Homework

This assignment should be completed by Wednesday, February 5th. **Note: there is nothing to hand in for this assignment.** In this homework assignment, you will explore:

- External memory interfacing, EPROMs and SRAMs
- Logic families

The majority of the assigned reading will be available on the course web site in PDF format.

**NOTE:** You should always try to use the data sheet provided by the manufacturer of the exact part that you are using in your circuits, since there can be differences between manufacturers of similar chips—even standard chips, such as the 74LSxx TTL logic family members.

1. Review the final project assignment, available from the course web site.

2. Read pages 1–18 of Philips application note AN457 "80C51 External Memory Interfacing". While you're reading it, keep in mind that the processor on the board that you will build will be running at 11.0592MHz, a significantly lower speed than 33MHz. Take time to understand the timing diagrams and what each of the minimum and maximum timing specifications really means. Take a few minutes and review the timing diagrams in the C501 or 80C51 product specification. Remember that during a read cycle, the peripheral chip (EPROM or SRAM) is driving the data bus, while during a write cycle, the processor is driving the data bus.

3. Obtain and read the following EPROM-related documents:
   - Data sheet for the AMD Am27C256 (32Kx8) EPROM
   - Technical note "Programming AMD's CMOS EPROMs"

   Determine how you would hook up the EPROM to the 80C51. Get a basic understanding for how EPROMs work, and how you would program and erase an EPROM. Think about how you would design a circuit to program an EPROM. These documents are also available at the AMD web site: http://www.amd.com/ (see EPROMs under the Flash Memory/Technical Resources link).

4. Obtain and skim the data sheet for the Hitachi 62256 (32Kx8), Samsung K6T0808C1D, or Winbond W24257 SRAM. Determine how you would hook it up to the 80C51. Compare the SRAM pinout to the EPROM pinout. Note that the package used in this class is the 28-pin DIP.

5. Understand how each of the following LS TTL chips works. The data sheets are available on the course web site, but you may also want to store them on a floppy disk or on your PC.
   - 74LS00, 74LS02, 74LS04, 74LS08, 74LS138, 74LS156, 74LS244, 74LS245, 74LS373, 74LS374

6. **[Optional]** Review a logic book or visit a web site such as one of the following and explore logic families. While you're at the chosen web site, explore a little and try to understand some of the differences between the different logic families (e.g. LS, S, ALS, FAST, HCT, etc.). Note the differences in supply voltages, and input and output voltages of some of the different devices. Using the information from the data sheets or from a text book, compare the fanout, propagation delays, signal transition times, and power consumption of at least three of the families. Think about the advantages and disadvantages of using each of the particular families you examined.
   - ON Semiconductor: http://www.onsemi.com/ (formerly Motorola logic)
   - Toshiba: http://www.toshiba.com/taec/
   - Philips: http://www.philipslogic.com/products/
   - Fairchild: http://www.fairchildsemi.com/