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Lab02: Breadboard Wiring and External Switches and
LEDs

ESE280-L03

Bench #3

1. The microcontroller circuit's functionality when Lab02_2PB1LED_1.hex is loaded is different from its functionality when Lab02_2PB1LED_2.hex is loaded, even though the hardware is the same. What important attribute of an embedded system does this illustrate?

The important attribute of an embedded system is that the system is able to code a program.

2. A digital computer is a synchronous sequential system and, therefore, requires a system clock. Where is the system clock in this microcontroller circuit?

The UPDI is the clock system in the microcontroller circuit.

3. What is the purpose of the resistor in series with the LED?

If there is no resistor between the LED and voltage source, the current will burn the LED. The purpose is to reduce the voltage at a point where the voltage is enough to light the LED.

4. Assuming that the forward voltage drop across the LED is 2.0 V when the LED is ON, compute the current through the LED?

The current is $I = V / R$. $I = 2.0 / 10k = 0.0002A$ is going through the LED.

5. Using either Window's Notepad or Editpad editor, view the hex file for Lab02_2PB1LED_1.hex. Based on information from prerequisite reading item 2, determine how many instructions are in the program? Assume that each instruction in the program is one word (two bytes) long. Explain how you made your determination.

There are 2 instructions are in the program. Because only second and third line contain the data and the code that contains the data is the actual instruction of the program.

6. Using either Window's Notepad or Editpad editor, view the hex file for Lab02_2PB1LED_1.hex. Based on the information from prerequisite reading item 2, determine the machine code (in hexadecimal) for the first four instructions in the program. Assume that each instruction in the program is one word (two bytes) long. Explain how you made your determination.

So the first two digits is the record length, the next four digits are Load offset which is the address, the next two digits are the record type, the next thirty-two digits are the Info or data, and the last two digits are the checksum.

7. When the program is executed why does the LED sometimes flicker ON then back OFF, or OFF then back ON, when you change the positions of the pushbuttons?

For the first file, the code illustrates a XOR logic gate and the second file code illustrates an OR logic gate. This is why when you press the buttons in different combination, the output is shown by the LED.