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/*
 * EXP6.c
 *
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 * Author : athar
 */

//Experiment 6 To interface a 16x2 LCD (Liquid Crystal Display) with an AVR
//ATmega32 microcontroller and program it using the C language
//Name : Atharva Rajendra Joshi
//Batch : A2
//Roll No : 211049
//PRN no : 22311496
//Date of Performance : 10/03/2025

#define F_CPU 8000000UL
#include <avr/io.h>
#include <util/delay.h>

#define LCD_DATA_Dir DDRC
#define LCD_Command_Dir DDRD
#define LCD_Data_port PORTC
#define LCD_Command_Port PORTD
#define RS PD7
#define RW PD6
#define EN PD5

void LCD_Command(unsigned char cmd) {
    LCD_Data_port = cmd;
    LCD_Command_Port &= ~(1 << RS); // RS = 0 (Command mode)
    LCD_Command_Port &= ~(1 << RW); // RW = 0 (Write mode)
    LCD_Command_Port |= (1 << EN); // EN = 1 (Enable pulse)
    _delay_us(10); // Increased delay for stability
    LCD_Command_Port &= ~(1 << EN); // EN = 0
    _delay_ms(2);
}

void LCD_char(unsigned char char_data) {
    LCD_Data_port = char_data;
    LCD_Command_Port |= (1 << RS); // RS = 1 (Data mode)
    LCD_Command_Port &= ~(1 << RW); // RW = 0 (Write mode)
    LCD_Command_Port |= (1 << EN); // EN = 1
    _delay_us(10); // Increased delay
    LCD_Command_Port &= ~(1 << EN); // EN = 0
    _delay_ms(2);
}

void LCD_String(char *str) {
    int i;
```

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    for (i = 0; str[i] != 0; i++) {  
        LCD_char(str[i]);  
    }  
}  
  
void LCD_Init(void) {  
    LCD_Command_Dir = 0xFF; // Set command port as output  
    LCD_DATA_Dir = 0xFF;    // Set data port as output  
    _delay_ms(20);          // LCD power-on delay  
  
    LCD_Command(0x38); // Initialize LCD in 8-bit mode  
    LCD_Command(0x0C); // Display ON, Cursor OFF  
    LCD_Command(0x06); // Auto increment cursor  
    LCD_Command(0x01); // Clear display  
    _delay_ms(2);  
    LCD_Command(0x80); // Move cursor to first line  
}  
  
int main(void) {  
    LCD_Init(); // **This was missing**  
  
    while (1) {  
        LCD_Command(0x80); // Clear LCD  
        LCD_String("Atharva R Joshi");  
        LCD_Command(0xC0); // Move to second line  
        LCD_String("Roll No: 211049");  
        _delay_ms(1000);    // Add a delay for visibility  
    }  
}
```