Introduction

The goal of this lab was to toggle an LED on/off in a microcontroller using the blue button on the same microcontroller of the LED we want to turn on/off. This Lab is designed to help us understand how to access the different types of registers of the microprocessor and how we can access and use different types of ports to "communicate" with each other by accessing the IDR register.

Functionality and Correctness

We first programmed the clocks to "on", for both the LED and blue button ports on the microprocessor. The LED we want to use is on Port A pin 5 (PA5), while the blue button is located on port C pin 11 (PC11). We then activated the registers for both ports that we needed so the LED and the blue button were "active". The next step was to get the blue and the LED to "communicate" with each other. To do this we used a while loop; inside the while loop is an if statement. In the if statement we used the IDR register for PC11. The condition of the if statement is if the button is pressed and the value is 0, then light up the LED by XNOR keyword (^) for the LED ODR value. We then made another while loop with same condition as the if statement and make it do nothing so the LED can be toggled. Overall, this method did work.

Pre-lab assignment

1) NO, you must reset first.

2b) Set the output type of PA 5 to push pull.

- Push-pull: 1(high/on), 0(ground/off)

The first thing to do is reset the second hex bit: OX 0000000 0 0

XXXX X X X X

Bit mask will be 2: 0010 (0x0000x

Invert the bit mask (2): 1101

Use the and operation on the second hex bit with the inverted bit mask:

$$\text{and} \quad \begin{array}{c} \text{X X X X} \quad \text{X X X X} \\ \text{1 1 0 1} \quad \text{1 1 1 1} \end{array}$$
___
$$\text{X X 0 X} \quad \text{X X X X}$$

now or the value with
the original bit mask

$$\text{or} \quad \begin{array}{c} \text{X X 0 X} \quad \text{X X X X} \\ \text{0 0 0 0} \quad \text{0 0 0 0} \end{array}$$
___
$$\text{X X 0 X} \quad \text{X X X X}$$

Bit mask is: 0X20   (0X00000020)
Bit Value is: 0X0   (0X00000000)

2c)

$$\text{0 0 0 0 0} \boxed{0} \text{0 0} \qquad \qquad \text{1 1 0 0}$$
$$\qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \uparrow$$

C inverted   reset: (Bit mask: 0XC0 0

$$\text{and} \begin{array}{c} \text{X X X X} \quad \text{X X X Y} \quad \text{X X X Y} \\ \text{0 0 1 1} \quad \text{1 1 1 1} \quad \text{1 1 1 1} \end{array}$$
___
$$\text{0 0 X X} \quad \text{X X X X} \quad \text{X X X X}$$
$$\text{or} \begin{array}{c} \text{0 0 X X} \quad \text{X X X X} \quad \text{X X X X} \\ \text{0 0 0 0} \quad \text{0 0 0 0} \quad \text{0 0 0 0} \end{array}$$
___
$$\text{0 0 X X} \quad \text{X X X X} \quad \text{X X X Y}$$

Bit mask: 0XC 00
Bit value: 0X0

3a   Bit mask: 0C00000
              value 0000000

3b   Bit mask 0C00000
              vale 0000000

Pre-lab 1

Flaco

Done

(20)
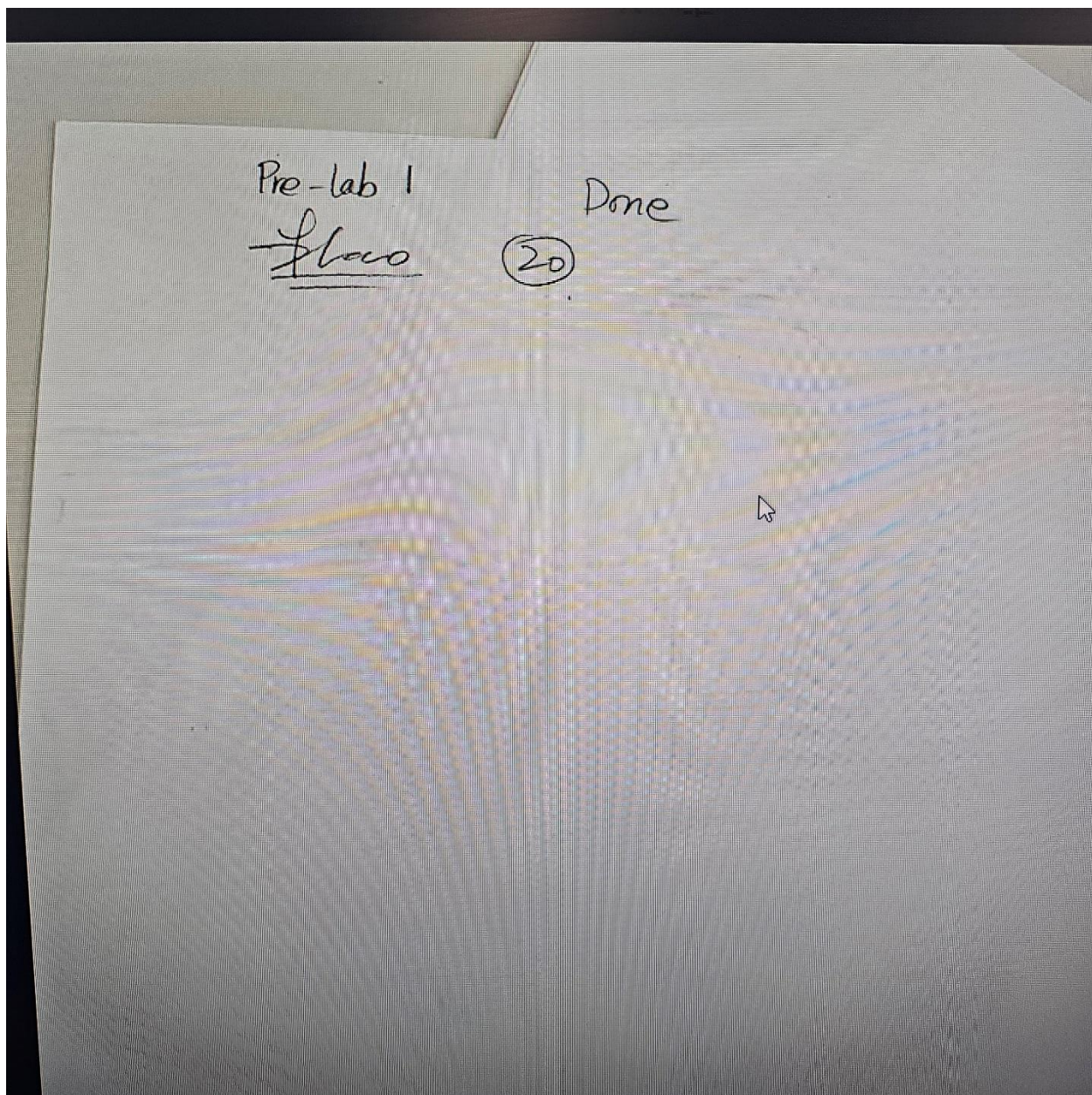
Post-lab assignment

Post-lab assignment for this lab is the conclusion.

Conclusion

Overall, the lab was successful. We made the LED light up and toggled it in the way it we were supposed to. I didn't have much difficulty for this lab. The while loops were a little difficult when first seeing it because we didn't understand how the IDR worked at first. But once we learned, the programming became more understandable.