

# Programming Embedded Systems 2016 / JB

**Exercise 1** / 18/19.1.2016 / Deadline for submitting report 1.2.2016

Return report electronically on address: <https://abacus.abo.fi/ro.nsf>. If you do not have an ÅA account, please email [jerker.bjorkqvist@abo.fi](mailto:jerker.bjorkqvist@abo.fi)

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## Equipment and tools

Equipment used:

- a) Texas Instruments LaunchPad **MSP430G2** development card
- b) Own laptop

## Objective

The objective of today is to set up the development environment and do some basic programming. The development tools used are GCC for building on Texas instruments.

## Task

The task is to implement a super-loop structured task in software. The Super-loop structured task should do the following:

- Switch the red led on the development platform on and off with internals of 1 second (the period of a on/off-cycle being 1 s)
- The delay should (in this exercise) be created using a delay loop
- Make an alternative; alternate between green and red led
- Find out on which hardware address the input of Port 1 on the microcontroller can be read; find also out which include file is used for the microcontroller

## Description

In order to build the software, we need a development environment. In this course, we use the GCC version for the MSP430 (alternative would be TI CodeComposer Studio, but we will stick to GCC).

GCC for MSP430 is available at TI home page, however; local versions are available

windows: <http://users.abo.fi/jbjorkqv/msp430-gcc-windows.exe>

linux: <http://users.abo.fi/jbjorkqv/msp430-gcc-linux.run>

Download and install in a directory of your choice <INSTALL\_DIR> in your laptop. In order to install drivers for USB connection; go to directory <INSTALL\_DIR>/emulation/drivers/msp430/DPIInst.

For details on how to use the compiler look on directory <INSTALL\_DIR>/docs.

1. Start by compiling the example file (note; on a windows machine, you need the tool “make” and make it available in the path, one easy one for windows is available at [users.abo.fi/jbjorkqv/make.exe](http://users.abo.fi/jbjorkqv/make.exe))
2. Execute the program – this is done by
  - a. Starting the debug agent (<INSTALL\_DIR>\bin\gdb\_agent\_console msp430.dat)
  - b. starting the debugger, using command “make debug”
  - c. In debugger
    - i. connect to device: > target remote :55000
    - ii. load program (> load)
    - iii. run program (> contiuene)
3. Verify that the blinking of led is OK

## NOTES!

1. The default software enables the watchdog timer in the device. Unless properly handled, the watchdog timer will reset the device every 2-3 seconds. To disable the watchdog timer, the watchdog control register WDTCTL is given value WDTPW|WDTHOLD.

Datasheet for uC can be found at [users.abo.fi/jbjorkqv/msp430g2553.pdf](http://users.abo.fi/jbjorkqv/msp430g2553.pdf)



## LaunchPad with MSP430G2553

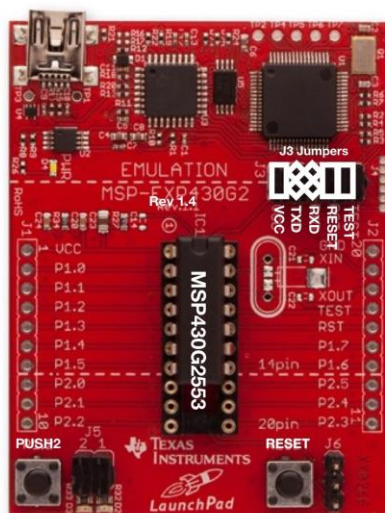
Revision 1.4

Flash 16 KB  
RAM 512 B

Serial	Hardware
ADC	10 bits

Use pins numbers only!

+3.3V				1
RED_LED		A0	P1_0	2
	RXD	A1	P1_1	3
	TXD	A2	P1_2	4
PUSH2		A3	P1_3	5
		A4	P1_4	6
	SCK (B0)	A5	P1_5	7
	CS (B0)		P2_0	8
			P2_1	9
			P2_2	10
temperature		A10		



Hardware	Pin number
µC	
Serial UART	
SPI	
analogRead()	
digitalRead() and digitalWrite()	
digitalRead(), digitalWrite() and analogWrite()	

20	P2_6			GROUND
19				XIN
18	P2_7			XOUT
17				TEST
16				RESET
15	P1_7	A7	SDA	MOSI (B0)
14	P1_6	A6	SCL	MISO (B0)
13	P2_5			GREEN_LED
12	P2_4			
11	P2_3			

GND
GND
+3.3V

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:**

Please note that we are using a learning journal in this course. The report of the labs will be parts of the learning journal. So please update your learning diary, and submit the lab reports in the new versions of the learning journal.

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