University of British Columbia
Electrical and Computer Engineering
Electronics Laboratory
EECE 284

The P89LPC9351 Microcontroller System

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Introduction

This guide shows you how to compile, download, and run programs into the P89LPC9351 microcontroller system. The P89LPC9351 is a modern derivative of the classic 8051 microcontroller developed by Intel in the early 1980's. Instructions on how to assemble the microcontroller system can be found in the document "Soldering the EECE281 Board".

## Writing, Compiling, and Downloading Code to the Microcontroller System.

a) Download and install CrossIDE from the course webpage.

b) Run CrossIDE, and create a new C file. Add the code listed below. Tip: You may as well cut and paste from this document!

```c
#include <p89lpc9351.h>

void delay(void)
{
    int j, k;
    for(j=0; j<100; j++)
    {
        for(k=0; k<1000; k++);
    }
}

void main(void)
{
    P2M1=0;
    P2M2=0;
    while(1)
    {
        P2_1=0;
        delay();
        P2_1=1;
        delay();
    }
}
```
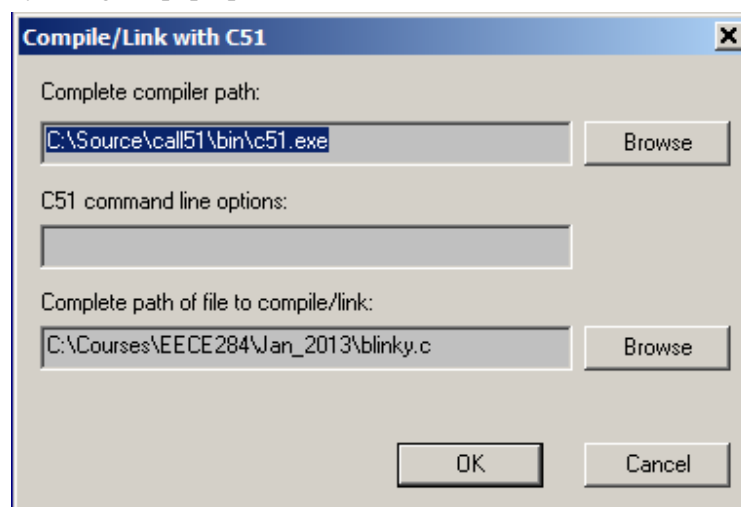
c) Attach a red LED to P2.1 of the P89LPC9351 microcontroller. The LED circuit is shown below.

VCC=5V

P89LPC9351

P2.1

1kΩ
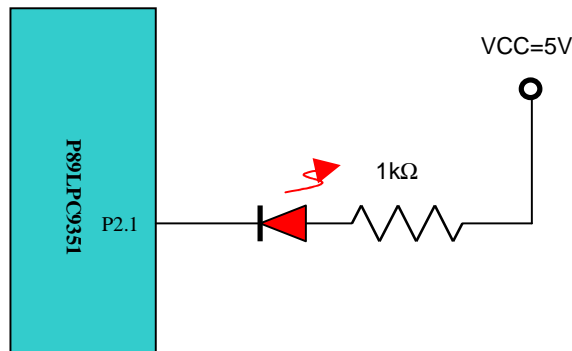
d) Compile and link the program using C51. In Crosside click "Build", then "Compile/Link with C51", you'll get a pop-up like this one:

Compile/Link with C51

Complete compiler path:

C:\Source\call51\bin\c51.exe   Browse

C51 command line options:

Complete path of file to compile/link:

C:\Courses\EECE284\Jan_2013\blinky.c   Browse

OK   Cancel

Make sure the complete path of c51.exe is correct and then click ok. c51.exe is located in the same folder where you installed Crosside, in a sub-folder called "call51\bin". If everything went well and you did not get any errors, the compiler should have created the file 'blinky.hex':

```
------- CrossIde - Compiling/Linking -------
C:\Courses\EECE284\Jan_2013\blinky.c:1: Compiling/Linking...
done
```

The HEX file is what we download to the microcontroller system. If you get any errors, they will be reported directly into CrossIDE. Fix them, and try compiling again.

e) To download the code to the microcontroller system we will be using CrossIDE's built-in flasher. Before you do that, attach the DB9 connector of the microcontroller system to the computer using a serial cable. Also, apply 9V to the voltage regulator as shown in figure 1. Then put the microcontroller in boot-load mode by: a) pressing and holding the BOOT button, b) pressing the RESET button, c) releasing the RESET button, and finally d) releasing the BOOT button. On CrossIDE click "fLash" followed by "Atmel AT89LP Bootloader". You get a pop-up window like this one:
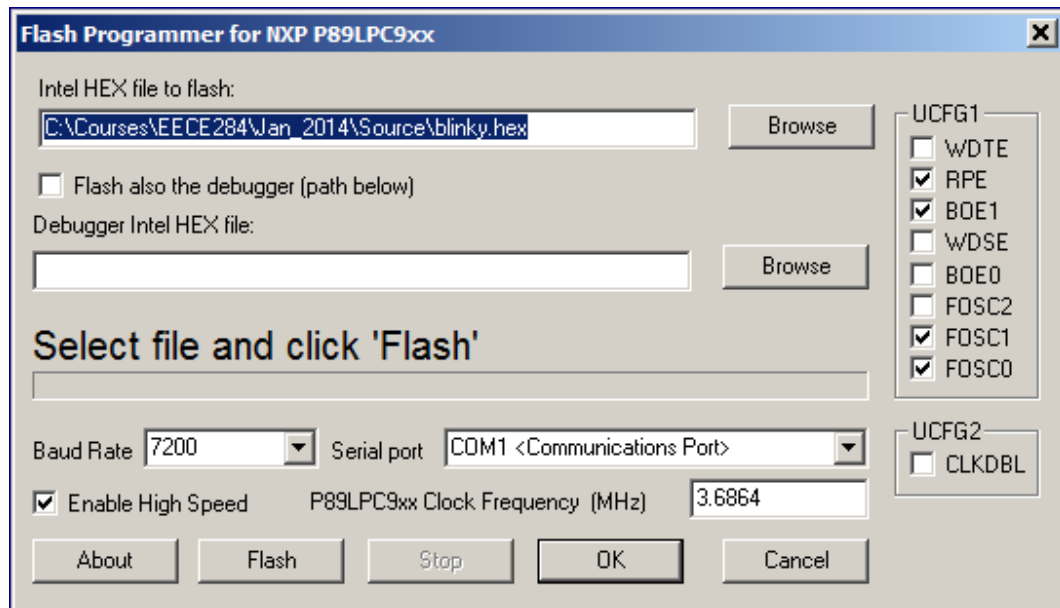
Select the HEX file created by the compiler, and click "Flash".   Wait for the process to complete.
After that, press the RESET button. The LED should be blinking now.