Due on: December 29, 2022

Introduction to Microcomputers

Lab8: Implementing a Counter Using Buttons

The goal of this lab is to make use of the buttons connected to PORTB of the experiment board.

Assignment

In this project you will implement a simple counter that can be incremented, decremented or reset to 0 using 3 buttons connected to pins 3, 4 and 5 of PORTB. Recall that the buttons in PICSIM are connected to PORTB pins using pull-up resistors. That means that you read a digital 0 when the button is pressed, and a digital 1 if the button is not pressed. The counter will start at 0 and go up to 9. If the counter is incremented when its value is 9, it will roll over to 0. If the counter is decremented when its value is 0, it will go back to 9. Any time the reset button is pressed, the value of the counter becomes 0.

The first button (the button connected to PORTB3) will be used to increment the counter.

The second button (the button connected to PORTB4) will be used to decrement the counter.

The third button (the button connected to PORTB5) will be used to reset the counter.

The value of the counter will be displayed on the first SSD on the experiment board.

If more than one button is pressed at the same time, you must ignore all button presses. You only process button presses if only one button is pressed.

Here is the pseudocode for this project in C:

```
TRISB = 0xFF;       // All pins of PORTB in input mode
TRISA = 0x00;       // All pins of PORTA in output mode
TRISD = 0x00;       // All pins of PORTD in output mode
PORTA5 = 1;         // Select the first SSD (DISP4)
counter = 0;

while (1){
    If (button3 is pressed){        // Increment button
        If (counter == 9) counter = 0;
        else                counter++;

    } else if (button4 is pressed){  // Decrement button
       If (counter == 0) counter = 9;
       else                counter--;

    } else if (button5 is pressed){    // Reset button
      counter = 0;
    } //end-else

   PORTD = DigitBits[counter];

  If (any of the buttons is pressed)
    DelayMs(100);  // Wait for 100 ms before checking the button status again
} //end-while
```