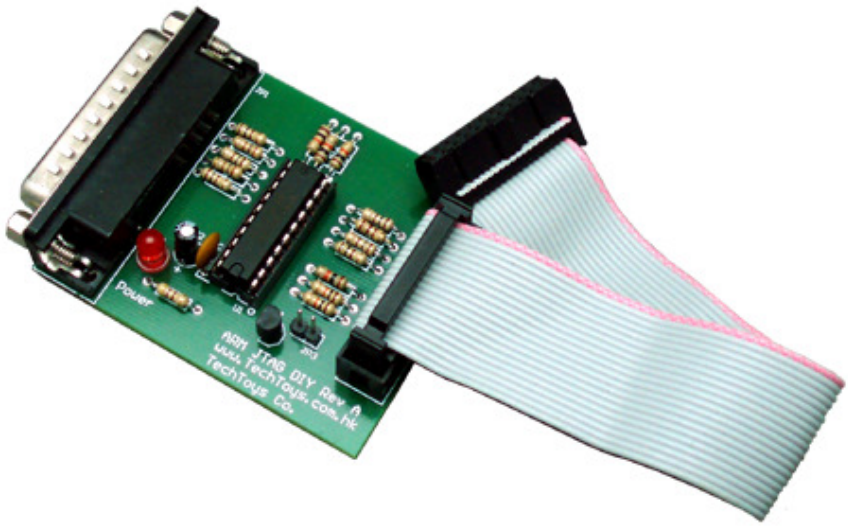
ARM JTAG DONGLE DIY

User Guide



INTRODUCTION

ARM JTAG DONGLE *DIY* is a wiggler-compatible JTAG board supporting RDI interface for ARM microcontrollers. It provides a low cost alternative for students or amateur engineers to debug and program ARM microcontrollers. This product is offered in unassembled form (Figure 1). However, only few components are required to finish the board so any averaged electronic engineer will be able to finish it within 5 minutes.

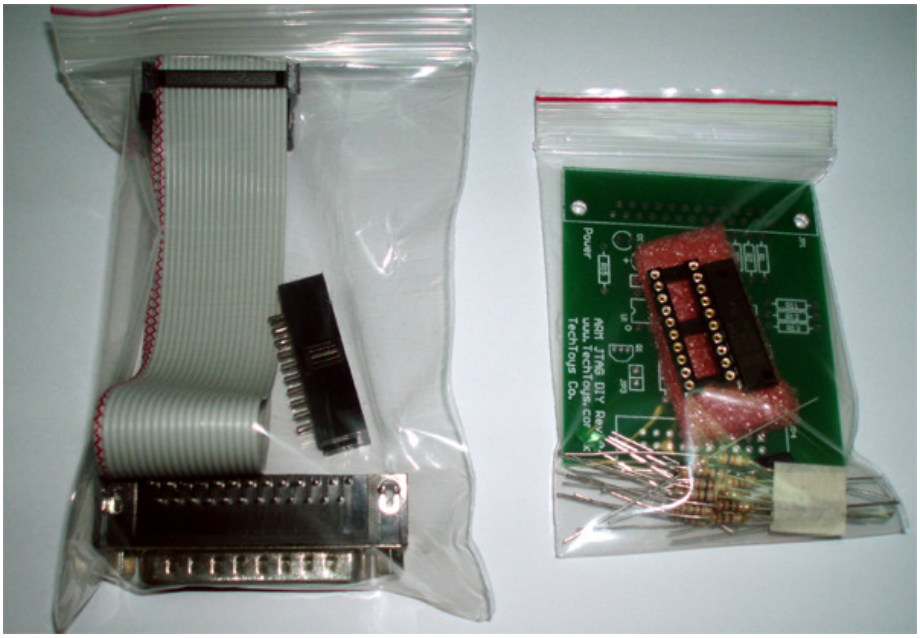


Figure 1 ARM JTAG DONGLE DIY

SOFTWARE

ARM JTAG DONGLE *DIY* is compatible with H-JTAG, a free JTAG debug agent for ARM. H-JTAG supports most of the popular debuggers, like SDT2.51, ADS1.2, REALVIEW and IAR. With the help of H-JTAG, you can debug all the ARM7/ARM9 based processors.

Web site of H-JTAG http://www.hjtag.com/index.html

H-JTAG package includes the H-JTAG server for connecting your PC to an ARM micro, and H-FLASHER will also be installed for programming different NOR flash and on-chip flash.

Manuals and operation instructions can be found under the H-JTAG web pages.

SETUP

Follow the schematic to finish the JTAG board. At one end, connect the DB-25 male port to the parallel port of your PC by a straight extension cable (not included). At the other end, connect the 20-pins flat cable (supplied with our package) from JTAG board to your evaluation board. Pin-out of the 20-pins flat cable is found under the schematic. Figure 2 shows the setup for our LPC2103 evaluation board as an example. Some ARM micros will check on the status of DBGSEL pin before entering debug mode. One needs to short this pin to high for debug. On LPC2103-Eval-1A it is the P5 jumper to short prior to a successful JTAG connection. Otherwise, the JTAG board will fail to halt the micro therefore failing to enter to debug state.

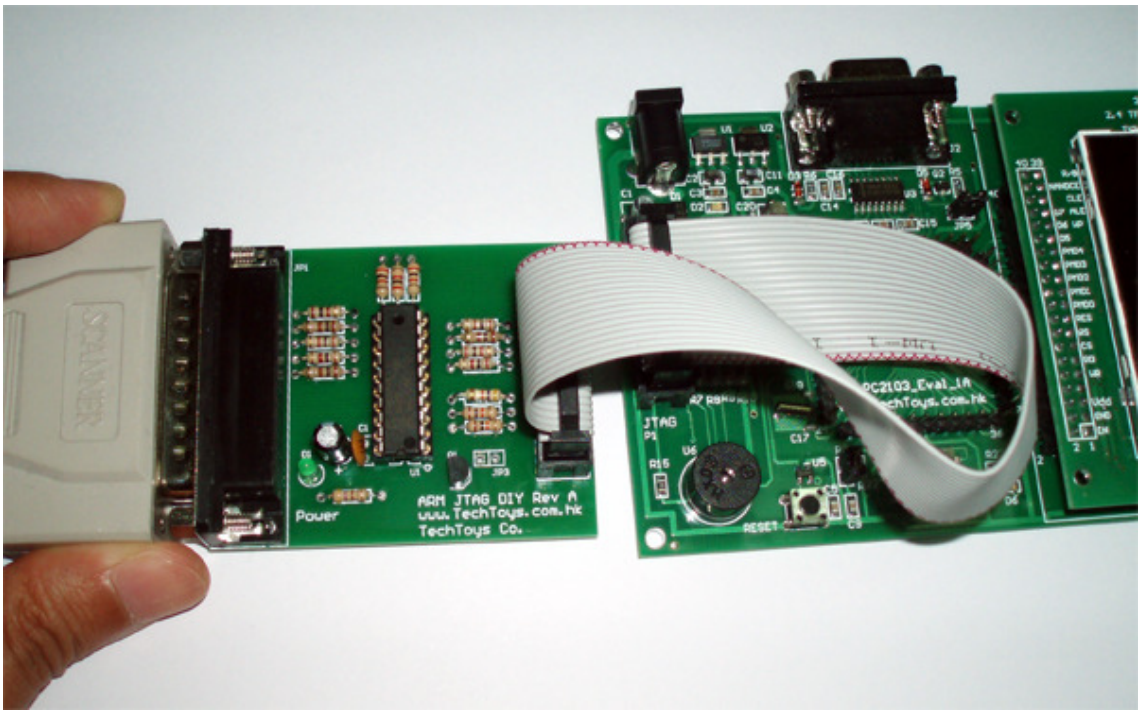


Figure 2 Connect ARM JTAG board to an ARM evaluation board via 20-pins flat cable

Apply power to the ARM evaluation board. There is no power supply for JTAG board because it draws power from the evaluation board. Launch H-JTAG software (Figure 3) to connect to the ARM microcontroller.

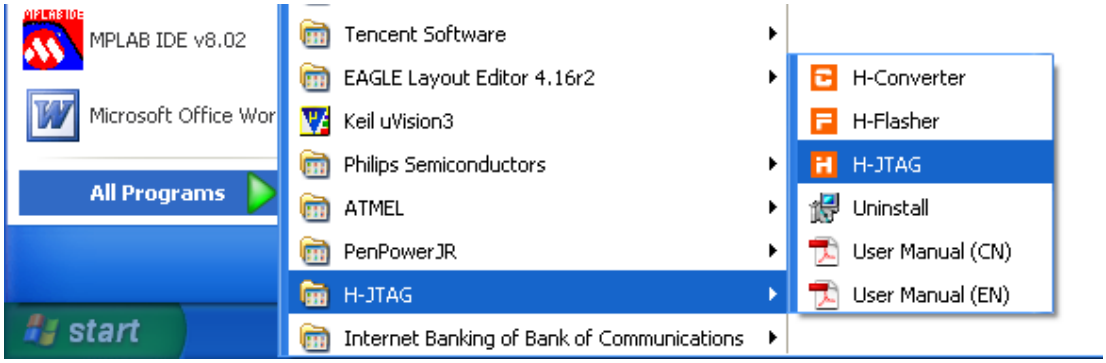


Figure 3 Launch H-JTAG software

H-JTAG Server automatically displays the IDCODE it detects. Different devices have different ID codes. For example, the code for LPC2103 is 0x4F1F0F0F.

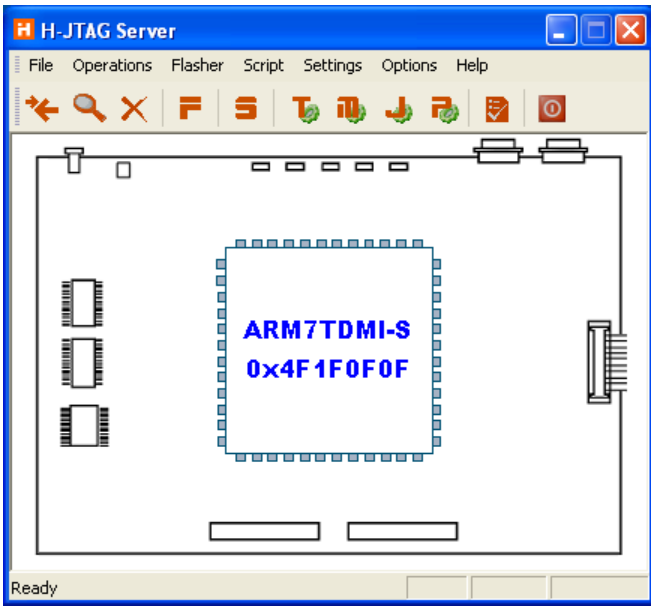


Figure 4 IDCODE for NXP LPC2103

If you are using Atmel's AT91SAM7S256, the IDCODE will be different.

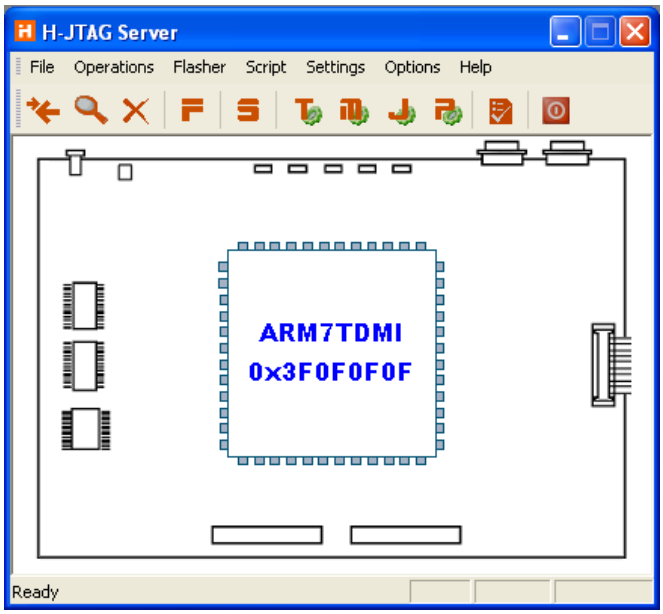


Figure 5 IDCODE for ATMEL AT91SAM7S256

Normally H-JTAG Server will automatically detect the interface and establish a connection. Just in case there is an error, go to ***Jtag Settings*** under ***Settings*** main menu to bring up the setup menu. Make sure Wiggler option has been selected with nTRST set to Pin2 D0. Try different values for TCK Speed for stability test. Finally, minimize H-JTAG Server. Don't close it.

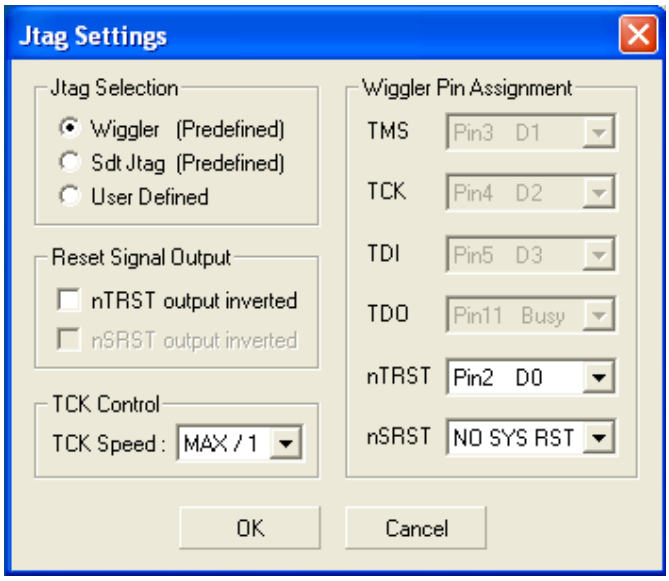


Figure 6 Jtag Settings

PROGRAM DEBUG

This example illustrates the procedure to debug under an evaluation copy of RealView which can be obtained after registration to Keil at https://www.keil.com/demo/eval/arm.htm. There is a 16KB program code limitation to this evaluation suite but it would be enough for a demonstration. For more details of operation, one may refer to the user guide of one of our evaluation boards for LPC2103 at the following web site.

http://www.techtoys.com.hk/ARM_boards/LPC2103_Eval_1A/LPC2103_Eval_1A.htm

Launch µVision3 to open the Blinky LED project for simplicity. It can be downloaded from the same web site above under Doc 04. Bring up the ***Options*** window and click on the ***Debug Tab***. Check ***RDI Interface Driver*** and click on ***Settings*** button. Please make sure the ***Run to main()*** checkbox and ***Load Application at Startup*** have been checked.

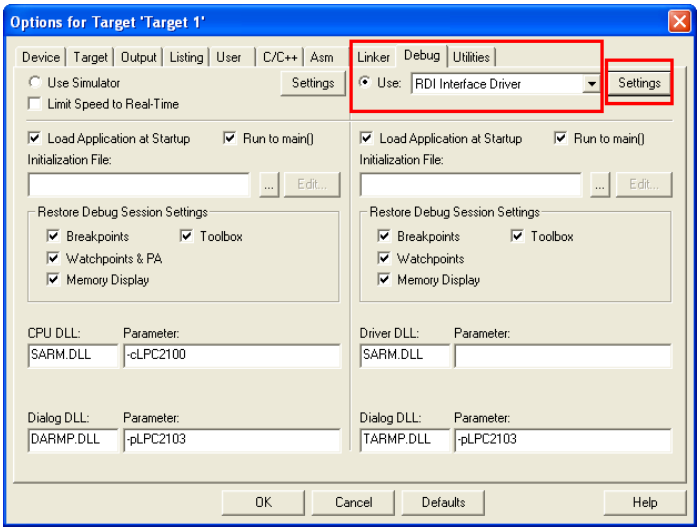


Figure 7 Use RDI interface for JTAG board

A click on ***Settings*** will bring up the window for ***RDI Interface Driver Setup***. Browse to H-JTAG.dll file which should have been installed under the H-JTAG server directory. The options ***Cache Code*** and ***Cache Memory*** are optional. Click ***OK*** to exit.

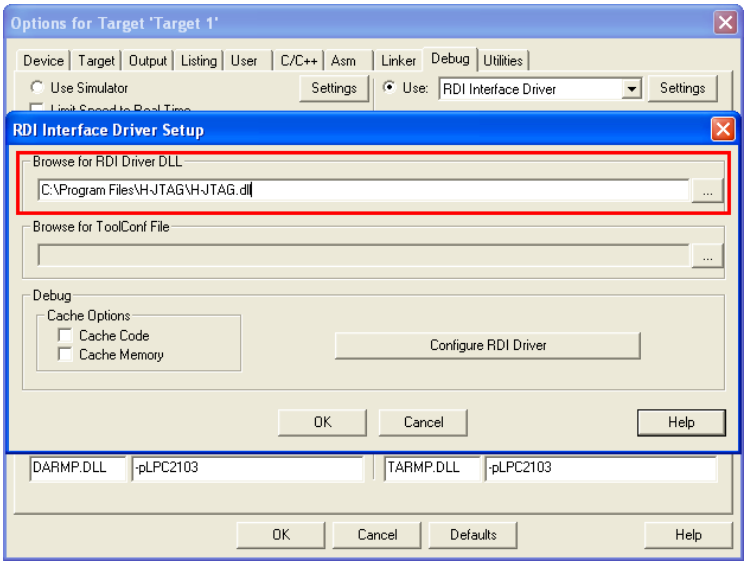


Figure 8 RDI Interface Driver Setup for H-JTAG Server

Click on ***Utilities Tab*** to bring up the flash programming option. We need to download the program to LPC2103 prior to debug. Check the option ***Use External Tool for Flash Programming*** since we are using H-Flasher for download. Browse to H-Flash.exe and check ***Run Independent*** option.

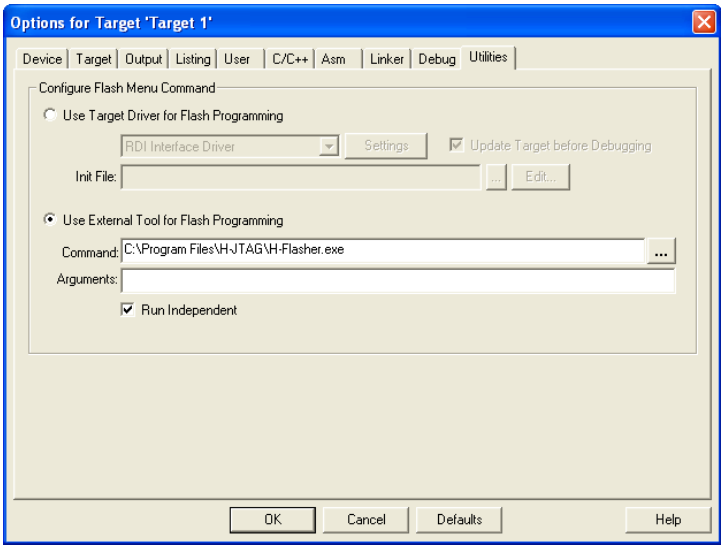


Figure 9 Use External Tool for Flash Programming

Click ***OK*** to exit the configuration window and go back to main menu. First, under ***Flash***, click ***Download***.

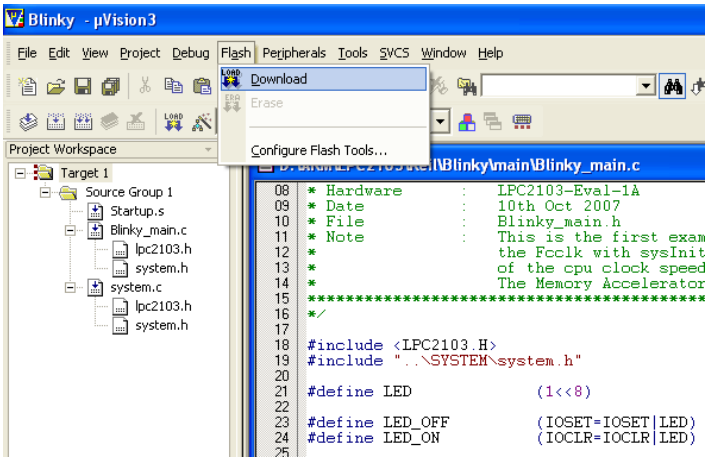


Figure 10 Prior to debug, download the program first

This action will bring up the H-Flasher application automatically for you. Highlight ***Flash Selection*** at the left, and choose your target chip, NXP→LPC2103 in this case.

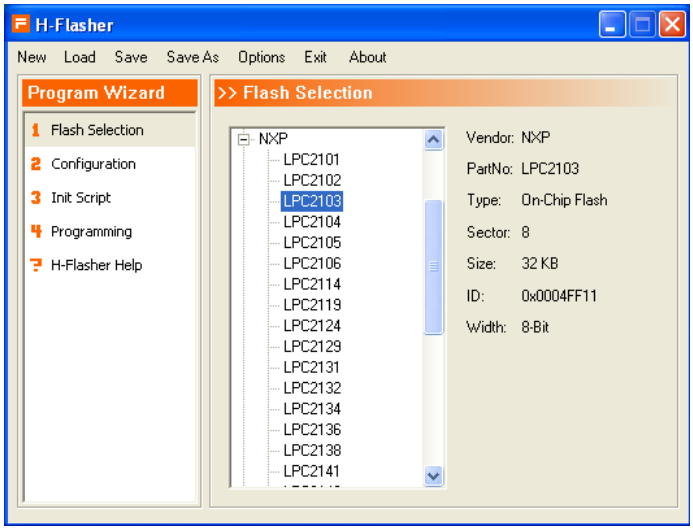


Figure 11 H-Flasher user interface

Highlight ***Programming*** at the left, and a click on ***Check*** button on the right side near the top section will detect the microcontroller. It is to the right of ***Src File*** text box, click on the browse (…) button to search for your target hex code, in my case it is under D:ARM\LPC2103\Keil\Blinky\Blinky.hex.

Please make sure the correct file has been selected. Once everything has been set, click on ***Program*** button to download the hex code to LPC2103. You may also perform other task like erase, blank check, and confine programming region from the pull-down manual below. This H-Flasher application can run independently therefore it serves as a stand-alone programming tool for ARM micros out of zero cost!

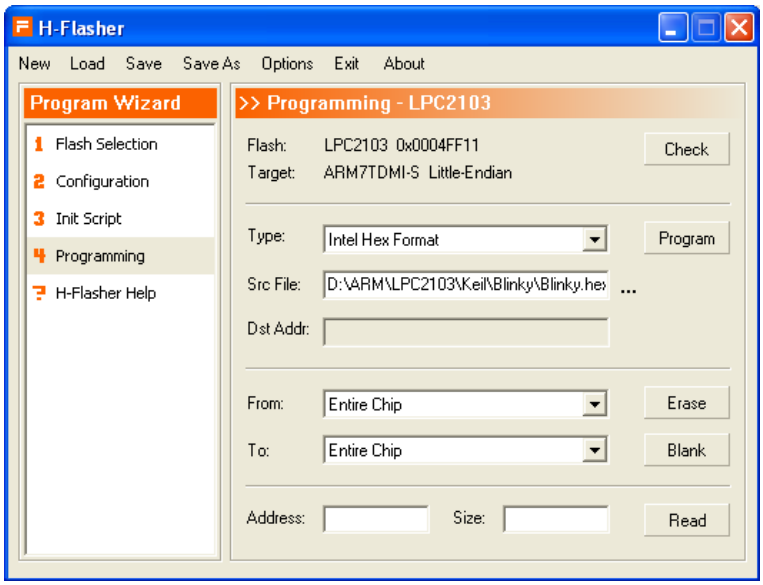


Figure 12 H-Flasher programming

After finished, minimize the H-Flasher application. Go back µVision3, under ***Debug→Start/Stop Debug Session*** or ***Ctrl+F5*** for short key to start debugging. You will see the debug window with registers R0-R15, CPSR, and SPSR which are the core of ARM microcontroller at the left panel. A cursor will stop at the first statement which is sysInit() in this case because the ***Run to main()*** option has been checked under the Debug option. Otherwise program stepping will begin from the startup code Startup.s assembly file. It may be a good chance to step through it to know what happen before main(void) is executed. Out of curiosity, just uncheck the ***Run to main()*** option and start all over again (no H-Flasher download required) to repeat the process but this time, Startup.s is stepped through.

Press F10 to step over each statement and observe the LED with LED_ON, LED_OFF stepped over. It will be switched on and off under your control.

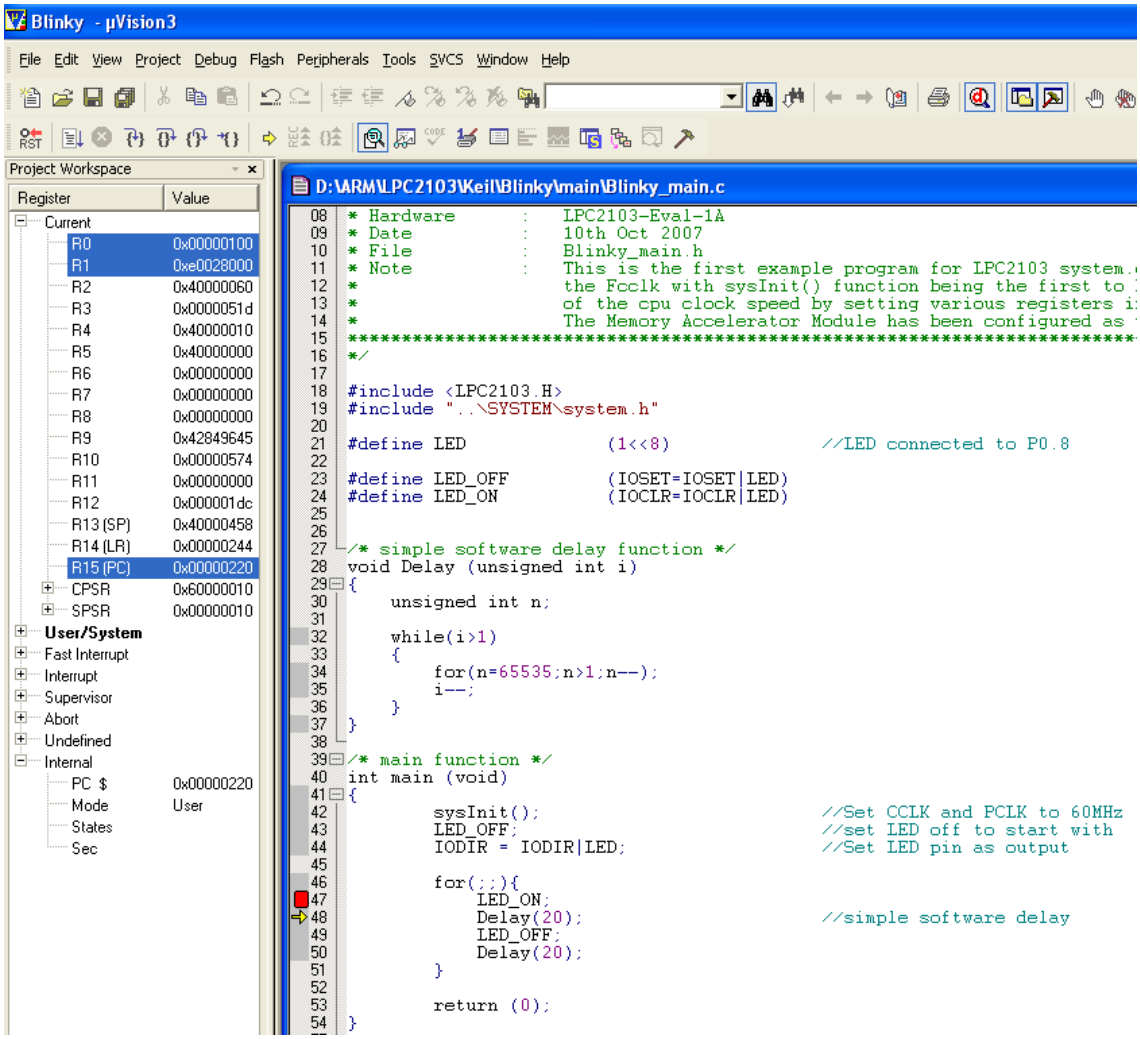


Figure 13 Keil µVision3 debug window