

Programming Embedded Systems 2017 / JB

Exercise 1 / 17/18.1.2016 / 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

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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

<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)

~~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 (> continue)~~

Alternative 2 (better...)

a) download the package users.abo.fi/jbjorkqv/mspdebug.zip

b) unpack into for instance folder c:\ti}

c) run the command (from command prompt (win+r → cmd))

mspdebug tilib

d) program using command

prog <path_to_.out-file>

run

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 MSP430 microcontroller can be found at



LaunchPad with MSP430G2553

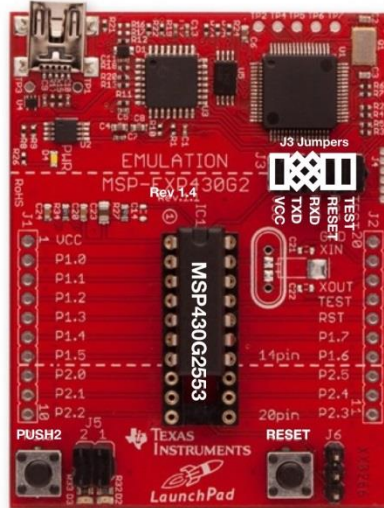
Revision 1.4

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			

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

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