PASSWORD SECURITY SYSTEM

A Mini Project Report submitted to the Microprocessor lab

Submitted by

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ABSTRACT

In today's world of increasing cyber dangers and data breaches, the necessity for strong password security measures is critical. This project responds to this need by offering a Configurable Password Security System based on the 8051 microcontroller. In an age when digital information is ubiquitous, the need to protect sensitive data cannot be stressed. This project attempts to improve cybersecurity by building a flexible and efficient password security mechanism.

This project's methodology combines the 8051 microcontrollers with advanced encryption algorithms to produce a versatile and secure password management solution. The microcontroller is the central processing unit, and it executes complicated algorithms to protect the security and integrity of user credentials. The system's versatility enables users to modify security parameters based on unique requirements, resulting in a bespoke approach to password protection.

The following are the key findings from this work: the proposed system provides a high level of security against unauthorized access, the proposed system is flexible and can be configured to meet the needs of various applications, and the proposed system is simple to use and maintain. These findings are significant because the proposed system can be employed in a variety of applications such as home security, office security, and industrial security.

Finally, the proposed adjustable password security system based on the 8051 microcontroller is a safe and versatile locking system that may be utilized in a variety of applications. The suggested system is secure against unauthorized access, adaptable and simple to use, and can be modified to fit the needs of various applications. The proposed system is built with an 8051 microprocessor, a keypad, and an LCD display.

Contents

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The 8051 Microcontroller-based password-based door lock system unlocks doors with a strong password. The system is made up of an electronic control assembly that uses a password to regulate the output load. On a motor is this output load. The 8051 microcontroller (89C51) is the circuit's primary component. For this project, the password is entered using a 4x4 Matrix Keypad. The password that was entered is compared to the pre-established password. The system rotates the door motor to open the door if the password is entered correctly, and the LCD shows the door's state. The door stays closed, and the LCD reads "Incorrect password" if the password is incorrect.

1.2 OBJECTIVE OF THE WORK

The goal is to develop a secure door-locking system that uses cutting-edge novel locking system techniques in place of conventional mechanical locks and key mechanisms. An electronic control assembly is used in the project, and it uses a password to regulate the output load. The motor is carrying this output load. It uses an 8051 to get a password-based system. When the right code or password is entered, the door opens and the person who entered is granted access to the secured area. Again, it will prompt you to input the password if someone else shows up. The door would stay closed, and the person would not be able to enter if the password was incorrect.

1.3 MOTIVATION

This initiative is driven by the need to strengthen and improve digital security protocols. Through utilizing the 8051 microcontroller's capabilities, the project seeks to offer a password security system that is changeable, enabling users to customize their defences in response to the ever-changing and dynamic nature of cyber threats. The urgent need to improve password-based authentication systems' resilience and provide a proactive solution that can keep up with the rapidly evolving cybersecurity landscape is what spurs our quest.

CHAPTER 2
BACKGROUND THEORY

2.1 HISTORY OF 8051

Intel first introduced the 8051 microcontrollers in 1981. It is an 8-bit microcontroller capable of processing 8 bits of data at once. The 8051 microcontroller was originally based on N-type metal-oxide-semiconductor (NMOS) technology, while later versions used complementary metal-oxide-semiconductor (CMOS). The 8051 microcontroller is widely used in embedded systems such as robotics, remote controls, the automobile sector, telecommunications applications, power tools, and other applications.

The 8051 microcontroller is a System-on-a-chip (SoC) microcontroller that integrates numerous computer components into a single chip. A CPU, memory, input-output (I/O) ports, timers, and secondary storage are among the components. The 8051 microcontroller is related to the 8052 microcontroller and the 8031 microcontrollers. Instead of 4K bytes of on-chip program ROM, the 8052 microcontroller features 8K bytes and 128 bytes of RAM. The 8031 microcontroller features 128 bytes of RAM and 0K bytes of on-chip program ROM.

UARTs, ADC, Op-amps, and other special function capabilities are available on the 8051 microcontrollers. It has a data pointer and a 16-bit program counter. The 8051 microcontroller is frequently utilized in automotive applications, medical devices, energy management, touch screens, and other similar applications.

2.2GENERAL ANALYSIS

Applications:

1)This circuit can be utilized as a door lock in the same way that key locks are.
2)It can be used to secure vital documents in high-security areas.
3)With a few changes, this idea can be used as a password-protected household appliance system.
4)With a minor adjustment, this project may be used to regulate load switching by password.

Advantages:

1)It is a simple but effective security method.
2)Lower power consumption

Limitations:

1) It is a low range circuit.
2) This circuit cannot be used remotely.

CHAPTER 3
METHODOLOGY

3.1 PRINCIPLE

The 8051 Password Security System functions by fusing cutting-edge encryption techniques with the ruggedness of the 8051 microcontrollers to produce a dynamic and adjustable barrier against unwanted access. The system offers a customized method of password protection by managing user-defined security parameters through the utilization of the microcontroller's processing power. The project guarantees a safe and flexible password authentication system by combining encryption techniques with user-configurable settings, improving the overall robustness of digital security.

3.2 COMPONENTS AND THEIR SPECIFICATIONS

HARDWARE-

- 8051 Microcontroller(89C51): The 8051 microcontroller, specifically the 89C51 model, is a well-known and widely used 8-bit microcontroller. On-chip program memory (ROM), data memory (RAM), and a variety of external connections are included. The 89C51 performs admirably in embedded systems, with capabilities like timers/counters, serial connectivity, and I/O ports. Its long-term popularity can be due to its dependability, ease of programming, and widespread community support.

- EEPROM: This is a form of non-volatile ROM that allows individual bytes of information to be erased and rewritten. That is why EEPROM chips are sometimes known as byte-erasable chips. EEPROM is commonly used to store tiny quantities of data in computers and other electrical devices.

  • Motor Driver L293D: A typical motor driver IC that lets the DC motor to operate in any direction. This consists of 16 pins that are used to operate a pair of DC motors in any direction instantly.

- 4X4 Matrix Keyboard: It has 16 keys organized in a 4 by 4 grid. Each key press generates a distinct set of row and column signals. This keyboard is frequently used to input data into various electrical devices. The matrix configuration simplifies wiring by requiring only eight connections (4 for rows and 4 for columns). It is frequently used in projects ranging from digital gadgets to embedded systems to interface with microcontrollers for efficient data entry and control.

- 16*2 LCD: It is a standard alphanumeric display module with two lines and 16 characters per line. It is made up of three parts: a backlight, a character display, and a driver circuit. A 5x8 dot matrix forms each character, resulting in clean and understandable typography. These modules are commonly used in embedded systems and electrical projects to provide a visual interface for displaying information.
- 10K and 1K Resistors
- 33PF Capacitor
- Diode
- Breadboard
- Switch
- Push Buttons
- Battery
- Transistors

SOFTWARE-

- KEIL µVision IDE
- MC Programming Language: Embedded C

3.3 CODE

```
#include<reg51.h>
#include<string.h>
sbit RS = P3^0;
sbit EN = P3^1;
sbit IN1 =P3^2;
sbit IN2 = P3^3;
void delay(int a)
{
        int i,j;
        for(i=0;i<a;i++)
        for(j=0;j<255;j++);
}
void cmd(char cm)
{
        P2 = cm;
        RS = 0;
        EN = 1;
        delay(1);
        EN = 0;
}
void dat(char dt)
{
        P2 = dt;
        RS = 1;
    EN = 1;
    delay(1);
    EN = 0;
}

void display(char *lcd)
{
    while(*lcd != '\0')
    {
        dat(*lcd);
        lcd++;
    }
}
void lcdint()
{
    cmd(0x01);
    cmd(0x38);
    cmd(0x0E);
    cmd(0x80);
```

```
}

void main()
{
        char pass[5] = "1234";
        char pass2[5];
        int i=0;
        char *ptr;
        ptr = pass2;
        lcdint();
        display("Password-");
        pass2[4]='\0';

                while(1)
                {
                while(i<4)
        {
                P1=0xFE;
                if(P1==0xEE)
                {
                        *(ptr+i)='7';
                        dat('7');
                        delay(200);
                        cmd(0x06);

                        i++;


        }
        else if(P1==0xBE)
        {
                *(ptr+i)='9';
                dat('9');
                delay(200);
                cmd(0x06);



                  i++;
        }
        else if(P1==0x7E)
        {
                  *(ptr+i)='/';
                  dat('/');
                  delay(200);
                  cmd(0x06);

                  i++;
        }

        P1=0xFD;
        if(P1==0xED)
        {
                    *(ptr+i)='4';
                    dat('4');
                    delay(200);
                    cmd(0x06);

                    i++;
             }
             else if(P1==0xDD)
             {
                    *(ptr+i)='5';
                    dat('5');
                    delay(200);
                    cmd(0x06);

                    i++;
             }
             else if(P1==0xBD)
             {
                    *(ptr+i)='6';
                    dat('6');
                    delay(200);
                    cmd(0x06);

                    i++;
             }
             else if (P1==0x7D)
             {


                     *(ptr+i)='*';
                     dat('*');
                     delay(200);
                     cmd(0x06);

                     i++;
              }


              P1=0xFB;
              if(P1==0xEB)
              {
                      *(ptr+i)='1';
                      dat('1');
                      delay(200);
                      cmd(0x06);

                      i++;
              }
              else if(P1==0xDB)
              {
                      *(ptr+i)='2';
                      dat('2');
                      delay(200);
                      cmd(0x06);
```

```
            i++;
    }
    else if(P1==0xBB)
    {
            *(ptr+i)='3';
            dat('3');
            delay(200);
            cmd(0x06);

            i++;
    }
    else if(P1==0x7B)
    {
            *(ptr+i)='-';
            dat('-');
            delay(200);
            cmd(0x06);




                    i++;
            }


            P1=0xF7;
            if(P1==0xE7)
            {
                    *(ptr+i)='C';
                    dat('C');
                    delay(200);
                    cmd(0x06);

                    i++;

            }
            else if(P1==0xD7)
            {
                    *(ptr+i)='0';
                    dat('0');
                    delay(200);
                    cmd(0x06);

                    i++;
            }
            else if(P1==0xB7)
            {
                    *(ptr+i)='=';
                    dat('=');
                    delay(200);
                    cmd(0x06);

                    i++;
            }
            else if(P1==0x77)
            {
                    *(ptr+i)='+';
                    dat('+');
                    delay(200);
                    cmd(0x06);

                    i++;
            }
  }
```

```
while(i==4)
{

if ((strcmp(pass, pass2)) == 0)
{
        cmd(0xC0);
        display("Access Granted");
        IN1 = 0;
        IN2 = 0;
        delay(100);
}
else
{
        cmd(0xC0);
        display("Incorrect");
        IN1 = 1;
        IN2 = 0;
        delay(100);
}
}
}
}
```

3.4 WORKING

The 8051 microcontroller-based Configurable Password Security System works by first recording user input through the code where we had defined the password, which is then recorded in EEPROM and encrypted using methods embedded in the 8051 microcontrollers. During successive access attempts, the entered password is compared with the saved configuration, and if a match occurs, access is provided to the LCD, which displays "Door Open" with the one LED glows which means the motor driver runs, and if the user input an incorrect password both the LEDs are on which means it is high and the motor driver doesn't work. As we have a 9v battery we use a voltage regulator and it converts 9v to 5v using 7805ic.To prevent unwanted access, the system incorporates error-handling features. The system's flexibility allows for the integration of additional components or security measures based on project requirements, offering a comprehensive and adaptable solution for password-based access control.

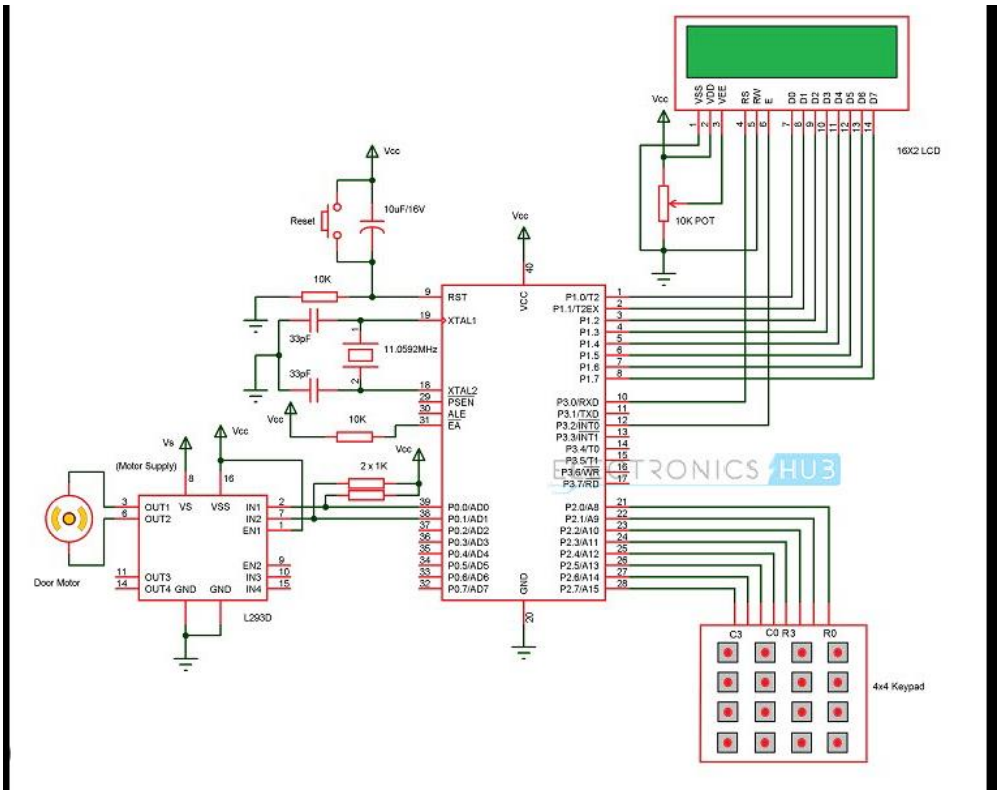

FIGURE 3.1: CIRCUIT DIAGRAM OF PASSWORD SECURITY SYSTEM

CHAPTER 4
RESULT ANALYSIS

4.1 PICTORIAL REPRESENTATION

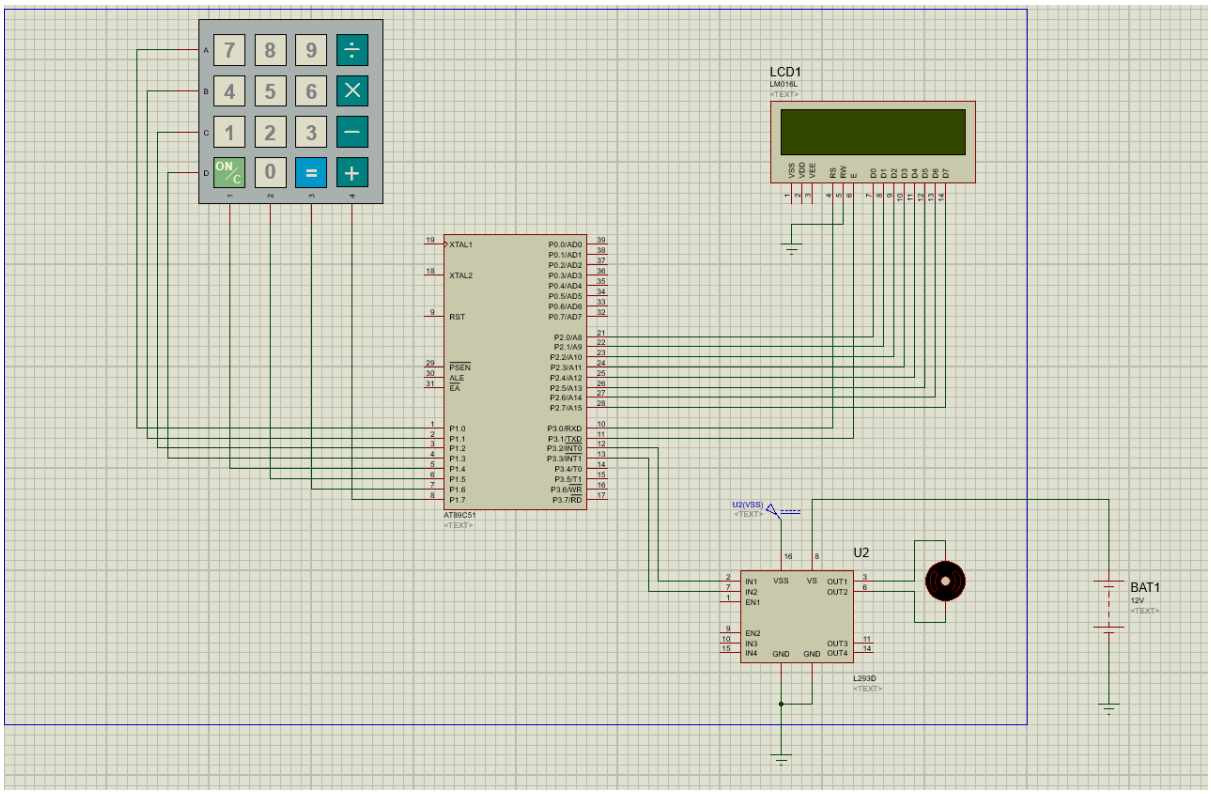

FIGURE 4.1: WORKING OF THE PROJECT ON PROTEUS SOFTWARE

4.2 RESULT OF THE ENTIRE PROJECT

The Configurable Password Security System, which is based on the 8051, provides a powerful access control solution after successful implementation. Users are prompted to input their password, which is then compared to the system password. If a match is identified, the system grants access by glowing one LED which means the motor is rotating and displaying on the LCD, and if the user entered an incorrect password both the LEDs will which means it is high and the driver motor doesn't work when it is high and shows incorrect password on LCD. This system's architecture makes use of the properties of the 8051 microcontrollers to manage password verification effectively, leading to a secure access control mechanism.

CHAPTER 5
CONCLUSION AND FUTURE SCOPE OF WORK

5.1 CONCLUSION

We conclude when a user enters the proper password recorded in the code, the door opens and the LED glows, displaying "door open" on the LCD, whereas when the user inputs the erroneous password, the LCD displays "incorrect password", and two LEDs will glow (motor does not revolve).

5.2 FUTURE SCOPE OF WORK

It anticipates continuous modifications and adaptations to meet growing cybersecurity threats. In the future, advanced biometric authentication technologies for multi-factor authentication may be integrated, greatly improving the system's security. To handle increasing dangers, enhanced encryption techniques, and constant monitoring features could be incorporated. The project could also look into integrating with cloud-based services for remote access management and real-time security updates. The concept of reconfigurability could be expanded to include machine learning methods for adaptive threat detection and response. Overall, the system's capabilities will be refined and expanded in the future to keep it at the forefront of cybersecurity innovations.

REFERENCES

- https://nevonprojects.com/configurable-password-security-system/
- https://www.youtube.com/watch?v=CA3hx6A1WZo&t=92s