MAS.S66
Problem Set 3
Due: 10/01

This problem set is intended to give you experience working with electronics and understanding what goes into an electronics product. Please complete 2 of the 3 following problems (your choice):

1. Create a document that outlines the major functional blocks of your product concept. This should include any enclosure, electronics, or mechanisms. For each of these of sections, be as detailed as you can. For example, if you are making a wireless speaker system, you will want to include a Bluetooth receiver, a power amplifier, a speaker, and a power supply source (switching powersupply, battery, etc.). For each of these subsections, get an estimate of how much power they consume, and how much they will cost. From this you can create a rough estimate for the whole product. These sorts of "ballpark" estimates are very useful in the early design stages to gauge whether your idea is possible or not.

2. Find a used or broken product which is similar to your idea, and do a full teardown of it. open it up, and list out all of the parts inside. Find the cost of the parts you can identify and make guesses for others. How does this cost breakdown compare to the sale price for this product?

3. Build a 5V powersupply and light up some LEDs. You will have to find a datasheet for the 7805 regulator to complete the assignment. The work can be done in the Resenv lab area.

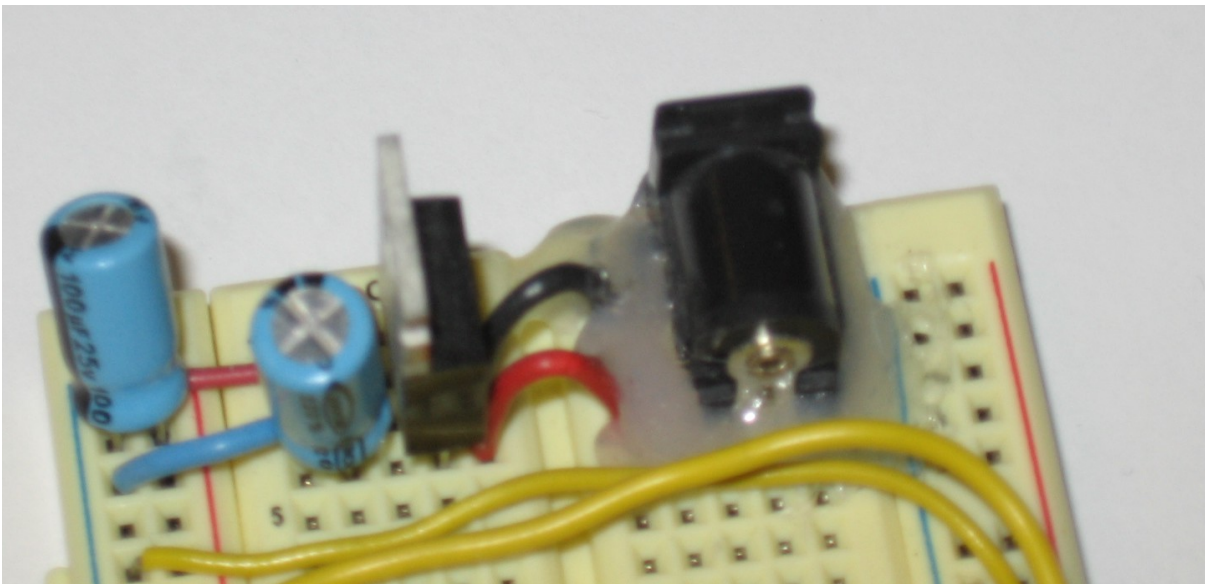
Please answer the questions below and turn in a written copy in class on the due date. At lab you will be provided a schematic and the following:

1 protoboard
1 power supply/wallwart
1 power jack
2 0.1uF capacitors
2 100uF/25V capacitors
1 7805 voltage regulator
1 green LED
1 red LED

A. Place the power jack into the protoboard, and run 2 wires from its power pins to an open section on the protoboard. Next, hotglue the power jack in place. There are 3 pins on the power jack, be sure you get the right 2, and that the polarity is correct. You can

check this with your multimeter. You will want to make sure it is correct before hotglueing it in place. What is the voltage coming out of your powersupply? is this AC or DC? can the 7805 handle this level of input voltage?

B. Build a 5V powersupply on your protoboard using the 7805, 100uF, and .1uF capacitors. The final assembly should look like this (0.1uF capacitors not shown):



If you were to connect a 100ohm resistor between 5V and ground, how much current would be flowing through the resistor? Can the 7805 handle this much current being drawn from it? How much power would the 7805 be burning under these conditions? How much power would be going through resistor?

C. Pick appropriate resistor values for your red and green LEDs, such that the LEDS have 10mA going through them. Write up a justification for your value. Find resistors of those values, and light up your LEDs.