Programming Embedded Systems 2013 / JB

Exercise 2 / 22/24.1.2014 / Deadline for submitting report 3.2.2014

Return report electronically on address: https://abacus.abo.fi/ro.nsf. If you do not have an ÅA account, please email report to Åke Syysloiste <agustavs@abo.fi>.

Advisor/labs: Åke Syysloiste. Åke will be available during lab hours, at other times he can be found in room A5031.

Equipment and tools

Equipment used: Modtronix SBC65EC single-board computer
PC with Microchip MPLAB IDE / MCC18-compiler (both can be downloaded for free from microchip home page: www.microchip.com).

Task

Using the requirements from ex1, rewrite the program to support basic Embedded Operating System (EOS), by

- a) Minimize the code (i.e. remove code that is not needed)
- b) Rewriting software into tasks (and init-functions)
- c) Writing O-O embedded C-code
- d) Creating software delays by using programmable timers

Details

Tasks. Create tasks (~=functions) for

- e) blinking the led
- f) reading input from a input Pin (led stops blinking when key pressed)
- g) creating a variable delay (in ms), using timers

O-O embedded C-code means that software modules should be clearly divided into separate files / and functions. Settings specific for microcontroller / topic area should be separated in include (.h) files.

Programmable timers on the Microchip 18F6627. The microcontroller has 4 16/8 bit timers, which are programmable. The T0CON register controls the behavior. The TMR0L and TMR0H are the timer counter values (low and high bytes). The timers can be controlled for interrupts, but here only overflow (TMR0L/H == 0).

Datasheet for microcontroller: http://ww1.microchip.com/downloads/en/DeviceDoc/39646c.pdf

Registers for I/O:

 TRIS – register for controlling I/O-port direction

TRISBbits.TRISB6 = 0; // pin 6 on port B is set as output

 LAT – register: latch for output ports

```
    LATBbits.LATB6 = 1; // pin 6 on port B is set high
```

PORT – value on port (for reading input)

```
        myval = PORTBbits.RB6;
```

Note that register NAME-ADDRESS mapping is found in the via the "p18cxxx.h", which dependent on your architecture is mapped to the file representing the actual hardware (depending on precompiler definitions). In this case the file "18f6627.h", which is found in the MCC18 installation folder h-directory (often "c:\mcc18\h").

Note also that your "ports.h" file can (should) be written like this

```
#define RED_LED PORTBbits.RB6;
```

Document what you have done, and submit the documentation and the code you have produced electronically to the address give above.

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General rules for documenting projects:

Each report should include:

- Title
- Name
- Date / timeframe when exercise performed
- Group (if not done individually)
- Assumptions on knowledge of the reader
- Own contribution (if performed in group)
- Description of the task / exercise
- Description of the equipment used
- Description of performed work
- Achieved results