
   rs = 0;
   rw = 0;
   en = 1;
   delay(1000);
   en = 0;
}

//lcd data function

void lcddat(unsigned char i)
{
   P1 = i;
   rs = 1;
   rw = 0;
   en = 1;
```

```
    delay(1000);
    en = 0;
}

//lcd display charecters function

void lcddisplay(unsigned char *q)
{
    int k;
    for (k = 0; q[k] != '\0'; k++)
    {
        lcddat(q[k]);
    }
    delay(10000);
}

// assign keypad character value function

char keypad()
{
    int x = 0;
    while (x == 0)
    {
        // assign values for first row
        keyrow1 = 0;
        keyrow2 = 1;
        keyrow3 = 1;
        keyrow4 = 1;
        if (keycolumn1 == 0)
        {
```

```
    lcddat('*');
    delay(1000);
    x = 1;
    return '1';
}
if (keycolumn2 == 0)
{
    lcddat('*');
    delay(1000);
    x = 1;
    return '2';
}
if (keycolumn3 == 0)
{
    lcddat('*');
    delay(1000);
    x = 1;
    return '3';
}
// assign values for second row
keyrow1 = 1;
keyrow2 = 0;
keyrow3 = 1;
keyrow4 = 1;

if (keycolumn1 == 0)
{
    lcddat('*');
    delay(1000);
    x = 1;
```

```
    return '4';
}
if (keycolumn2 == 0)
{
    lcddat('*');
    delay(1000);
    x = 1;
    return '5';
}
if (keycolumn3 == 0)
{
    lcddat('*');
    delay(1000);
    x = 1;
    return '6';
}

// assign values for third row
keyrow1 = 1;
keyrow2 = 1;
keyrow3 = 0;
keyrow4 = 1;
if (keycolumn1 == 0)
{
    lcddat('*');
    delay(1000);
    x = 1;
    return '7';
}
if (keycolumn2 == 0)
```

```
{
   lcddat('*');
   delay(1000);
   x = 1;
   return '8';
}
if (keycolumn3 == 0)
{
   lcddat('*');
   delay(1000);
   x = 1;
   return '9';
}

// assign values for forth row
keyrow1 = 1;
keyrow2 = 1;
keyrow3 = 1;
keyrow4 = 0;

if (keycolumn1 == 0)
{
   lcddat('*');
   delay(1000);
   x = 1;
   return '*';
}
if (keycolumn2 == 0)
{
   lcddat('*');
```

```
            delay(1000);
            x = 1;
            return '0';
        }
        if (keycolumn3 == 0)
        {
            lcddat('*');
            delay(1000);
            x = 1;
            return '#';
        }
    }
}

// password check function and run the door motor

void check()
{
    //  compare the input value with the assign password value
    if (pin[0] == Epin[0] && pin[1] == Epin[1] && pin[2] == Epin[2] && pin[3] == Epin[3] && pin[4]
== Epin[4])
    {
        delay(1000);
        lcdcmd(0x01); //decimal value: 1
        lcdcmd(0x81); //decimal value: 129
        // show pin is correct
        lcddisplay("CORRECT PIN");
        delay(1000);
        // door motor will run
        motorpin1 = 1;
```

```
        motorpin2 = 0;
        lcdcmd(0xc1); //decimal value: 193
        // show the door is unlocked
        lcddisplay("DOOR OPENED");
        delay(10000);
        motorpin1 = 1;
        motorpin2 = 0;
        lcdcmd(0x01); //decimal value: 1
    }
    else
    {
        lcdcmd(0x01); //decimal value: 1
        lcdcmd(0x80); //decimal value: 128
        lcddisplay("WRONG PIN");
        delay(1000);
        lcdcmd(0x01); //decimal value: 1
    }
}


// end
```

Discussion:

In the program first we imported the 8051-family header file which contains all the necessary classes. Then we assigned some particular connected pins to some variables.
In keypad we assigned variables as keyrow1 to keyrows4 for keypad rows and keycolumn1 to keycolumn3 for keypad columns. Then we connected the motor pins and lcd pins in the variable called motor pins and rs, rw and en.
After assigning the connected pins to the variables. We declare functions for every task. The main function calls the other functions for the execution of program.
Delay function is used for delay the program execution for few seconds. It helps us to execute the program smoothly. We delay the execution for 1000ms = 1secs.
The lcdcmd function is help us to control the lcd. It will control the current flow for the lcd screen and also help to perform Read/Write Operation.
The lcddat function control the lcd data pins. In the LCD there is total 8 pins D0 to D7 Pins used to send Command or data to the LCD.

The lcddisplay function is used for display user input characters and also assign the values for every keypad character values. First, we select a single keypad row and assign the values for the key. Also encoded with the asterisk (*) character, for pin protection.
The check function is used for compare the user input with the assign password number. If the user input matches the assign password, it will show the “pin correct” message and give the signal to run the motor. After running the motor, it will show the “door open” message. On the other hand, if the user input password is wrong, it will show the “wrong pin” message. Then it will delay few second and give another chance to input the password again.
The main function will call other function in other to perform the task. At first it will call the lcdcmd function to control the lcd, then it will call the lcddisplay function for display the messages in the lcd screen. It will delay for few seconds. After that it will run loop until the correct pin enter. To check the password is correct it will call check function, then execute the program.
To simulate the program circuit, we use the proteus simulation. All the code is written in C code, which is not directly executed by the 8051 microcontrollers. To run the program first we need to build the program and convert the program in hex file. The hex file is supported by the 8051 microcontrollers. Every 8051 controller has a clock frequency for perform the task. To run the program, we use 12 MHZ clock frequency. For the hex code we face some difficulty. Firstly, we use mikroc pro for pic. There we didn’t find our microcontroller 8051. Then after consulting with the instructor we used keil to write our hex code. We couldn’t use the first program because we have used a microcontroller and the program was for pic microcontroller.

Contribution:

Minhajul Imaj: Block Diagram, Schematic circuit diagram, Project Report

Sazzad Hossain Sabbir: Code, Project Report

Zahidul Islam: Project proposal, Schematic diagram, Code, Project Report