Microcontrollers and Applications

Mini Project Assignment - Report

BTech E&TC 2018-22 Semester – V

AY 2020-21

Title:

Key Quest (Password protected system).

Aim:

Key Quest (Password protected system):

To take digits of password from the user and compare it with the correct password, if the entered password is correct, display “Welcome” message else “Wrong Password” message will be displayed.

Introduction:

Key Quest *is a password protected entry system, the user enters a 4 digit key as password and if it matches with the fixed correct password then the user gets entry to the room else his entry/access is denied.*
In this project, we have interfaced between the LCD (16x2) display and the keypad (2 peripherals of PIC18F4520). On compiling the project, first, an “Enter password” message is shown which disappears in short time then there is a blank screen for the user to enter the password (4 digits), if this key matches with the set correct password then a “Welcome” message is displayed and after a short while entry to room is granted by displaying “Enter room now!”, if the entered key is incorrect then a “Wrong password” message is displayed and after a short while entry to room is denied by displaying “Access Denied”.

Peripheral(s) used:

1. LCD (16x2) display
2. Keypad

Program 1:

```
/*
 * File:   newfile.c
 * Author: rhea.sawant.btech2018@sitpune.edu.in
  *
 * Created on 11/22/2020 6:16:22 AM UTC
 * "Created in MPLAB Xpress"
 */

#include<xc.h>
#include<string.h>
#include <pic18f4520.h>
#pragma config OSC=HS
#pragma config PWRT=OFF
#pragma config WDT=OFF
```

```
#pragma config DEBUG=OFF, LVP=OFF
#pragma config PBADEN=OFF

void delay(unsigned int value);
void lcdcmd(unsigned char value);
void lcddata(unsigned char value);
void lcdinit(void);
void lcdr(char c);
int check();
void lcddisplay(int row,unsigned char *str);

#define rs PORTEbits.RE2
#define en PORTEbits.RE1
#define ldata PORTD
#define COL1 PORTBbits.RB0
#define COL2 PORTBbits.RB1
#define COL3 PORTBbits.RB2
#define ROW1 PORTDbits.RD3
#define ROW2 PORTDbits.RD2
#define ROW3 PORTDbits.RD1
#define ROW4 PORTDbits.RD0
#define R1C1 '1'
#define R1C2 '2'
#define R1C3 '3'
#define R2C1 '4'
#define R2C2 '5'
#define R2C3 '6'
#define R3C1 '7'
#define R3C2 '8'
#define R3C3 '9'
#define R4C1 '*'
#define R4C2 '0'
#define R4C3 '#'

int i,j,count,s;
char password[5]={'0','0','0','0'};
// Password is the fixed correct password
char pswd[5]; // Pswd is the password that the user will enter
int r=0;
int flag=0;

unsigned char open_msg[]={"Enter Password"};
unsigned char welcome_msg[]={"Welcome"};
unsigned char close_msg[]={"Wrong Password"};
unsigned char enter_msg[]={"Enter room now!"};
unsigned char reject_msg[]={"Access denied!"};

void lcdr(char c)
{
    TRISD = 0x00;
    delay(10);
    lcddata(c);
    TRISD = 0xFF;
    delay(10);
}
```

```
void lcdinit(void)
{
    lcdcmd(0x38);
    delay(10);
    lcdcmd(0x0E);
    delay(10);
    lcdcmd(0x01);
    delay(10);
    lcdcmd(0x06);
    delay(10);
}

void lcdcmd (unsigned char value)
{
    TRISD=0x00;
    ldata=value;
    rs=0;
    en=1;
    delay(10);
    en=0;
    TRISD=0xFF;
}

void lcddata (unsigned char value)
{
    ldata=value;
    rs=1;
    en=1;
    delay(10);
    en=0;
}

void lcddisplay(int row, unsigned char *str)
{
    int k;
    if (row==1)
        lcdcmd(0x80);
    else
        lcdcmd(0xC0);
        for(k=0;k<16;k++)
        {
            if(str[k] !=0)
                lcdr(str[k]);
            else
                break;
        }
}

void delay(unsigned int value)
{
    int i,j;
    for(i=0;i<=value;i++)
        for(j=0;j<=50;j++);
}

int check()
```

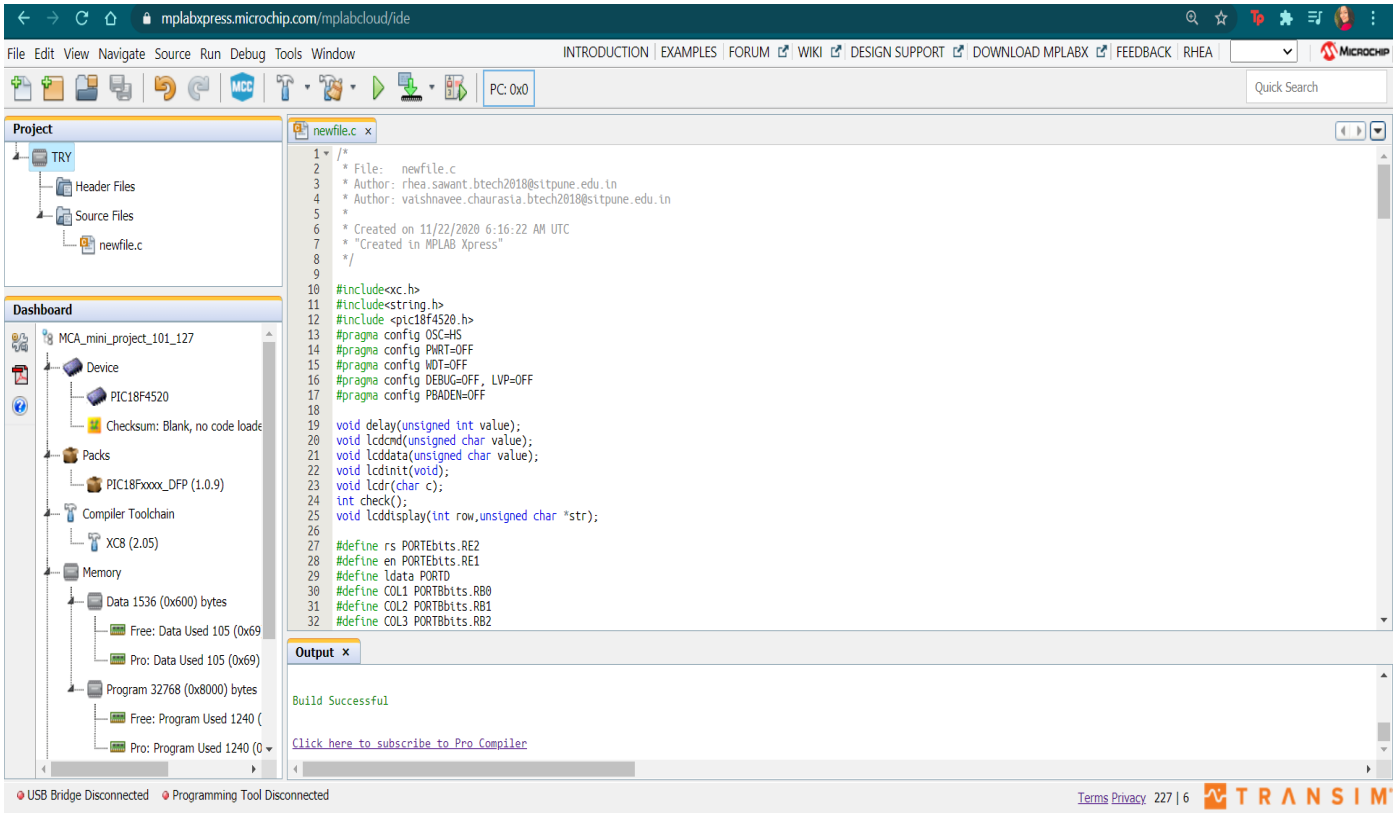
```
{
    for(int v=0;v<4;v++)
    {
        if(pswd[v]==password[v])
// To check whether the entered password is equal to the saved password
        {
            flag++;
        }
    }
    if(flag==4)
        return 1;
    else
        return 0;
}

void key_pressed() // To take input digits as '#' from the user
{
    COL1 = 1;
    COL2 = 1;
    COL3 = 1;
    COL1 = 0;
    delay(10);
    if(ROW1 == 0)
    {
        lcdr('#');
        pswd[r]=R1C1;
        r++;
    }
    if(ROW2 == 0)
    {
        lcdr('#');;
        pswd[r]=R2C1;
        r++;
    }
    if(ROW3 == 0)
    {
        lcdr('#');
        pswd[r]=R3C1;
        r++;
    }
    if(ROW4 == 0)
    {
        lcdr('#');
        pswd[r]=R4C1;
        r++;
    }
    COL1=1;
    delay(10);
    COL2 = 0;
    delay(10);
    if(ROW1 == 0)
    {
        lcdr('#');
        pswd[r]=R1C2;
        r++;
    }
```

```
    if(ROW2 == 0)
    {
        lcdr('#');
        pswd[r]=R2C2;
        r++;
    }
    if(ROW3 == 0)
    {
        lcdr('#');
        pswd[r]=R3C2;
        r++;
    }
    if(ROW4 == 0)
    {
        lcdr('#');
        pswd[r]=R4C2;
        r++;
    }
    COL2=1;
    delay(10);
    COL3 = 0;
    delay(10);
    if(ROW1 == 0)
    {
        lcdr('#');
        pswd[r]=R1C3;
        r++;
    }
    if(ROW2 == 0)
    {
        lcdr('#');
        pswd[r]=R2C3;
        r++;
    }
    if(ROW3 == 0)
    {
        lcdr('#');
        pswd[r]=R3C3;
        r++;
    }
    if(ROW4 == 0)
    {
        lcdr('#');
        pswd[r]=R4C3;
        r++;
    }
    COL3=1;
    delay(10);
}

void main()
{
    TRISD = 0x00;
    TRISE = 0x00;
    TRISB = 0x00;
    lcdinit();
```

```
      lcddisplay(1,open_msg);
  // To display the open message "Enter Password"
      delay(2000);
      lcdcmd(0x01); // To clear the screen for user to enter pswd
      while(1)
      {
          if(r==4) // To ensure that entered digits are equal to 4
          {
              s=check();
              if(s==1)
              {
                  lcddisplay(1,welcome_msg);
  // To display the welcome message "Welcome"
                  delay(2000);
                  lcddisplay(1,enter_msg);
  // To give access to room and display the enter message "Enter room
now!"
                  delay(2000);
                  break;
              }
              else
              {
                  lcddisplay(1,close_msg);
  // To display the closing message "Wrong Password"
                  delay(2000);
                  lcddisplay(1,reject_msg);
  // To deny access to room and display the reject message "Access
denied!"
                  delay(2000);
                  break;
              }
          }
          key_pressed(); // To take entry for the next user
          delay(10);
      }
  }
```


mplabxpress.microchip.com/mplabcloud/ide
File Edit View Navigate Source Run Debug Tools Window
INTRODUCTION | EXAMPLES | FORUM | WIKI | DESIGN SUPPORT | DOWNLOAD MPLABX | FEEDBACK | RHEA
PC: 0x0
Quick Search
Project
TRY
Header Files
Source Files
newfile.c
Dashboard
MCA_mini_project_101_127
Device
PIC18F4520
Checksum: Blank, no code loade
Packs
PIC18Fxxxx_DFP (1.0.9)
Compiler Toolchain
XC8 (2.05)
Memory
Data 1536 (0x600) bytes
Free: Data Used 105 (0x69
Pro: Data Used 105 (0x69)
Program 32768 (0x8000) bytes
Free: Program Used 1240 (
Pro: Program Used 1240 (0
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Output
Build Successful
Click here to subscribe to Pro Compiler
USB Bridge Disconnected
Programming Tool Disconnected
Terms Privacy 227 | 6
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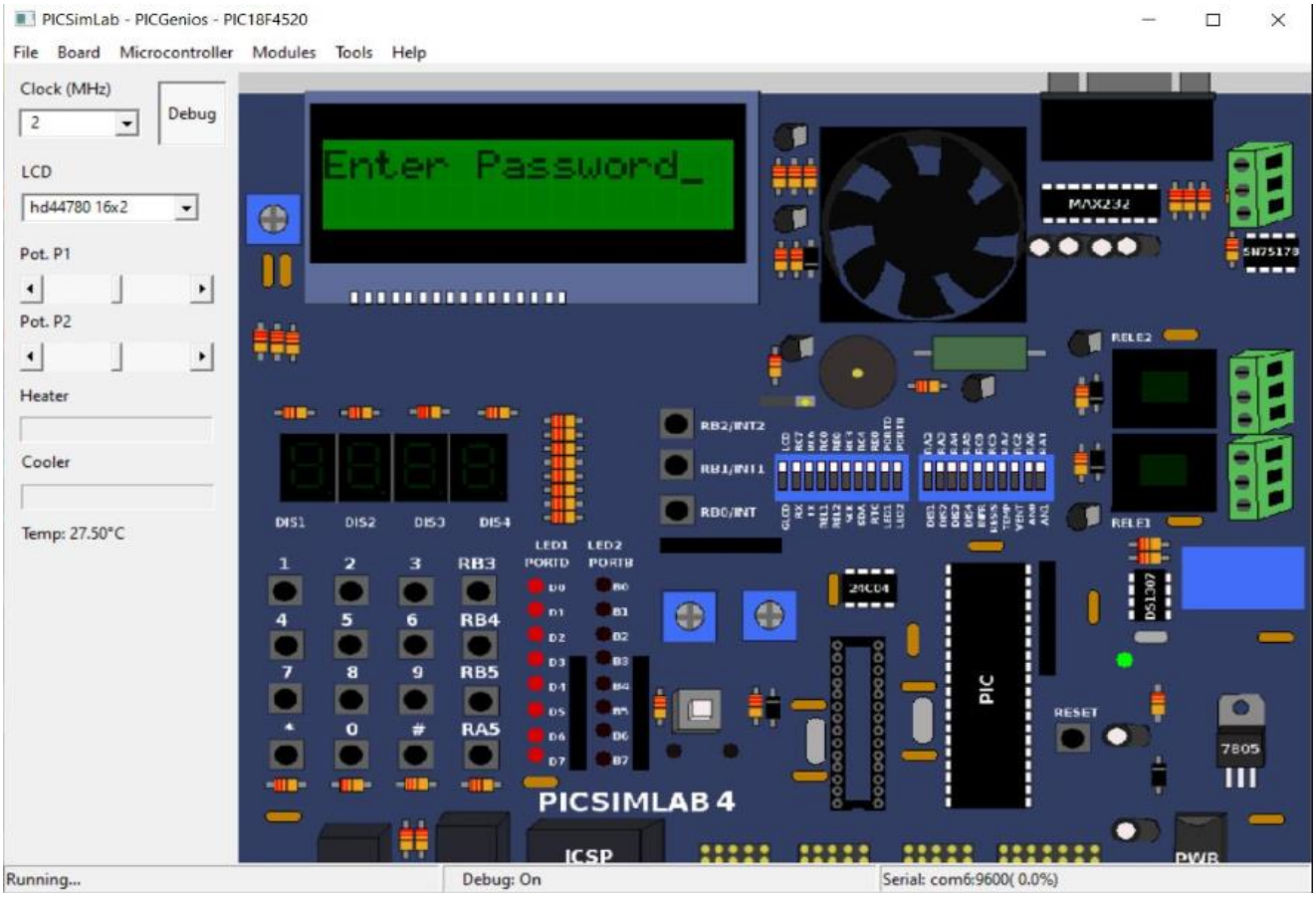
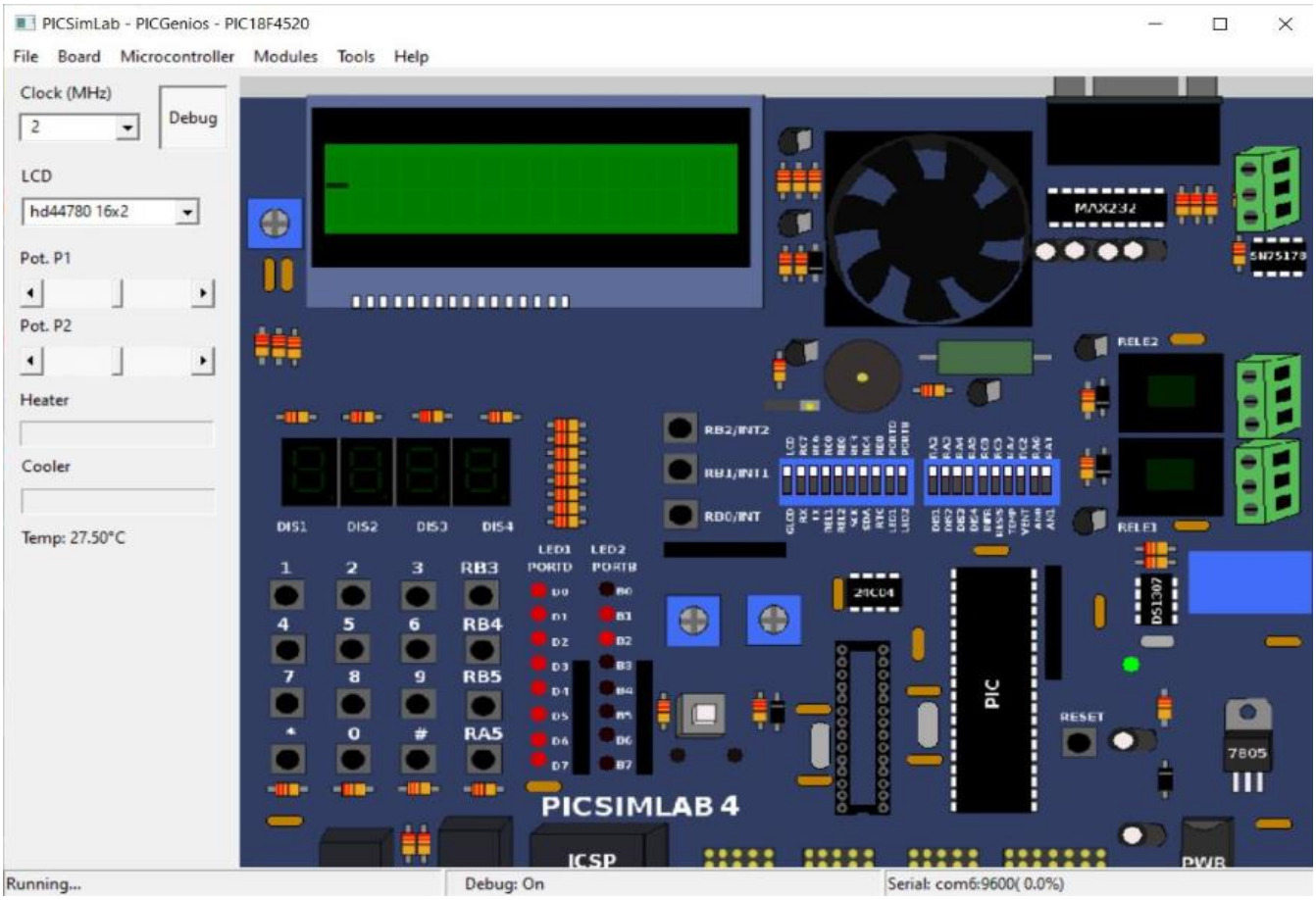

PICSimLab - PICGenios - PIC18F4520
File Board Microcontroller Modules Tools Help
Clock (MHz)
2
Debug
LCD
hd44780 16x2
Pot. P1
Pot. P2
Heater
Cooler
Temp: 27.50°C
Enter Password_
MAX232
SN75179
RELE2
RELE1
RB2/INT2
RB1/INT1
RB0/INT
DIS1
DIS2
DIS3
DIS4
LED1 PORTD
LED2 PORTB
1 2 3 RB3
4 5 6 RB4
7 8 9 RB5
* 0 # RA5
24C04
PIC
RESET
7805
DS1307
PICSIMLAB 4
ICSP
PWR
Running...
Debug: On
Serial: com6:9600(0.0%)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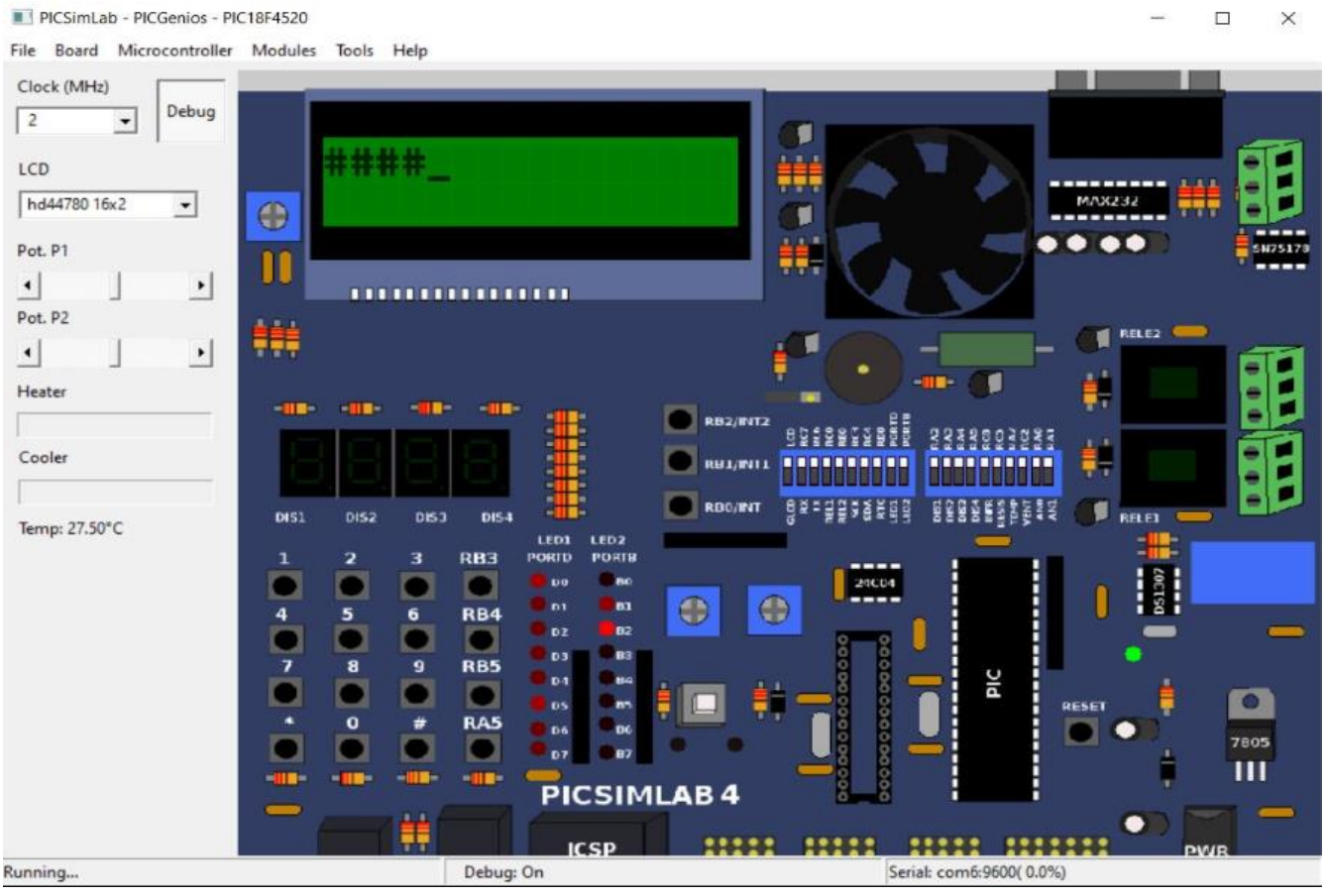
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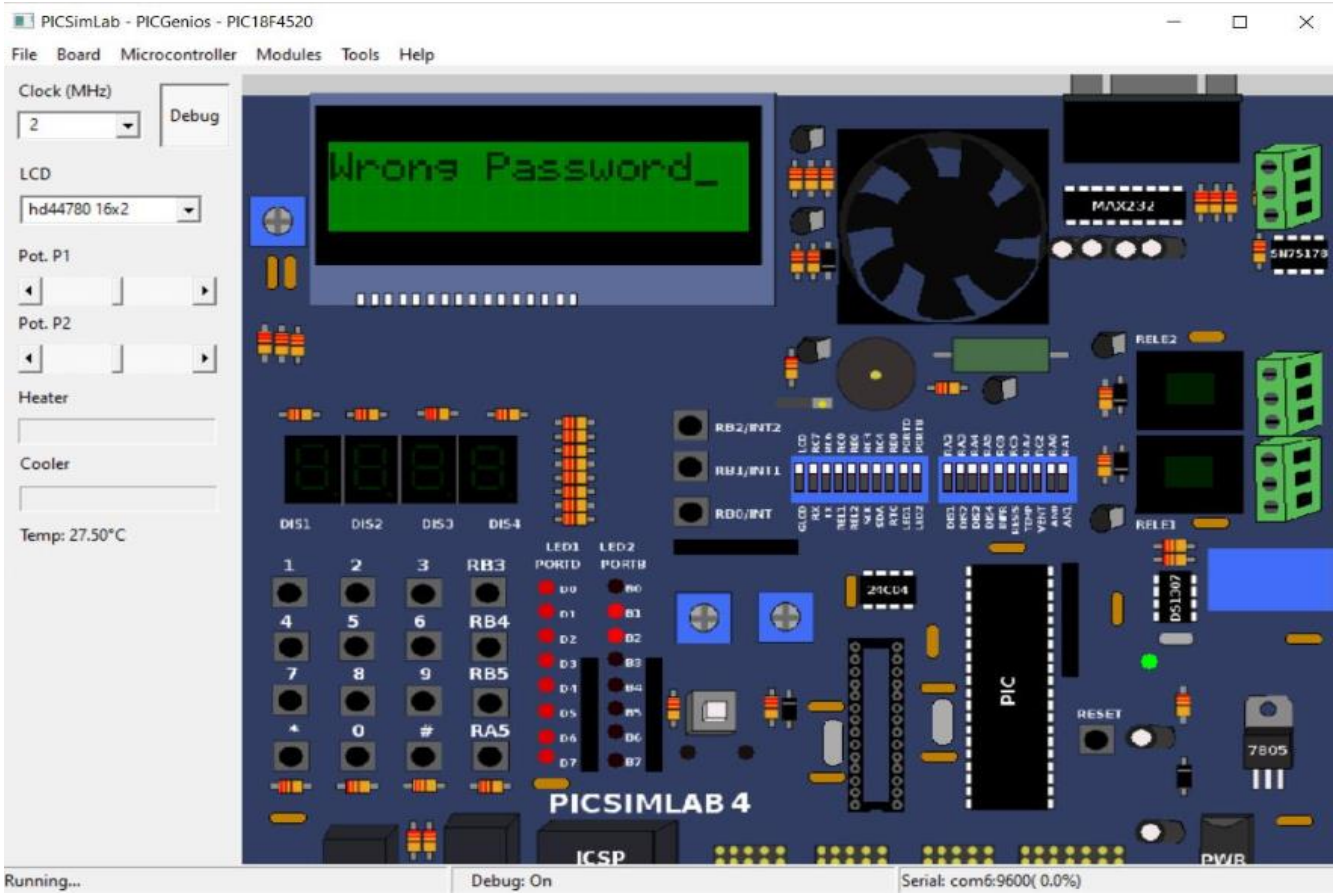
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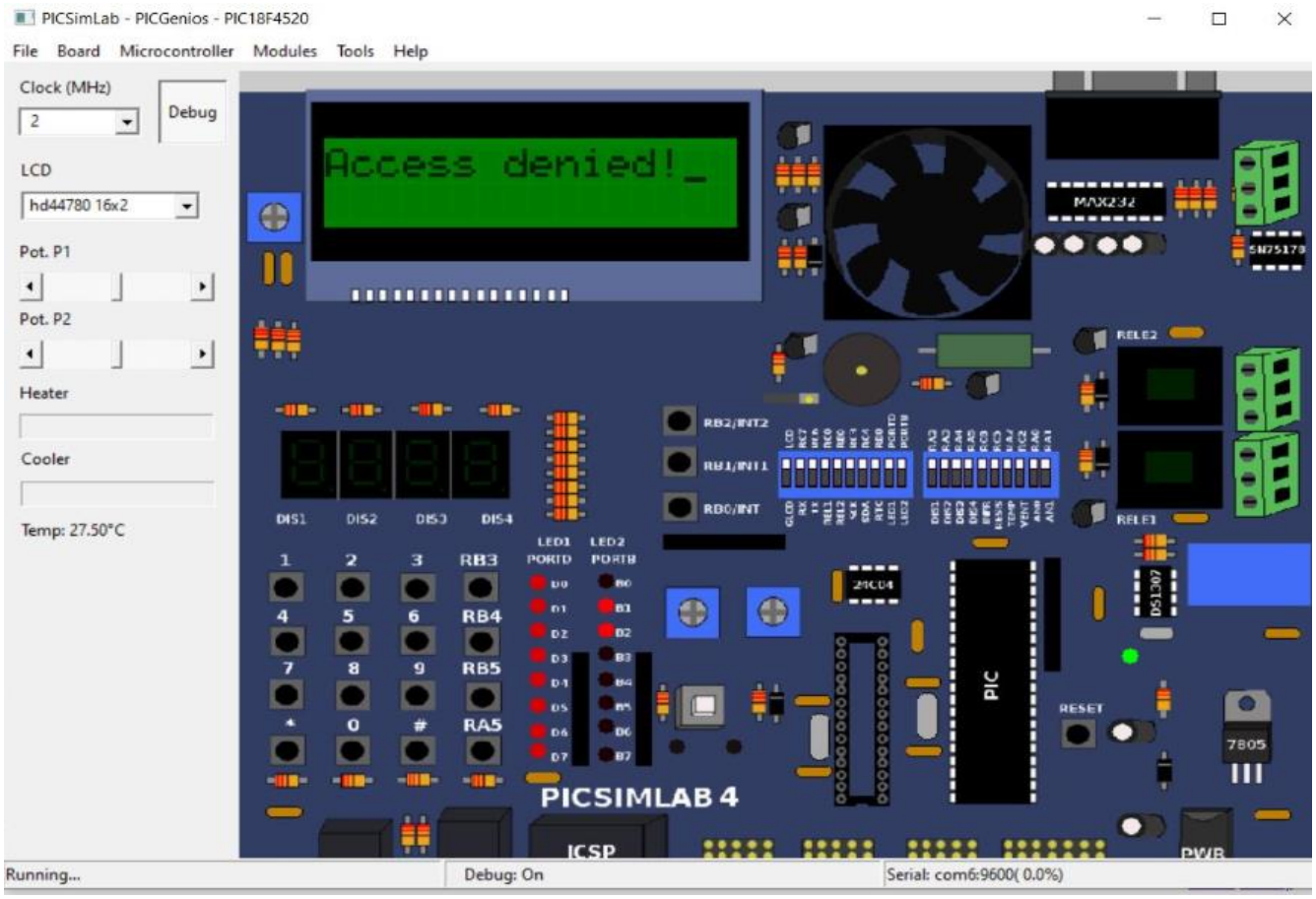
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Access denied!_
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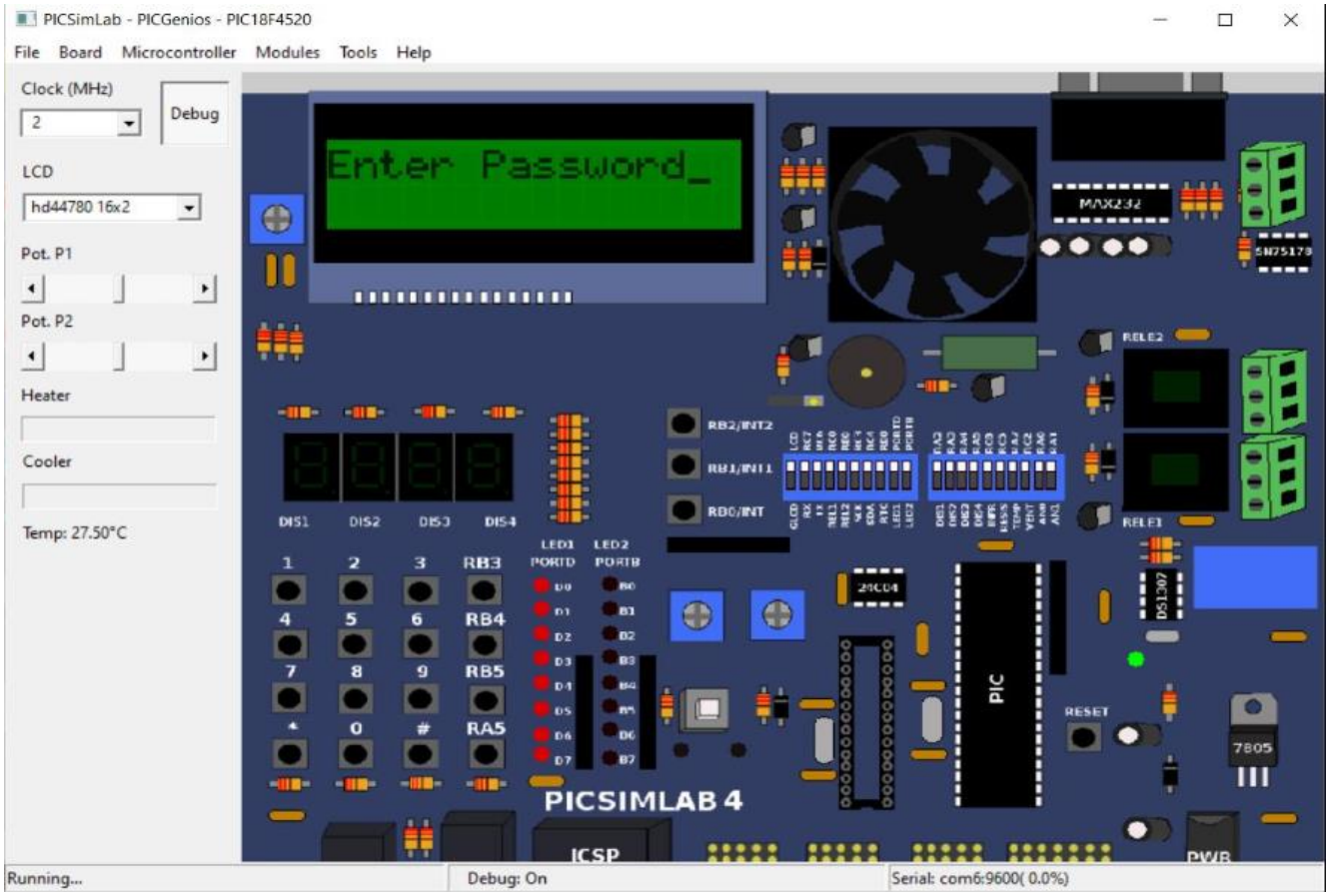
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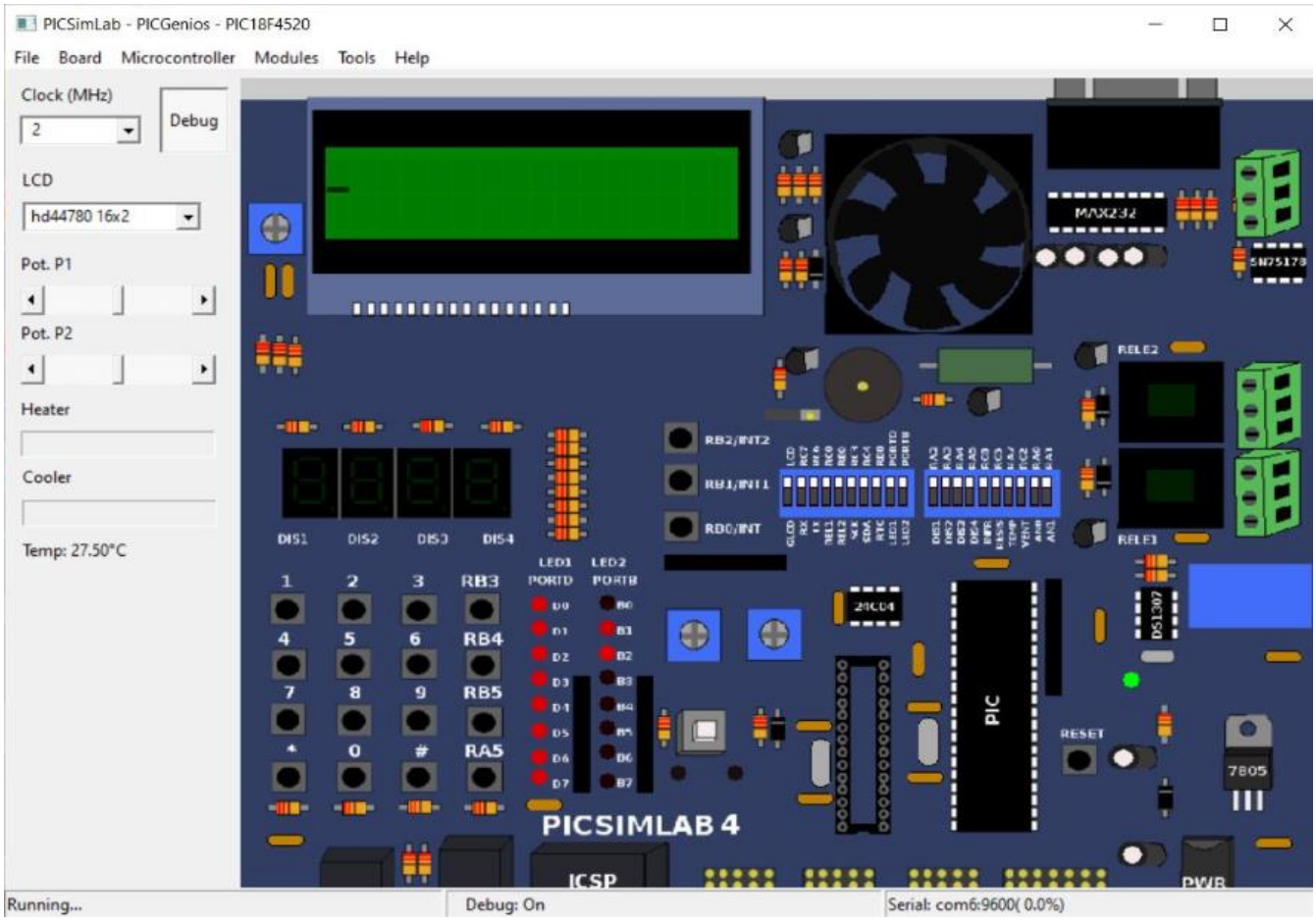
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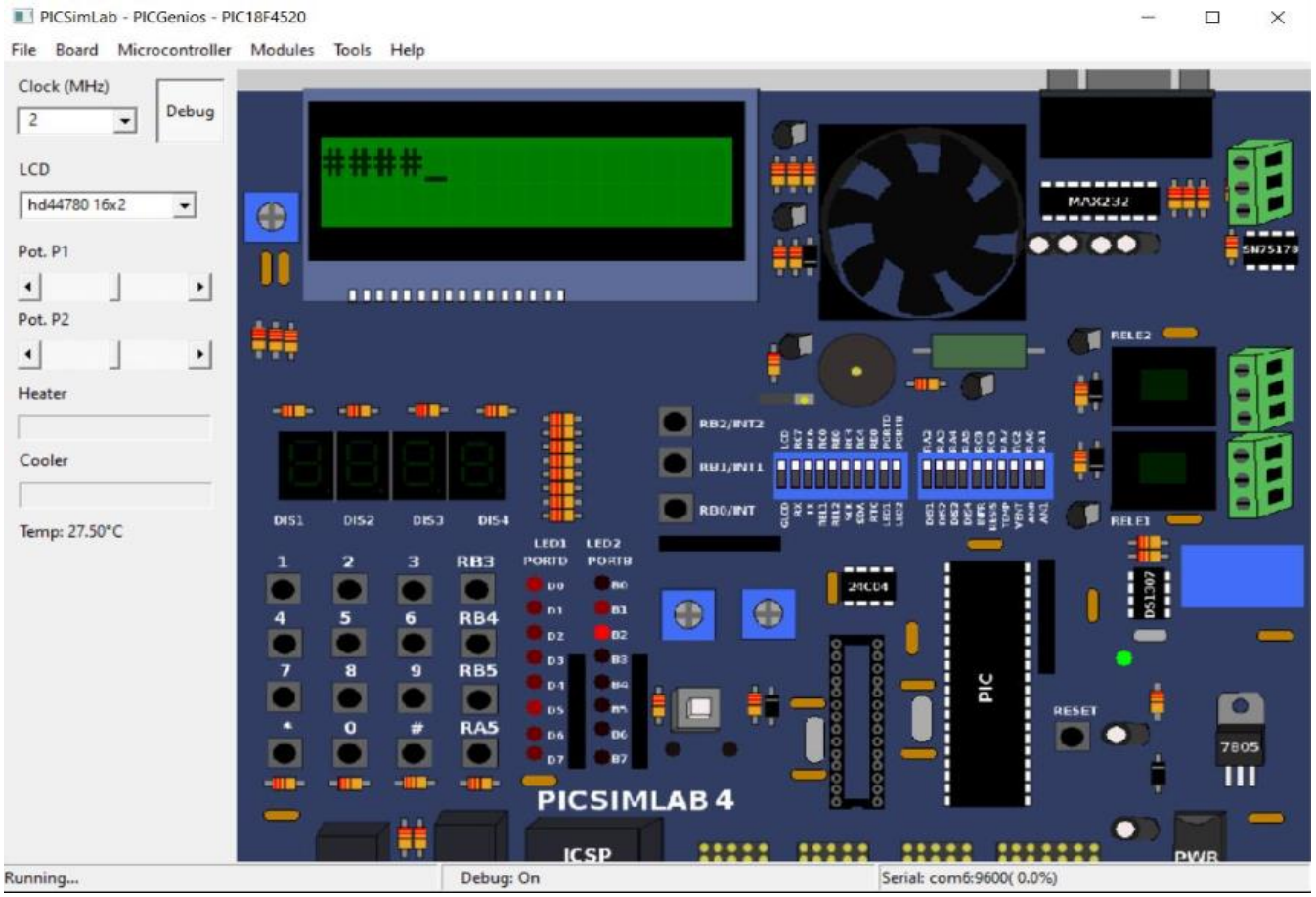
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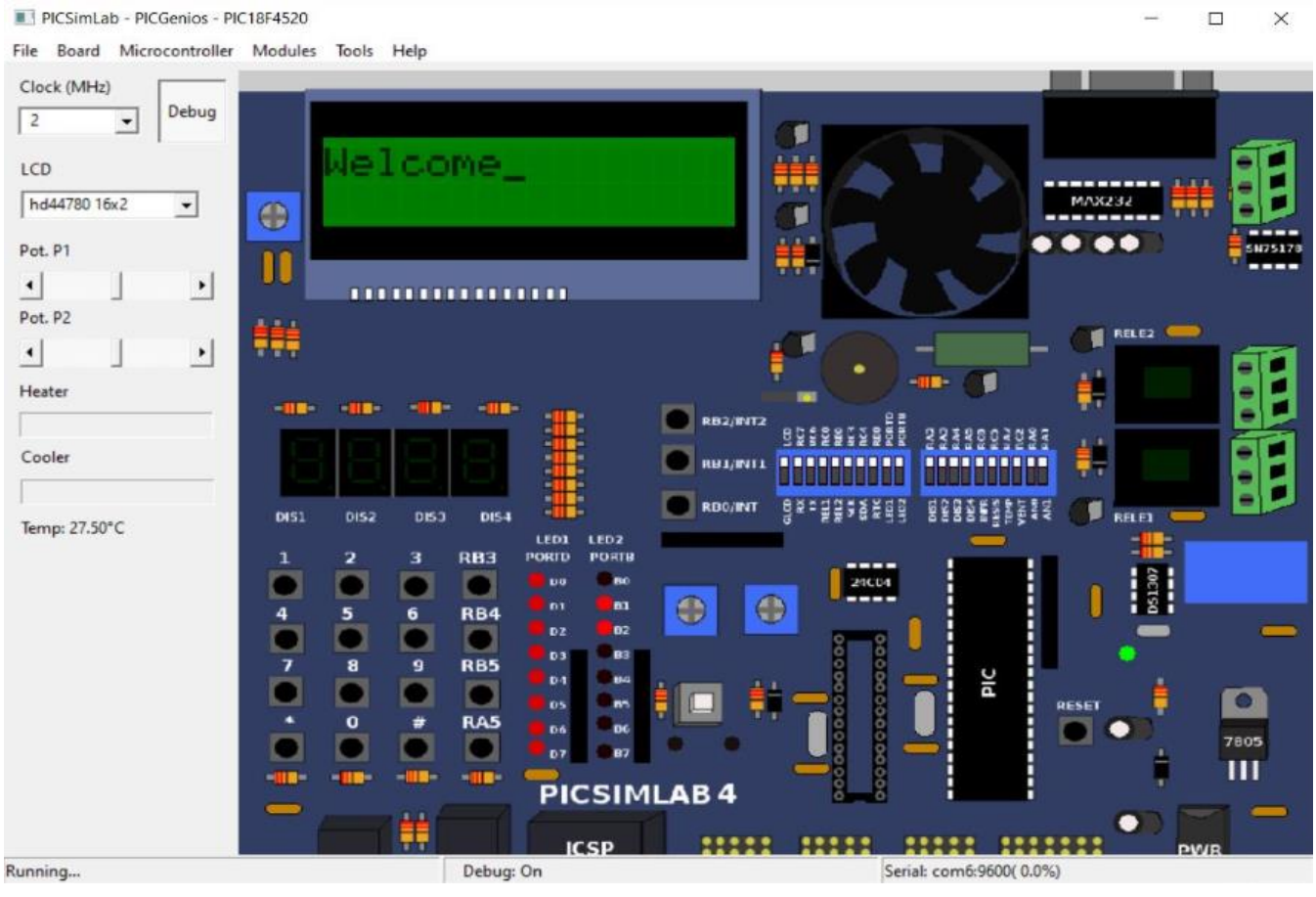
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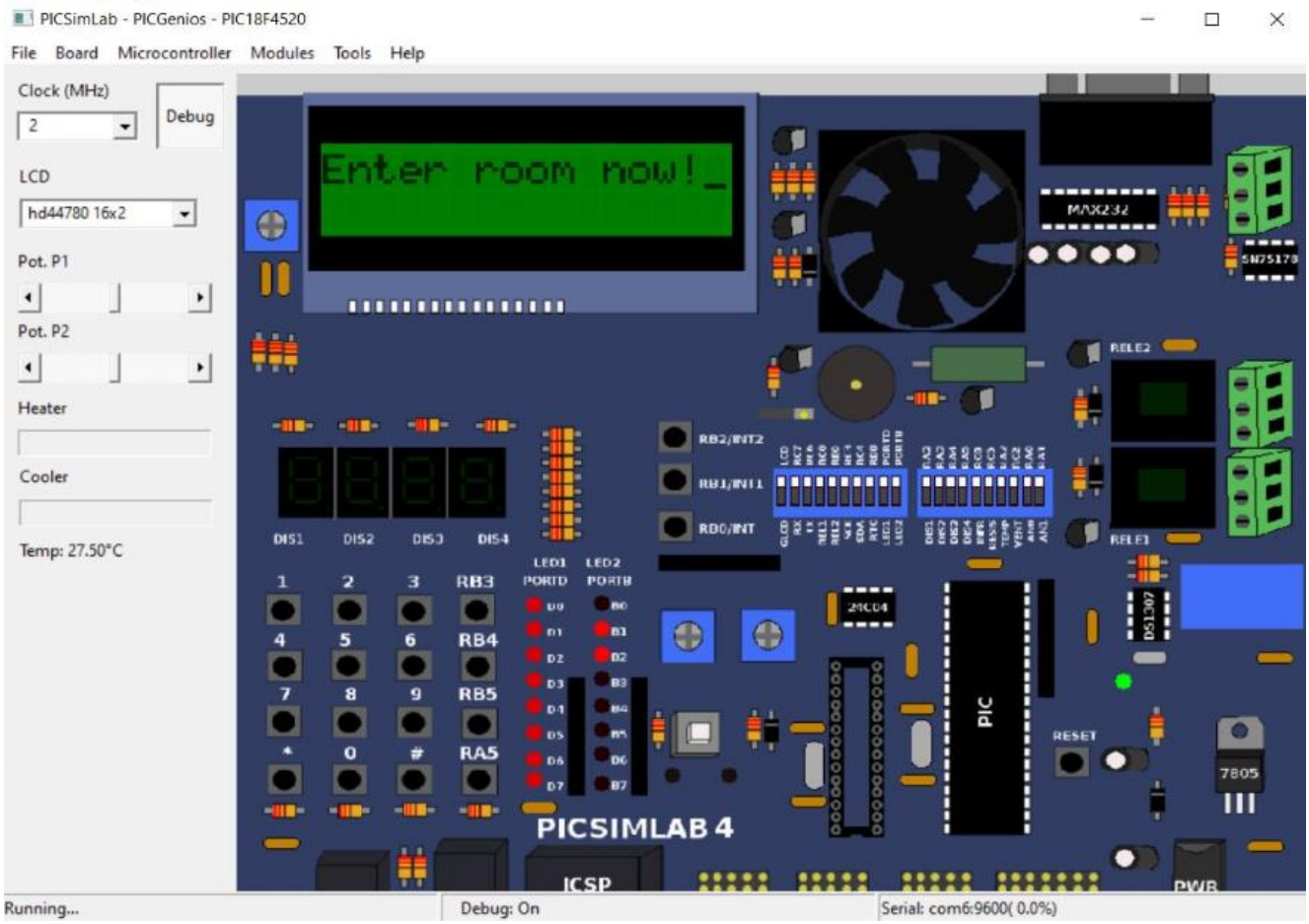

Inference:

LEDs, LCD (16x2) display and the keypad of PIC18F4520 were getting interfaced successfully on PICSIM Lab software for simulation, the projects/applications were working desirably. The code has also been commented wherever it was needed.
The Key Quest application is properly reading inputs by the user from the keypad and comparing it character by character with the actual set correct password and displays messages as desired.