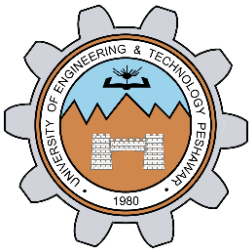
**MICROPROCESSOR BASED SYSTEM DESIGN LAB**

**LAB 9**




**Spring 2021**

**CSE307L MBSD Lab**

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Class Section: **B**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: _____

Submitted to:

**Engr. Amaad Khalil**

Tuesday, August 10, 2021

**Department of Computer Systems Engineering**

**University of Engineering and Technology, Peshawar**

## Task 1:

Electronic code lock using 8051 Microcontroller, which can only be unlocked by a predefined code, if we enter the wrong code, the system alerts by displaying warning.

## Code:

```
#include <reg51.h>
#include <stdio.h>


//Function declarations
void cct_init(void);
void delay(int);
void lcdinit(void);
void writecmd(int);
void writedata(char);
void Return(void);
char READ_SWITCHES(void);
char get_key(void);

//*******************
//Pin description
/*
P2 is data bus
P3.7 is RS
P3.6 is E
P1.0 to P1.3 are keypad row outputs
P1.4 to P1.6 are keypad column inputs
*/
//*******************
// Define Pins
//*******************
sbit RowA = P1^0;     //RowA
sbit RowB = P1^1;     //RowB
sbit RowC = P1^2;     //RowC
sbit RowD = P1^3;     //RowD

sbit C1   = P1^4;     //Column1
sbit C2   = P1^5;     //Column2
sbit C3   = P1^6;     //Column3
sbit C4   = P1^7;   //Column4


sbit E    = P3^6;     //E pin for LCD
sbit RS   = P3^7;     //RS pin for LCD

unsigned int key_count = 0;
char array[4];
// ************************************************************
// Main program
//
int main(void)
{
  char key;               // key char for keeping record of pressed key
```

```
cct_init();             // Make input and output pins as required
lcdinit();              // Initilize LCD

writecmd(0x95);
        writedata('E');                 //write
        writedata('n');                 //write
        writedata('t');                 //write
        writedata('e');                 //write
        writedata('r');                 //write
        writedata(' ');                 //write
        writedata('T');                 //write
        writedata('h');                 //write
        writedata('e');
        writedata(' ');
        writedata('C');
        writedata('o');
        writedata('d');
         writedata('e');
writecmd(0xd5);
        writedata('4');                 //write
        writedata(' ');                 //write
        writedata('D');                 //write
        writedata('I');                 //write
        writedata('G');                 //write
        writedata('I');                 //write
        writedata('T');                 //write
        writedata('S');                 //write
        writedata(' ');
        writedata('C');
        writedata('O');
        writedata('D');
        writedata('E');

writecmd(0x80);
while(1)
{
  key = get_key();      // Get pressed key
        if (key == 'C')
                {
                writecmd(0x01);       // Clear screen
                array[0]= array[1]= array[2]=array[3]='n';
                key_count = 0;
                }
        else if(key == '=')
                {
                writecmd(0x01);       // Clear screen
                        if(array[0] == '1' && array[1]=='2' && array[2]=='3' && array[3]=='4')
                        {
                          writedata('C');                 //write
                          writedata('o');                 //write
                          writedata('r');                 //write
                          writedata('r');                 //write
                          writedata('e');                 //write
                           writedata('c');                //write
                          writedata('t');                 //write
                          writedata(' ');                 //write
```

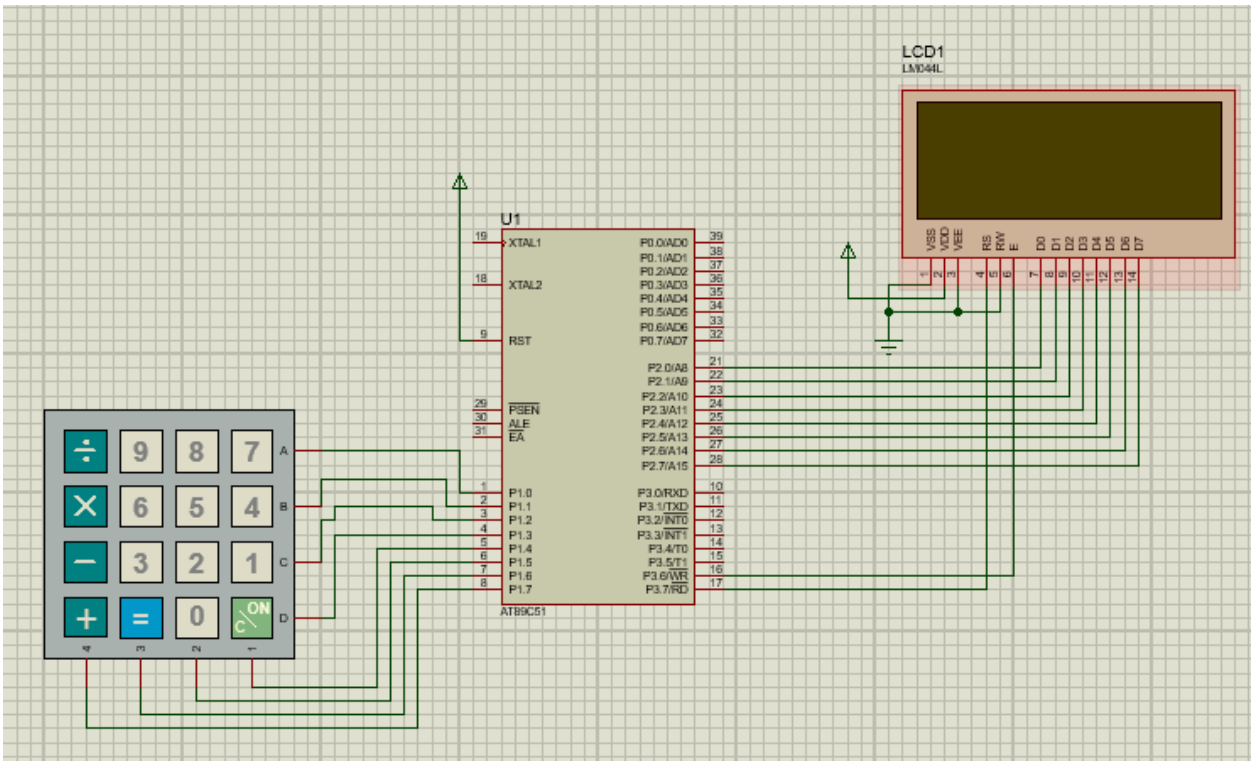
```
                                writedata('P');                         //write
                                writedata('a');                         //write
                                writedata('s');
                                writedata('s');
                              }
                              else
                              {
                                writedata('W');                         //write
                                writedata('r');                         //write
                                writedata('o');                         //write
                                writedata('n');                         //write
                                writedata('g');                         //write
                                writedata(' ');                         //write
                                writedata('P');                         //write
                                writedata('a');                         //write
                                writedata('s');
                                writedata('s');

                              }
                    }
          else
                    writedata(key);       // Echo the key pressed to LCD
  }
}


void cct_init(void)
{
          P0 = 0x00;   //not used
          P1 = 0xf0;   //used for generating outputs and taking inputs from Keypad
          P2 = 0x00;   //used as data port for LCD
          P3 = 0x00;   //used for RS and E
}

void delay(int a)
{
  int i;
  for(i=0;i<a;i++);   //null statement
}

void writedata(char t)
{
  RS = 1;            // This is data
  P2 = t;           //Data transfer
  E  = 1;           // => E = 1
  delay(150);
  E  = 0;           // => E = 0
  delay(150);
}


void writecmd(int z)
{
  RS = 0;            // This is command
  P2 = z;           //Data transfer
  E  = 1;           // => E = 1
```

```
  delay(150);
  E  = 0;           // => E = 0
  delay(150);
}

void lcdinit(void)
{
 ////////////// Reset process from datasheet /////////
    delay(15000);
  writecmd(0x30);
    delay(4500);
  writecmd(0x30);
    delay(300);
  writecmd(0x30);
    delay(650);
 ////////////////////////////////////////////////////
  writecmd(0x38);    //function set
  writecmd(0x0c);    //display on,cursor off,blink off
  writecmd(0x01);    //clear display
  writecmd(0x06);    //entry mode, set increment
}

void Return(void)     //Return to 0 location on LCD
{
 writecmd(0x02);
   delay(1500);
}

char READ_SWITCHES(void)
{
        RowA = 0; RowB = 1; RowC = 1; RowD = 1;          //Test Row A

        if (C1 == 0) { delay(10000); while (C1==0); return '7'; }
        if (C2 == 0){ delay(10000); while (C2==0);  return '8'; }
        if (C3 == 0) { delay(10000); while (C3==0); return '9'; }
        if (C4 == 0) { delay(10000); while (C4==0); return '/'; }

        RowA = 1; RowB = 0; RowC = 1; RowD = 1;          //Test Row B

        if (C1 == 0) { delay(10000); while (C1==0); return '4'; }
        if (C2 == 0) { delay(10000); while (C2==0); return '5'; }
        if (C3 == 0) { delay(10000); while (C3==0); return '6'; }
        if (C4 == 0) { delay(10000); while (C4==0); return 'x'; }

        RowA = 1; RowB = 1; RowC = 0; RowD = 1;          //Test Row C

        if (C1 == 0) { delay(10000); while (C1==0); return '1'; }
        if (C2 == 0) { delay(10000); while (C2==0); return '2'; }
        if (C3 == 0) { delay(10000); while (C3==0); return '3'; }
        if (C4 == 0) { delay(10000); while (C4==0); return '-'; }

        RowA = 1; RowB = 1; RowC = 1; RowD = 0;          //Test Row D

        if (C1 == 0) { delay(10000); while (C1==0); return 'C'; }
        if (C2 == 0) { delay(10000); while (C2==0); return '0'; }
        if (C3 == 0) { delay(10000); while (C3==0); return '='; }
```

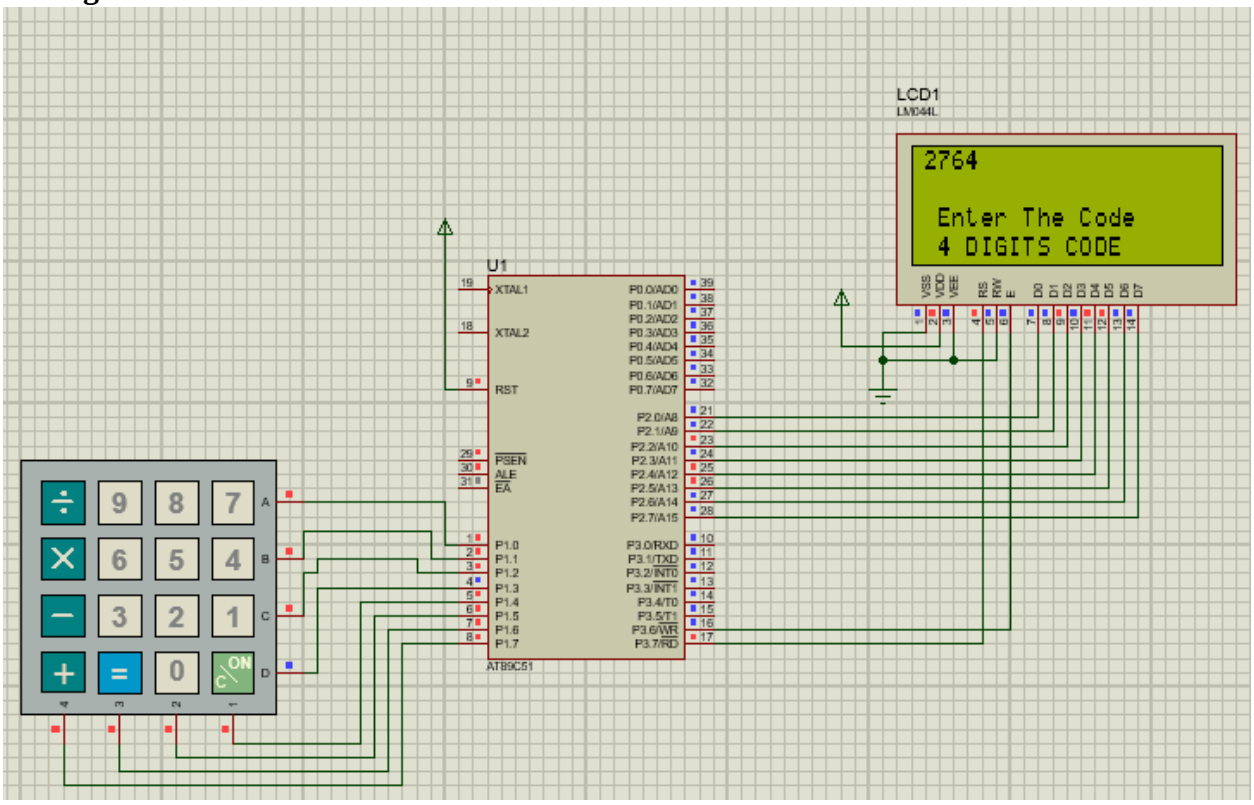
```
        if (C4 == 0) { delay(10000); while (C4==0); return '+'; }
        return 'n';             // Means no key has been pressed
}

char get_key(void)          //get key from user
{
        char key = 'n';             //assume no key pressed

        while(key=='n')             //wait untill a key is pressed
                key = READ_SWITCHES();   //scan the keys again and again
        array[key_count++]= key;

        return key;                 //when key pressed then return its value
}
```

## Output / Graphs / Plots / Results:

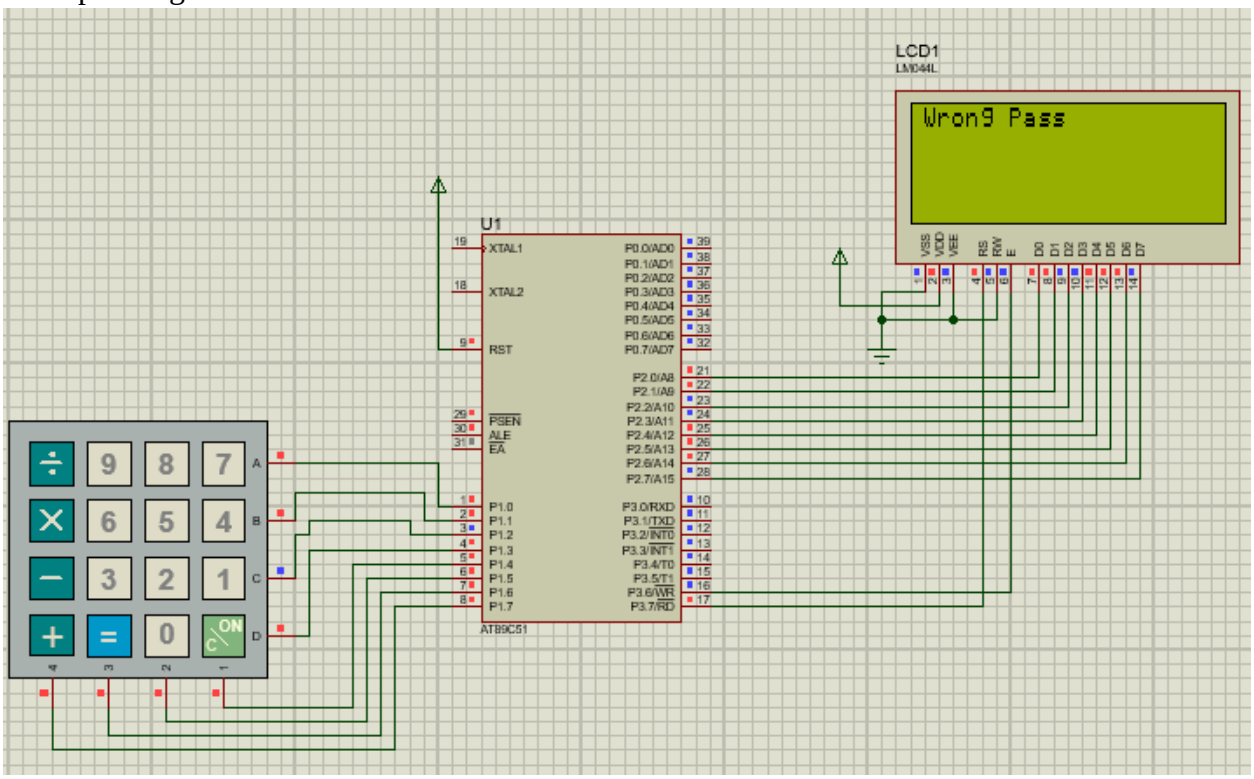
### Schematic:



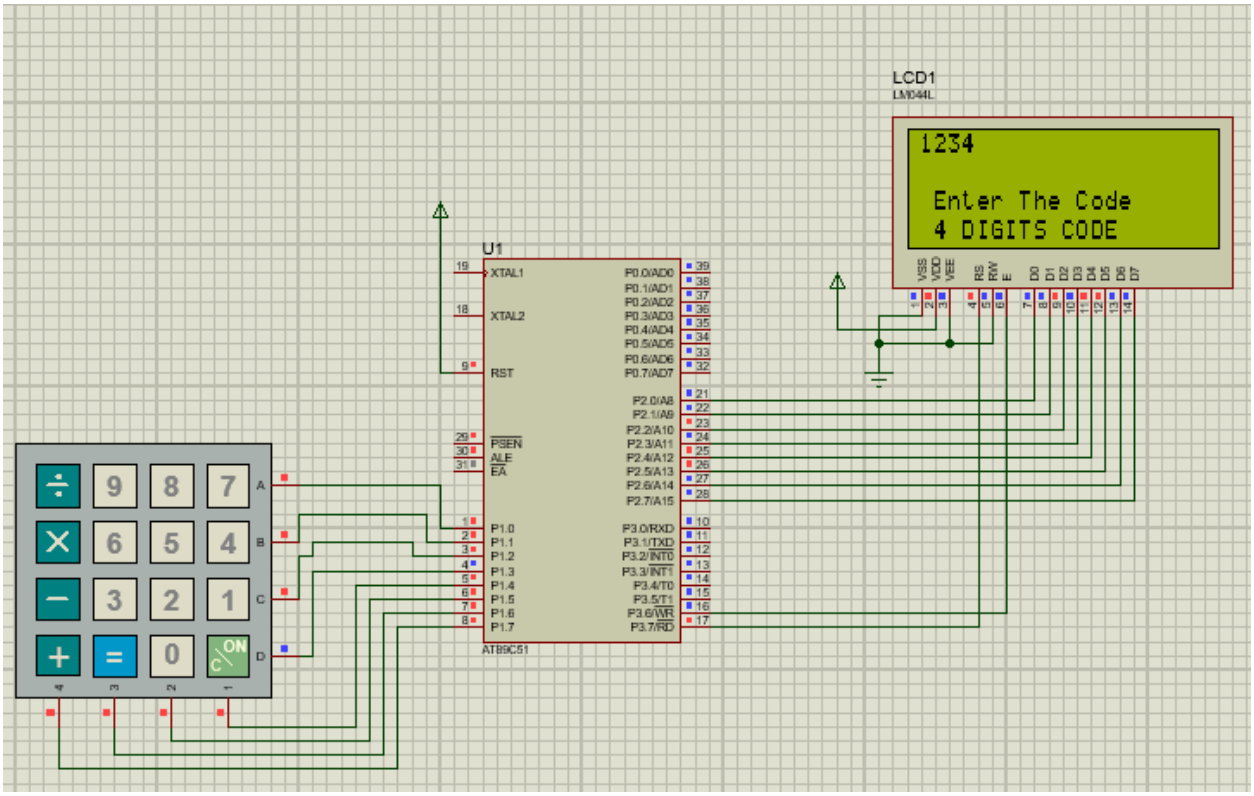
**Wrong Password:**




After pressing the = button:



**Correct Password:**




After pressing the = button: