Due on: November 10, 2022

**Introduction to Microcomputers**

**Lab3**

The goal of this lab is to emulate the looping constructs using PIC16F877A instructions.

**Assignment**

Zibonacci numbers are recursively defined as follows:

Zib(0) = 1;

Zib(1) = 2;

Zib(N) = (Zib(N-1) & 0x3f) + (Zib(N-2) | 0x05) for N>=2

Iteratively, the following C code can be used to compute the Nth Zibonacci number:

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| uint8\_t zib0 = 1;  uint8\_t zib1 = 2;  uint8\_t zib;  uint8\_t i = 2;  int N = 13;  for (i = 2; i <= N; i++) {  zib = (zib1 & 0x3f) + (zib0 | 0x05);  zib0 = zib1;  zib1 = zib;  } //end-for  // When we come here, zib contains the Nth Zibonacci number |

Here are the Zibonacci numbers from 2 to 13:

|  |  |  |  |
| --- | --- | --- | --- |
| **N** | **Fib(N) [Decimal]** | **Fib(N) [Hex]** | **Fib(N) [Binary]** |
| 2 | 7 | 0x07 | 00000111 |
| 3 | 14 | 0x0E | 00001110 |
| 4 | 21 | 0x15 | 00010101 |
| 5 | 36 | 0x24 | 00100100 |
| 6 | 57 | 0x39 | 00111001 |
| 7 | 94 | 0x5E | 01011110 |
| 8 | 91 | 0x5B | 01011011 |
| 9 | 122 | 0x7A | 01111010 |
| 10 | 153 | 0x99 | 10011001 |
| 11 | 152 | 0x98 | 10011000 |
| 12 | 181 | 0xB5 | 10110101 |
| 13 | 210 | 0xD2 | 11010010 |

Instead of computing just the Nth Zibonacci number and displaying the result on the LEDs connected to PORTD, you will display each and every Zibonacci number from 2 to 13 within the while loop on the LEDs, and wait for the user to press Button3 (RB3 on PICSIM) to move on to the next iteration of the loop. Also make a 250ms delay before checking if the button is pressed and moving on to the next iteration of the loop. Essentially, you will be implementing the following C code:

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| BANKSEL TRISB ; Select the Bank where TRISB is located (Bank 1)  TRISB = 0xFF ; Make all pins of PORTB as input pins  TRISD = 0x00 ; Make all pins of PORTD as output pins  BANKSEL PORTD ; Select the Bank where PORTB is located (Bank 0)  CLRF PORTD ; Turn off all LEDs  uint8\_t zib0 = 1;  uint8\_t zib1 = 2;  uint8\_t zib;  uint8\_t i = 2;  int N = 13;  for (i = 2; i <= N; i++) {  zib = (zib1 & 0x3f) + (zib0 | 0x05);  zib0 = zib1;  zib1 = zib;  PORTD = zib; ; Display the current Zibonacci number on the LEDs  DelayMs(250) ; Wait for 250ms  while (PORTB3 == 1) ; ; Wait for Button3 (RB3) to be pressed  } //end-for  while (1); ; Infinite loop |