

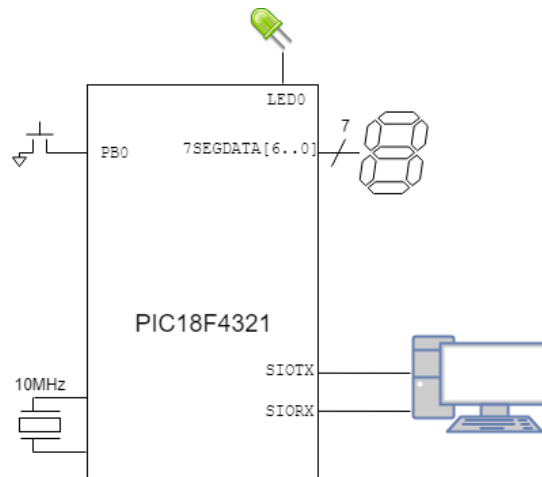
Session 1. Be cooperative my friend

Session objectives

1. Learn how to use the Timer ADT.
2. Learn how to program a microcontroller in C.

Statement

We have a PIC18F4321 with the following *hardware* connected:



The microcontroller must perform the following operations:

- At the beginning, the 7-segments display will show a "0". Each time a pushbutton is pressed (**with 20 ms. bounces**), it will increase in one unit the number shown and, when it reaches the number "9" it will show the number "0" again.
- Simultaneously, the LED0 must be displaying a **PWM** of frequency equal to 50Hz and duty cycle proportional to the number shown on the display (resolution of 2ms).
- Moreover, the microcontroller will be connected to a computer through a serial channel. The microcontroller will be always **listening to the serial** port waiting for an 'R' or an 'M', the rest of the characters will be ignored. When the 'R' character is received, the microcontroller has to store the value that is currently displayed on the 7-segment display. Then, the 7-segments display must show a '0' again. When the character 'M' is received, the last 10 stored numbers must be sent through the EUSART separated by a dash (-) and followed by the geometric average of those values. All the values must be sent in ASCII.

Example: if the 10 last stored values were 1,2,3,4,5,6,7,8,0,9; the microcontroller should send the following information when 'M' is received:

"1-2-3-4-5-6-7-8-0-9-0" (in ASCII)

The *baudrate* of the system must be 9600 bauds, you can choose the oscillation frequency of the microcontroller.

Steps

- 1- ADTs diagram of the system.
- 2- Dictionary.
- 3- Motor diagrams of the system
- 4- Implementation of the .c and .h files of the problem, checking if they work using the test board.
- 5- Check the cooperative uncertainty of your system (time that it takes between two consecutive calls of the same motor).