Microprocessors B (17.384)

Spring 2011

Lecture Outline

Class # 05

February 22, 2011

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Today's Lecture

- Administrative
- Microcontroller Hardware and/or Interface
- Programming/Software
- Lab
- Homework

Course Admin

Administrative

- Admin for tonight …
  - Syllabus Highlights
    - Lab #1 is due Tonight (February 22nd)
    - Lab #2 is due March 22nd … ***Changed***
      - I want you to get Lab #1 back as well as some additional time to work on the Lab
  - We shall finish Lab #2 this week
  - ***Exam #1 is in two weeks … March 8th***
  - NO lecture … ***Lab only***

Syllabus Review

Week	Date	Topics	Lab	Lab Report Due
~~1~~	~~01/25/11~~	~~PIC pin out, C programming, Watchdog Timer, Sleep~~		
~~2~~	~~02/01/11~~	~~General-purpose IO, LED/switch IO, FSM~~	~~1~~	
~~3~~	~~02/08/11~~	~~Lab~~	~~1 con't~~	
~~4~~	~~02/15/11~~	~~Interrupts, Timers, interrupt-driven IO~~	~~2~~	
5	02/22/11	Lab	2 con't	**1**
6	03/01/11	Asynchronous and Synchronous Serial IO (UART, I^2C, SPI)	3	
7	03/08/11	**Examination 1**		
X	03/15/11	**No Class – Spring Break**		
8	03/22/11	Lab	3 con't	**2**
9	03/29/11	Serial EEPROM operation, DAC, DC motor control, Servos, Stepper motor control	4	3
10	04/05/11	Lab	4 con't	
11	04/12/11	Advanced Hardware Topics	Project	4
12	04/19/11	**Examination 2**		
13	04/26/11	Work on Course Project	Project	
14	05/03/11	Final Exam/Course Project Brief and Demonstration	Demo	

Chat Page

- Still looking into what is available through the school
  - More to follow as it develops

Microcontroller Hardware and / or Interfaces

Additional Info on Prior Topics …

Configuration Word …

Configuration Word

- Thus far …
  - We have been using MPLAB to set the configuration word
- The following can be placed in the software …

```
_FBS(BWRP_WRPROTECT_OFF);
_FGS(GSS_OFF & GCP_OFF & GWRP_OFF);
_FOSCSEL(FNOSC_FRC & IESO_OFF);
_FOSC(FCKSM_CSECMD & IOL1WAY_OFF & OSCIOFNC_ON & POSCMD_NONE);
_FWDT(FWDTEN_OFF & WINDIS_OFF & WDTPRE_PR128 & WDTPOST_PS512);
_FPOR(FPWRT_PWR16 & ALTI2C_OFF);
_FICD(JTAGEN_OFF & ICS_PGD1);
```

Configuration Word

- **The following slides provide a detail as to what each configuration statement is doing**

Configuration Word … continued

- _FBS(BWRP_WRPROTECT_OFF);
    - // Write Protect Disabled
- _FGS(GSS_OFF & GCP_OFF & GWRP_OFF);
    - // Code protect off, Code protect Disabled, Write Protect Disabled
- _FOSCSEL(FNOSC_FRC & IESO_OFF);
    - // Fast RC oscillator, Two-speed Oscillator Startup Disabled

Configuration Word … continued

- _FOSC(FCKSM_CSECMD & IOL1WAY_OFF & OSCIOFNC_ON & POSCMD_NONE);
    - // Only clock switching enabled, Single configuration for remappable I/O Disabled, OSC2 Pin function Digital I/O
- _FWDT(FWDTEN_OFF & WINDIS_OFF & WDTPRE_PR128 & WDTPOST_PS512);
    - // Watchdog Timer Disabled, Windowed WDT Disabled, Watchdog prescaler 1:128, Watchdog postscaler 1:512

Configuration Word … continued

- _FPOR(FPWRT_PWR16 & ALTI2C_OFF);
    - // Power-on Reset Value 16 ms, Alternate I2C Pins I2C mapped to SDA1/SCL1
- _FICD(JTAGEN_OFF & ICS_PGD1);
    - // JTAG is disabled, ICD communication channel select bits communicate on PGC1/EMUC1 and PGD1/EMUD1

Additional Info on Prior Topics …

PICkit 2 …

PICkit 2 Connection

- With the PICkit 2 connected to J1 on your breadboard …
  - When you "program" the PIC24HJ32GP202 …
    - You MUST perform the following in MPLAB …
      - Select >>> *Programmer*
      - Then select >>> *Release from Reset*
  - This will cause the PICkit 2 to stop asserting a MCLR
    - The program can then function … with the PICkit 2 still attached

Parallel Input / Output (PIO) Configuration …

Parallel Input / Output (PIO) Configuration

- Lab #1 code …
  - RB13 … input … switch
  - RB14 … output … LED

```
/************ PIO config ***********/

_ODCB13 = 0;              // Open drain disabled
_TRISB13 = 1;             // Config RB13 as input
_PCFG11 = 1;              // Config RB13 (AN11) for digital mode
_CN13PUE = 1;             // Enable weak pull-up on RB13


_ODCB14 = 0;              // Open drain disabled
_TRISB14 = 0;             // Config RB14 as output
_PCFG10 = 1;              // Config RB14 (AN10) for digital mode
_LATB14 = 0;              // RB14 initially low
```

Programming/Software

Programming/Software

- No topics for discussion

Lab

Peer Review of Software …

Peer Review of Software Developed

- How did you write your code?
- What problems did you encountered?
- Any questions that you need resolved?

Lab #2 …

Lab #2

- Update current Lab #1 programs such …
  - That we use Timers
  - And use Interrupts

Next Class

Next Class Topics

- Asynchronous and Synchronous Serial Input / Output
  - UART
  - I^2C
  - SPI
- Lab #2 Start/continue

Homework

Homework

- Read …
  - Material for next week's lecture …
    - Chapter 10, pages 367 – 437
- Study for Exam #1 … in two weeks (March 8th)
- Labs …
  - Code development for Lab #2
  - Lab #2 Report … due March 22nd

Time to start the lab …

Lab

- **Continue Lab #1, if needed**
- **Start Lab #2**

White Board …

References

References

1. None