

Microprocessor Systems and Interfacing

Lab Report

Lab05

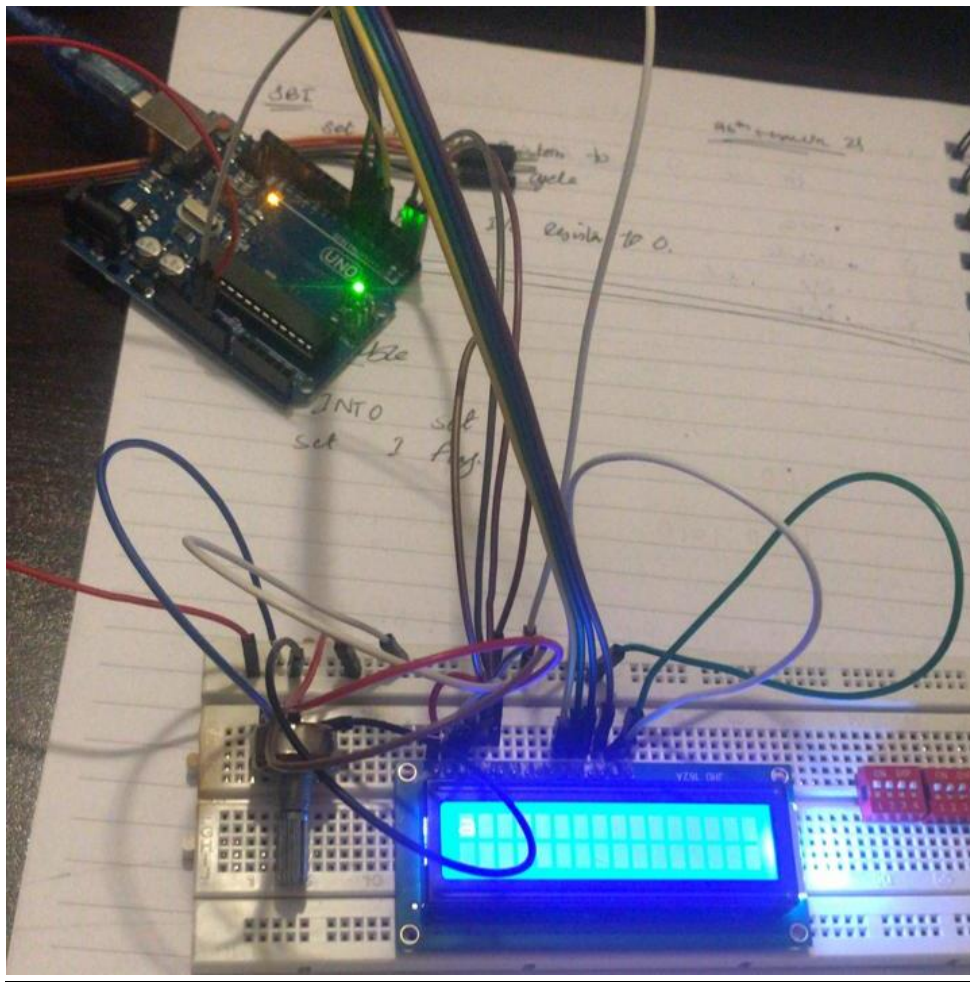


Group Members Name & Reg #:	<u>Muhammad Haris Irfan</u> (FA18-BCE-090)
Class	Microprocessor Systems and Interfacing CPE342 (BCE-6B)
Instructor's Name	Dr. Omer Ahmad

Pre-Lab Tasks

Task-1

Interface an LCD with Atmega328p (Nano/Uno) in the 4-bit mode. Bring the breadboard implementation to the Lab.



Task-2

Write a C function that reads an 8-bit value from a DIP switch and displays it on the LCD. Configure the port as input with pull-ups activated. Model and simulate the task shown in Figure 5.5 on Proteus.

Code:

```
#include <avr/io.h>
#define F_CPU 1000000UL
#include <util/delay.h>

int LCD_Send_Array(char * ptr);
void LCD_Send_Data( unsigned char data );
void LCD_Send_Command( unsigned char comm );
void LCD_init ();

int main()
{
    LCD_init();
    while (1)
    {
        LCD_Send_Data(PINB);
        _delay_ms(5000); //delay to wait before next read
    }
}

void LCD_init ()
{
    DDRD = 0xFF;
    DDRC = 0xFF;
    DDRB = 0x00; //
    PORTB = 0xFF; // For pull up
    _delay_ms(100);

    LCD_Send_Command(0x02);
    _delay_ms(2);
    LCD_Send_Command(0x28);
    _delay_ms(2);
    LCD_Send_Command(0x0C);
    _delay_ms(2);
    LCD_Send_Command(0x06);
    _delay_ms(2);
    LCD_Send_Command(0x01);
    _delay_ms(2);
}

void LCD_Send_Command( unsigned char comm )
{
    PORTC &=~(1<<PC0);
    PORTD = (PORTD & 0x0F);
    PORTD = (comm>>4);
    PORTC |= (1<<PC1);
    _delay_ms(2);
}
```

```

    PORTC &=~(1<<PC1);

    _delay_ms(100);
    PORTD = (comm & 0x0F);
    PORTC |= (1<<PC1);
    _delay_ms(2);
    PORTC &=~(1<<PC1);
}

void LCD_Send_Data( unsigned char data )
{

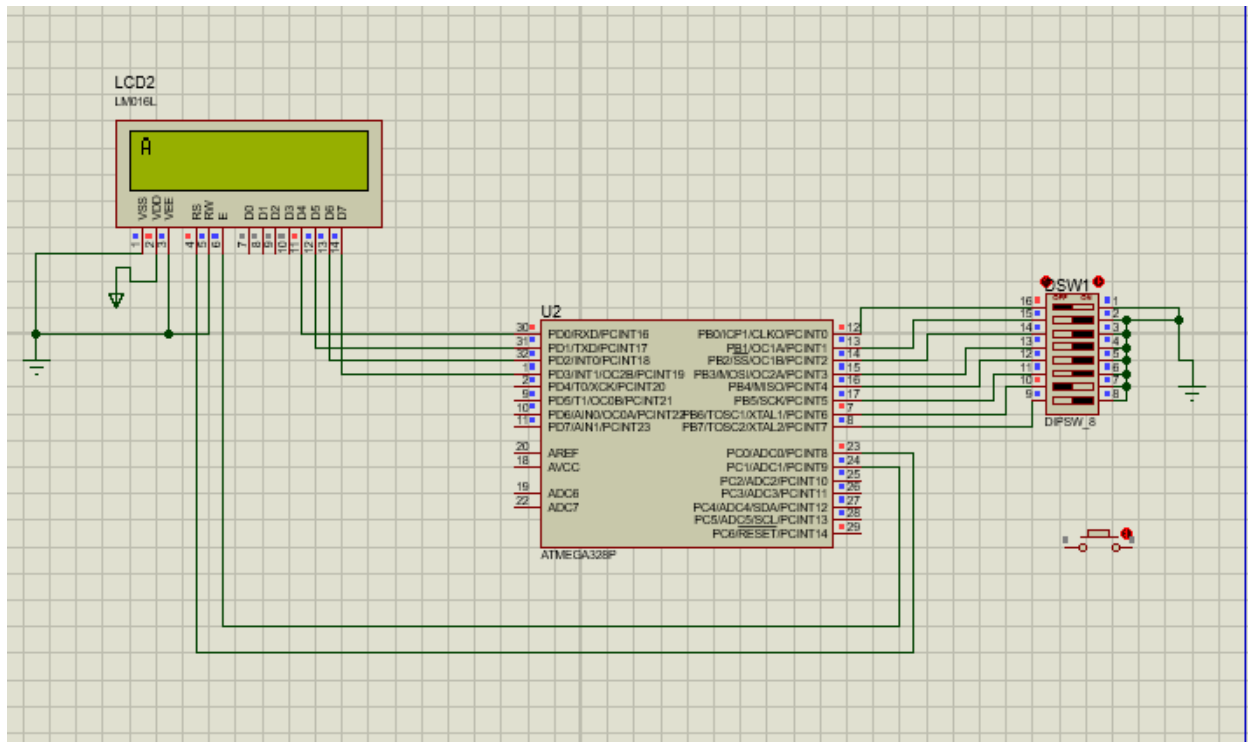
    PORTC |= (1<<PC0);
    PORTD = (PORTD & 0xF0);
    PORTD = (data>>4);
    PORTC |= (1<<PC1);
    _delay_ms(2);
    PORTC &=~(1<<PC1);

    _delay_ms(100);

    PORTD = (PORTD & 0xF0);
    PORTD = (data & 0x0F);
    PORTC |= (1<<PC1);
    _delay_ms(2);
    PORTC &=~(1<<PC1);
}

```

Simulation:

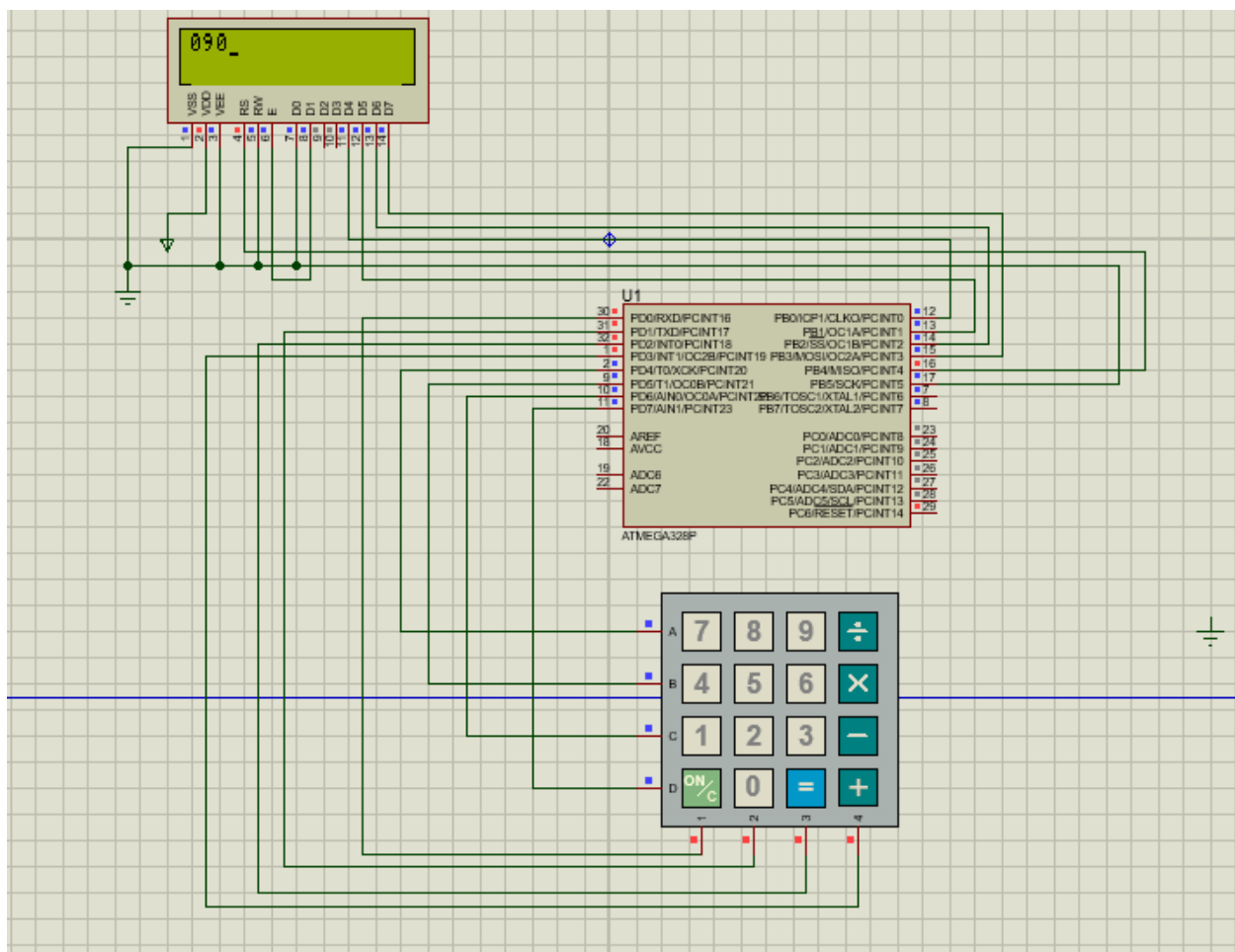


In Lab Tasks

Task 1:

For this task, you will need to display the key pressed on the keypad on a 16 x 2 LCD interfaced in the 4-bit mode. You may use the LCD interface software from the previous task.

Simulation:



Post Lab Tasks

Task 1:

Make a basic calculator with numeric addition, subtraction, multiplication and division. The user should be able to enter the operands and the operation using the keypad and the process and the results should be displayed on the LCD.

Simulation:

