Work Completed

This week I completed the PC Board fabrication on the Express PCB software, explored using an audio amplifier to increase the volume of voice responses, as well as chosen a plastic material for the device casing.

Due to the amount of wiring involved in my circuit schematic, the PC Board utilizes both the top and bottom trace layers for the circuit’s on-board connections. The Express SCH (schematic) and Express PCB (printed circuit board) programs were easy to use with their “linking” feature. This feature allowed me to link the schematic of my circuit to the PCB file, which made it easier to know where the wire connections are supposed to be. The Express PCB program made it simple to lay out my on-board circuit in a clean and neat manner. After printing out the PC board layout, I noticed that the printout image was exactly to scale with the actual circuit elements in my circuit. Due to the 1:1 scaling, I was able to put the actual circuit elements directly on top of the image, making it clear to see that the board will come exactly as it appears on the page. Knowing the exact size and shape of the board ahead of time enabled Kenta and I to properly begin on the device casing.

For the casing of the device, Kenta and I chose Polypropylene for its strength, machinability and low price. The other candidates for the device casing material were PVC and Dextrin Acetal. PVC was a little more rigid than polypropylene, however the price was a little higher steeper and it didn’t come in the thickness that we wanted. Instead of 2 inches, we wanted
2.5 inches so that we weren’t cutting it close with the internal size dimensions. Dextrin Acetal was the most dense, rigid and heavy material of the three candidates. Its price exceeded that of polypropylene by almost $100. Polypropylene’s light weight compared to the other two candidates was one of the key concerns of the plastics decision.

The voice response volume issue has been analyzed and due to the nature of the waterproof speaker, the voice responses couldn’t be amplified without significant distortion in sound quality. To reduce the amount of heard distortion, we could use a larger more powerful speaker, however there is a chance that we may not be able to afford this along with the PC Board and plastic casing expenses that we expect to have. Weighing the pros and cons of amplifying vs. not amplifying, my team and I have decided not to amplify at all. The sound quality without amplification is clearer than with amplification, although at a slightly lower volume. This is justifiable because the client will most likely use the device at the end of the shower opposite the shower head, where water noise within the shower environment is minimal. At this location, she can be close enough to the device to scan the bottle, and at the same time hear the voice responses, which can’t be more than two feet away from her ears since she has to scan the bottles with her hands. Those things being considered, amplification of the voice responses may not be as necessary as we previously thought.

**Future Work**

In the coming week, I will continue to wait for the 8MHz crystal that I have ordered last week. Until then, I will be unable to test the independent circuit with the color sensor. Kenta and I will also have to continue with the device casing schematics and have them ready for the following week. Bill
will have to approve our PC board layout so that we can proceed to order it and test the on-board circuit. The stickers also have yet to be purchased.

**Project Review**

There are officially two weeks left before the projects are due. Considering that the internal circuit is confirmed and legitimate, the device casing is the last task to complete with these final weeks.

Hours Worked: 15