ECEN 4613/5613  Embedded System Design  Week #9  
Spring 2006  Homework #9  3/15/2006

This assignment should be completed by Wednesday, March 22nd. **Note: there is nothing to hand in for this assignment.** In this homework assignment, you will explore:

- Serial EEPROMs
- I²C

The required reading for this assignment is available on the course web site.

1. Read pages 1-8, 12, 13 of Microchip Application Note AN536 "Basic Serial EEPROM Operation" and skim the rest.

2. Read Microchip Application Note AN551 "Serial EEPROM Solutions vs. Parallel Solutions".

3. Read the first 4 pages of Fairchild Application Note AN-794 "Using an EEPROM - I²C Interface".

4. Read the data sheet for the NM24C16 Serial EEPROM.
   
   (a) Why is a dummy write required prior to a random read?

   (b) Why is acknowledge polling (ACK polling, or busy polling) used with serial EEPROMs?

   (c) During a page write operation, what happens if more than 16 bytes of data are sent to the EEPROM from the master?

   (d) During a page write operation, what happens if 16 bytes of data are sent to the EEPROM from the master, but the transfer starts at an address in the middle of a page?

   (e) During a sequential read from an NM24C16, what happens if 2050 bytes are read starting at address 0?

5. Read Microchip Application Note AN709 "System Level Design Considerations When Using I²C Serial EEPROM Devices".

   (a) How can an internal EEPROM reset be forced by using software?

   (b) Why would this be important?

6. Determine what I²C software you will use for your development environment. If you are using MICRO-C, this could be the built-in MICRO-C I²C functions or it could be I²C code found elsewhere on the web. If you are using SDCC, it will be code from the web - refer to the Notes on SDCC document for more information.

   
   (a) What data rates are supported by I²C?

   (b) If two devices start communicating simultaneously, is the transmission lost due to bus contention? Briefly describe how bus arbitration works.

   (c) What determines the minimum and maximum values of the pull-up resistors used on SCL and SDA?

8. **[Optional]** Review the Maxim application note "Comparing the I²C Bus to the SMBus".
   
   - What are the major differences between I²C and SMBus?