```
/*
 * Filename: Lab1_IO.c
 * Version: 1
 * Created: 8/15/2023 9:23:56 PM
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Operations:
1-3: In this procedure the main objective of the code is to toggle LED13 on and off
repeatedly.
4: In this procedure PORTA is used as an output port for the 8 LEDs to create a sequence
that makes the LEDs turn on from right to left and then checks for the rightmost LED
before going back and turning each LED off individually.
5: In the final procedure the 8 LEDs are still used as outputs while the three
pushbuttons are used as inputs from PORTC. The first pushbutton is used to start the
sequence in part 4. The second pushbutton pauses that sequence and the third push button
is used to reset and turn off the 8 LEDs and wait for the first push button to be pressed
again in order to start the sequence again.

Hardware connection:
Atmega2560          Hardware:

Procedure 1-3:

PortB PIN7       LED13 Active high

Procedure 4:

PORTA            8 LED outputs

Procedure 5:

PORTA            8 LED outputs
PORTC            3 Pushbutton inputs

Other Comments:

*Each procedure was commented out in order once completed. However this define F_CPU
16000000UL and these libraries <avr/io.h> <util/delay.h> were kept throughout the entire
code.*

*////////////////////////////////////////////////////////////////////////////////

#define F_CPU 16000000UL
#include <avr/io.h>
#include <util/delay.h>

//Checkoff 1-3
void io_init(void) //initialize io ports
{
       DDRB=(0xFF); //LED 13 set as output
       PORTB=(0x80); //turn off LED at initialization
}

int main(void)
{
    io_init(); //initialize io and call function
    while (1)
    {
```

```
            PORTB ^=(0x80); //toggle pin 7 LED13 on and off
            _delay_ms(500); //time delay of 500ms
    }
}



//checkoff4
void io_init(void) //initialize io ports
{
       DDRA=(0xFF); //set PORTA as output
       PORTA=(0x00); // initial LEDs states are off
}

void LED_Sweep(); //function prototype for LED_Sweep

int main(void)
{
       io_init(); //initialize io
       while (1)
       {
              PORTA=(0x00); //turn off all LEDS at power up
              LED_Sweep(); //call LED_Sweep function
              if (PORTA & 0x01) //check if rightmost LED is on
              {
                     //repeat sequence when the right most LED is turned on.
                     PORTA=(0xFF);
                     LED_Sweep();
       }
       }

}

void LED_Sweep()
{
       // Turns on LEDs one at a time from right to left
       for (int i = 0; i < 8; i++) {
              PORTA |= (1 << i);    // Turn off LED at i
       //     _delay_ms(500);
       }

       //_delay_ms(500); //delay for when all LEDs turn on

       // Turns off LEDs one at a time
       for (int i = 7; i >= 0; i--) {
              PORTA &= ~ (1 << i);     // Turn on LED at i
              //_delay_ms(500);
       }
}



//checkoff 5
#define Start 01   //define and assign first push button
#define Pause 02   //define and assign second push button
#define Reset 04   //define and assign third push button

void LED_Sweep(); //function prototype for LED_Sweep
```

```
void io_init(void) //initialize io ports

{
	DDRA=(0xFF); //set PORTA as output
	PORTA=(0x00); // initial LEDs states are off

	DDRC = 0x00; //set PORTC as input
	PORTC = 0xFF; //enable push buttons
}

int main(void)
{
	io_init(); //initialize io
	uint8_t input_sw; //stores input switch status

	while (1)
	{
		input_sw = PINC & ( (1<<PC0) | (1<<PC1) | (1<<PC2)); //bit masking PORTC
for the pushbuttons

		if (input_sw & Start){ //starts LED sequence
			LED_Sweep(); //call LED_Sweep function
		}
	}
}


void LED_Sweep(void)
{
	// Turns on LEDs one at a time from right to left
	for (int i = 0; i < 8; i++) {

		{
			while (PINC&Pause) //pauses the LEDs sequence
			{
				//waits for pushbutton to be released after being paused
			}
		if (PINC&Reset) //resets LEDs
		{
			PORTA=0x00; //turns off LEDs
			break; //breaks out of loop
		}
		PORTA=(PORTA^(1<<i)); //moves Leds to the left
		_delay_ms(500);
		}
		PORTA |= (1 << i);    //shifts PORTA bits to the left by one
	_delay_ms(500);
	}

	_delay_ms(500); //delay for when all LEDs turn on

	// Turns off LEDs one at a time
	for (int8_t i = 0; i >= 8; i++) {

			while (PINC&Pause) //pauses the LEDs sequence
			{
				//waits for push button to be released after being paused
```

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                }

            if (PINC&Reset)// resets the LEDs
            {
                PORTA=0x00; //turns off all LEDs
                break; //breaks out of loop after restart.
                }
            }
            PORTA = (PORTA >> 1); // shifts PORTA bits to the right by one
            _delay_ms(500);
}
```