Work Completed

This week our team earned our preliminary senior design grade based on our current progress. The Shampoo-conditioner device casing has been mapped out, and has yet to undergo machining. We have completed the circuitry of the device, however further improvements have to be made before the finished product is attained.

I have spent the past week soldering the dip socket for the PIC and the SP03 pins to the PC Board. The full device circuit has been tested numerous times and the results show that there are an undesirable amount of false positives being produced from the device. In other words, there are times when the device will call “Shampoo” or “Conditioner on the wrong color. To help fix this problem, I have decided that I need a faster crystal oscillator. A faster clock will remedy the situation because the current 8MHz crystal doesn’t offer enough resolution at higher frequencies in order for more specific frequency selection. As a reminder, the color sensor outputs an AC signal of varying frequencies that is dependent on the color that it sees. The color blue will produce a signal of about 96Hz, and with the 8MHz crystal, the best detectable range around 96Hz is about 95-112Hz. This is a problem
because the PIC will accept a wider array of frequencies than the true signal, resulting in false positives. A faster crystal will enable the device to get narrower ranges about the true signal. This is because a faster oscillator will result in more timer overflows per capture; the basis of the period counter that the PIC performs. Therefore with a faster oscillator, I will have more control over the frequency selection of the PIC, thus greatly reducing the amount of false positives. I will perhaps go with a 20MHz crystal for 2.5 times the original clock speed of the current setup.

The PDA casing has been through the first stage in machining, where the pieces were cut. Now, the edges of the pieces have to be refined, because they are still somewhat rough and uneven. Perhaps I should mill the edges since the milling machine produces a smoother, and straighter edge than the band saw and sander have produced.

**Future Work**

The work that remains at this point is purchasing the stickers for the shampoo and conditioner bottles. I have been trying to order stickers for about 3 weeks already, but I am having trouble getting vendors to reply to my emails. This week I will have to try my best to get phone numbers and find more sticker merchants because senior design day is in 2 weeks.
The device casing must begin the machining process this week, as well as refining the PDA casing pieces.

A faster crystal needs to be purchased for the reduction of false positives in our code. Not only will it reduce false positives, but it may be fast enough to filter out the regular high frequency signal impurities in the sensor’s output. Since crystal oscillators cost between 1 and 2 dollars apiece, I will order more than one. Perhaps I will order 2 20MHz or 30MHz crystals just to see how much resolution I can possibly get from these oscillators in my circuit. Also, I’ll order 2 of each just in case a crystal doesn’t work. At this point, the last thing we need is a critical circuit element to NOT work. We can’t afford to waste time with parts that don’t work so we need to play it safe.

**Project Review**

With less than two weeks left until senior design day, correcting the false positives problem doesn’t seem to be a problem at this point, machining the device casing will take time, effort and most of all stress, because the Polypropylene has cost us almost 100 dollars, so I can’t afford to make a critical mistake while machining it.

Hours Worked: 12