

EECS 100/43

Lab 9 – PIC Input-Output (I/O)

1. Objective

In this lab, you will simply hook up the output from the strain gauge circuit you designed the previous week to the PIC microcontroller.

2. Equipment


- a. Breadboard
- b. Wire cutters
- c. Wires
- d. Oscilloscope
- e. Function Generator
- f. Power supply
- g. PICDEM 2 Plus demo board
- h. MPLAB ICD 2 (InCircuit Debugger)
- i. MPLAB IDE installed on lab computer¹
- j. Various connectors for power supply, function generator and oscilloscope.
- k. **YOUR STRAIN GAUGE CIRCUIT**

3. Theory

a. Downloading the sample project

In this section, you download the digital code to your microcontroller board. Since you did not cover digital systems in lecture, all the code is already done for you. All you need to do is uncomment the A/D code for interfacing the strain gauge.

1. Download the StrainGauge project folder from the EE100 labs homepage (the same project you used for lab 8). Save this to your U: (network) drive. **DO NOT SAVE THIS ONTO YOUR DESKTOP. FILES SAVED ONTO YOUR DESKTOP ARE AUTOMATICALLY DELETED WHEN YOU LOG OFF!!**

2. Navigate to your folder and double-click on  icon. A window similar to figure 1 will pop up.

 StrainGaugeInterface.mcp
Microchip MPLAB Project
2 KB

¹ Note: The microcontroller programming tools are installed in 140 Cory ONLY for ease of maintenance

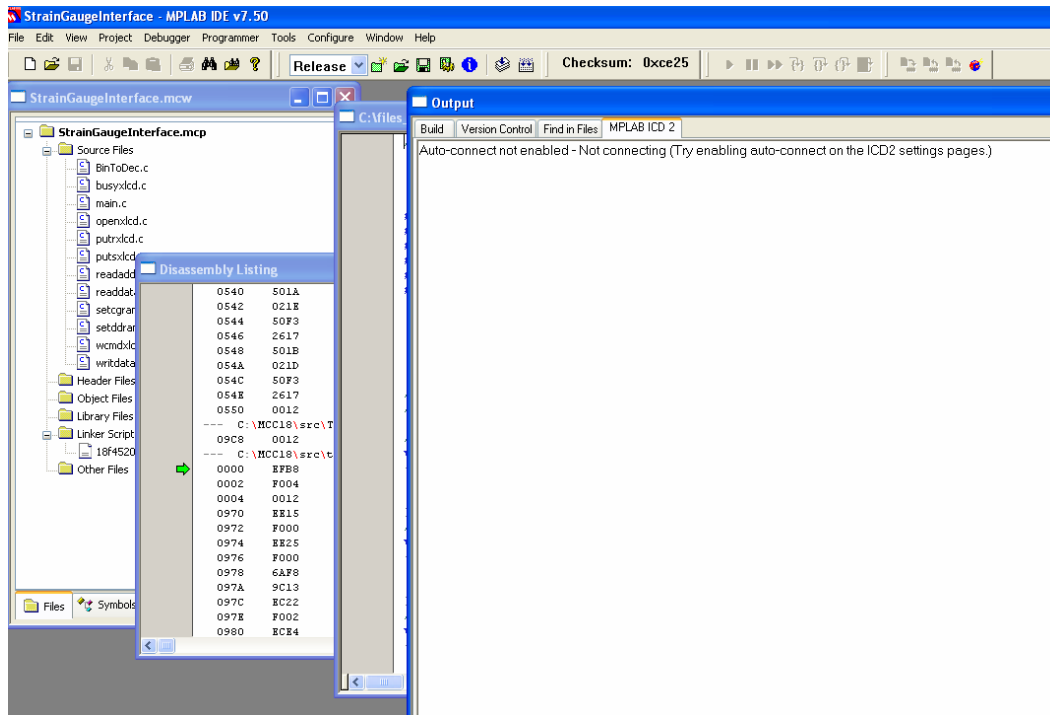


Figure 1. MPLAB IDE has opened your Strain Gauge project

3. Now, double click on main.c in the StrainGaugeInterface.mcp window. The main program should pop up. Look through it. Find the line that displays VOLTMETER. Replace this with STRAIN READING:
4. Next, you need to comment out the voltmeter reading code. These are the first two lines after void main(void) line. The default code is shown below. You should be able to use this code to figure out how to comment out those lines.

```
void main( void )
{
    TRISA=0xFF; // Configure AN0 as input. This is default
    ADCON0=0x41; // configure ADC to receive signal from AN0
    .....
```

5. Uncomment the lines for interfacing an external signal (in this case your sensor reading) to your PIC board. These are the lines immediately after the lines you commented out in 4. above.

```
//TRISE= 0x02;
//ADCON0 = 0x59; //configure ADC to receive signal from
// AN6 (RE1)
.....
```

6. You should debug the program before downloading it to the board. To do this: Click on Debugger→Select Tool. Make sure MPLAB ICD 2 is selected. Refer to figure 2.

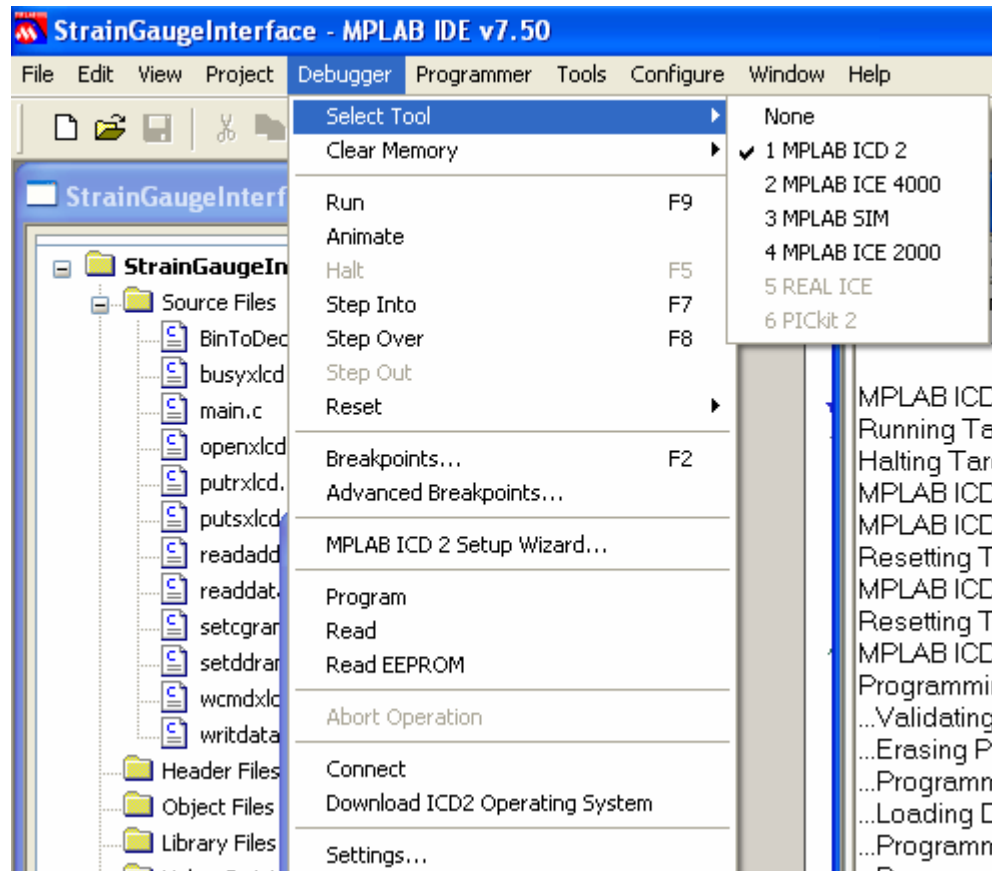


Figure 2. Make sure MPLAB ICD 2 is selected as the debugger

7. The debugger should ask you to download an operating system to the board. Defaults are OK for everything. Before you connect to the board, **MAKE SURE THE BOARD IS POWERED ON AND CONNECTED TO THE ICD2 DEBUGGER. MAKE SURE THE DEBUGGER IS CONNECTED TO THE COMPUTER (check with a TA).** Next, connect to the board: Debugger→Connect.
8. Build your program. Select Project→Build All
9. Program the board with your code: Debugger→Program.
10. Run the program: Debugger→Run.
11. If all goes well you should see the LCD screen display your strain gauge reading.
12. If you are satisfied that your program is working, you can “permanently” download code to EEPROM². First, halt debug mode: Debugger→Halt.
13. Select Debugger→Select Tool→None. You cannot use the programmer and the debugger at the same time.
14. You pretty much repeat the same process for programming as debugging: Select Programmer→Select Tool→MPLAB ICD 2.
15. Select Programmer→Connect
16. Select Programmer→Program

² EEPROM: Electrically Erasable Programmable Read Only Memory

17. Select Programmer→Release from Reset.
18. Power off the board and power-on again. Your code will start running again.

4. PRELAB **NAME:** _____ **/SECTION** _____

Please turn in **INDIVIDUAL COPIES** of the prelab. They are due **10 MINUTES** after start of lab, **NO EXCEPTIONS!**

a. TASK 1: THOROUGHLY READ THIS DOCUMENT!
(YES, THIS PRELAB IS A GIMME)

PRELAB COMPLETE: _____ **(TA CHECKOFF)**

5. REPORT NAME(S): _____/SECTION _____

a. TASK 1: PROJECT COMPLETE.

TA Checkoff: _____

**TURN IN ONE REPORT PER GROUP AT THE END OF YOUR LAB SESSION.
THERE IS NO TAKE HOME REPORT.**

6. REVISION HISTORY

Date/Author	Revision Comments
Summer 2007/Bharathwaj Muthuswamy	Typed up source documentation, organized lab report, typed up solutions.