

# Programming Embedded Systems 2015 / JB

**Exercise 4** /16/20.2.2015 / Deadline for submitting report 6.3.2015

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](mailto:agustavs@abo.fi)>.

Advisor/labs: Åke Syysloiste. Åke will be available during lab hours, at other times he can be found in room A5035.

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## Equipment and tools

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

## Task

This time, we will go a step further, and implement the co-operative Embedded Operating system. We are also going to use the inbuilt A/D converter to read the ambient temperature using a Negative Temperature Coefficient (NTC) resistor.

Re-use the code from the previous exercise, but update it in the following way.

- Implement the interrupt driven co-operative EOS (i.e. scheduler / dispatcher) (lecture notes, set II)
- Create tasks
  - 1: Use the A/D converter on the board for sampling the NTC (Negative Temperature Coefficient) resistor on the daughterboard.
  - 2: Using the value read from the NTC, make the led (red / or yellow) blink with a frequency correlating to the A/D value read
  - 3: Check the buttons, enable / disable blinking by pressing a button

For both cases, figure out suitable intervals for running the two tasks.

## Registers for A/D on PIC18F6627

ADCON0 – register for controlling A/D conversion

Bit 5-2 : Select A/D channel

Bit 1: Start A/D conversion / is A/D conversion in progress

Bit 0: A/D module enabled / disabled

ADCON1 – register for controlling A/D

Bit 5-4 : Voltage reference

Bit 3-0: A/D port configuration bits

ADCON2 – register for controlling A/D

Bit 7 – Result format select

Bit 5-3 – A/D Acquisition time

Bit 2-0 – A/D clock source

### **General rules for documenting exercises**

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