

ECE480 Application Notes

NX 3D Module for Dispenser Cup

Design Team #8

Whirlpool Co.

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In this project, a functional dispenser cup is designed to meet customers' requirements as follows:

1. There are three separate cups for detergent, softener and bleach respectively.
2. Appliance control unit tell the dispenser which cups need to be filled via LEDs.
3. Removeable dispenser.



Figure 1. Dispenser cup of the Washer¹

To meet the requirements of customers, the dispenser cup we designed is different from the ones on the market now (Figure 1. Dispenser cup of the Washer). We

¹ Picture from Dr. Dean Aslam

improved the design of the dispenser cup not only on how it looks, but also in how it works. The dispenser cup has been designed to have three layers with different functions, when assembled together it creates the dispenser cup as a whole (Figure 2. Assembled Dispenser Cup).

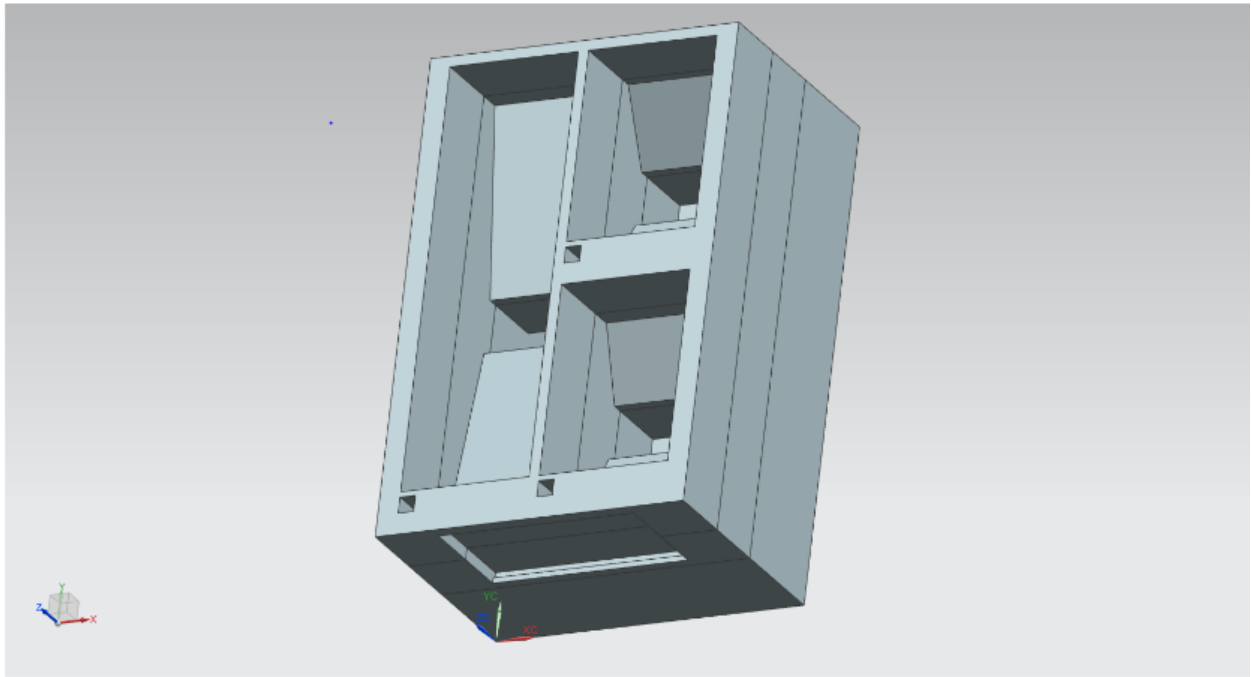


Figure 2. Assembled Dispenser Cup

In the first layer (Figure 3. First Layer of the Dispenser Cup), there are three cups for detergent, bleach and softener respectively. Also, there are three LEDs besides each cup. The application of the LEDs is to tell the customer which cup needs to be filled and what should be put in the cup. For example, when the detergent cup needs to be filled, the LED besides the cup will turn to blue. When the cup is filled with the correct material and amount, the LED will turn to green, otherwise the LED will be red.

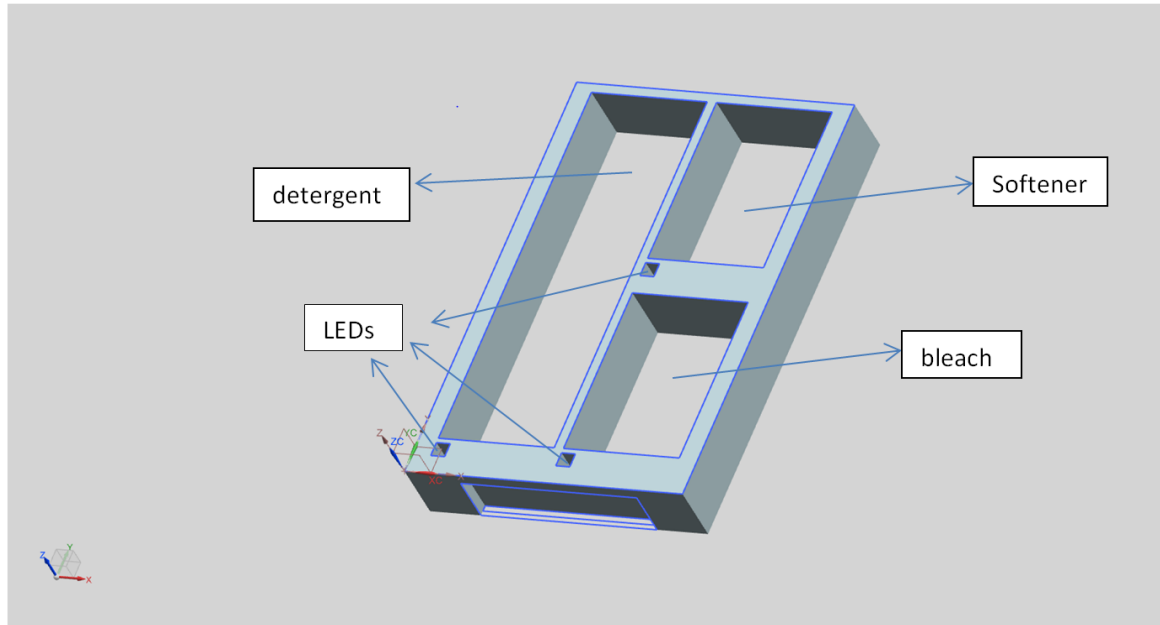


Figure 3. First Layer of the Dispenser Cup

In order to decrease the waste of detergent/bleach/softener, a unflat cup bottom has been designed as the second layer (Figure 4. Second Layer of the Dispenser Cup).

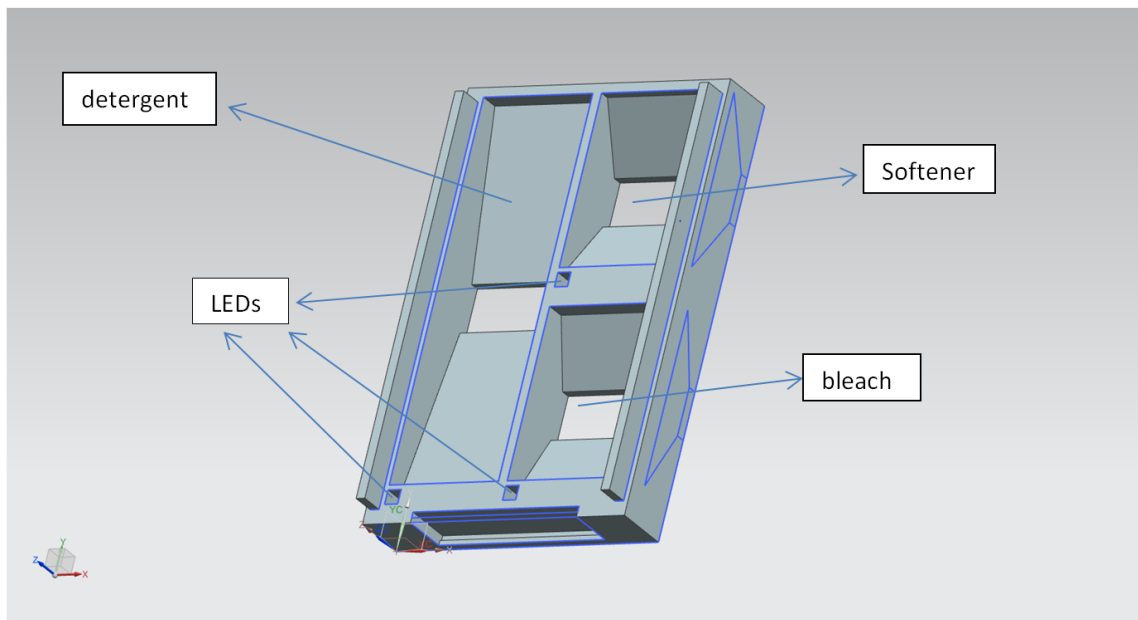


Figure 4. Second Layer of Dispenser Cup

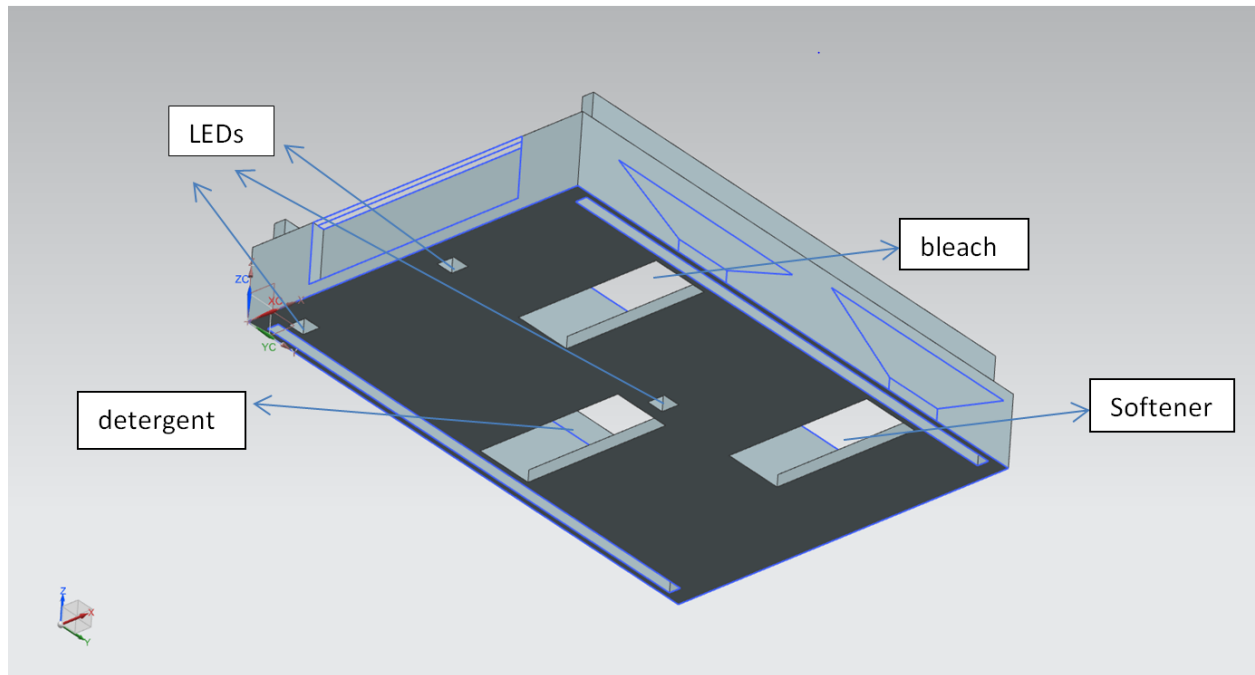


Figure 5. Bottom View of the Second Layer

The bottom layer (Figure 6. Top view of the Bottom Layer) is to store the microcontroller, battery and other circuits. There is also a common path (Figure 7. Side View of the Bottom Layer) for detergent/bleach/softener to go through to main part of the washer.

To stabilize the dispenser cup, bars have been design in the second and bottom layer. There are rectangular shaped bar holes at the bottom of the first and second layer for bars to insert in.

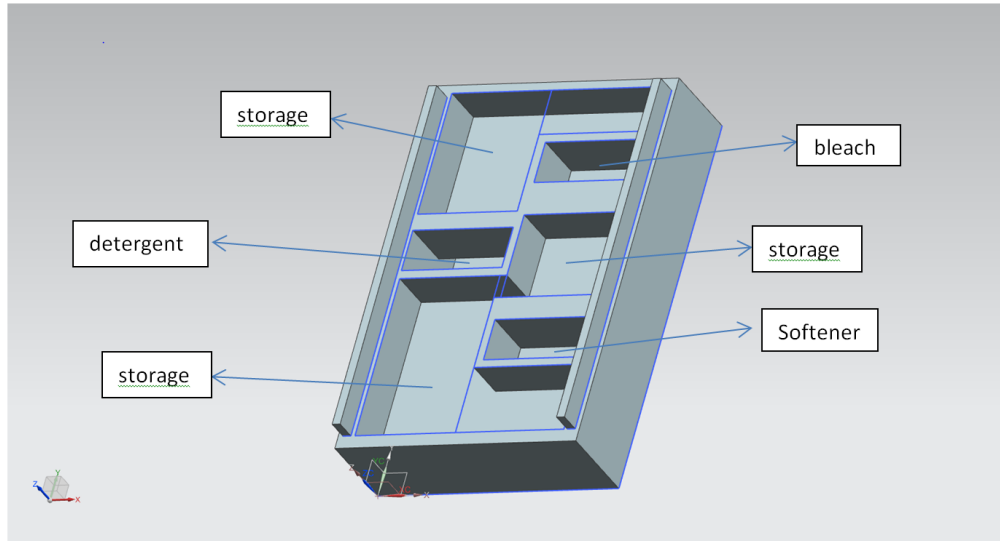


Figure 6. Top view of the Bottom Layer

The storage place is to store the microcontroller, power supply circuit and battery. The LEDs of the first layer will be directly connected to the circuit from the bottom layer. To keep the electrical circuit and microcontroller out of water, the storage place and the detergent/bleach/softener path has been separated.

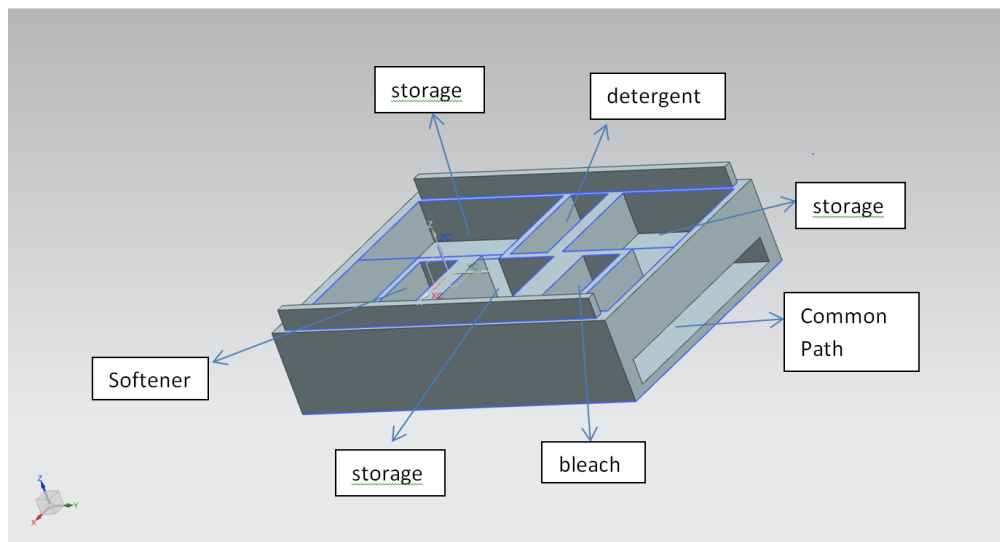


Figure 7. Side View of the Bottom Layer

However, based on the available budget of the group, print out the dispenser cup as designed as above is not applicable. After meeting with the Whirlpool Co., a new dispenser cup needs to be designed, that no storage place for the circuit will be needed since the cup is only a prototype.

The modified cup has two parts: cup (Figure 8. Modified Dispenser Cup) and lid (Figure 9. Modified Dispenser Cup Lid).

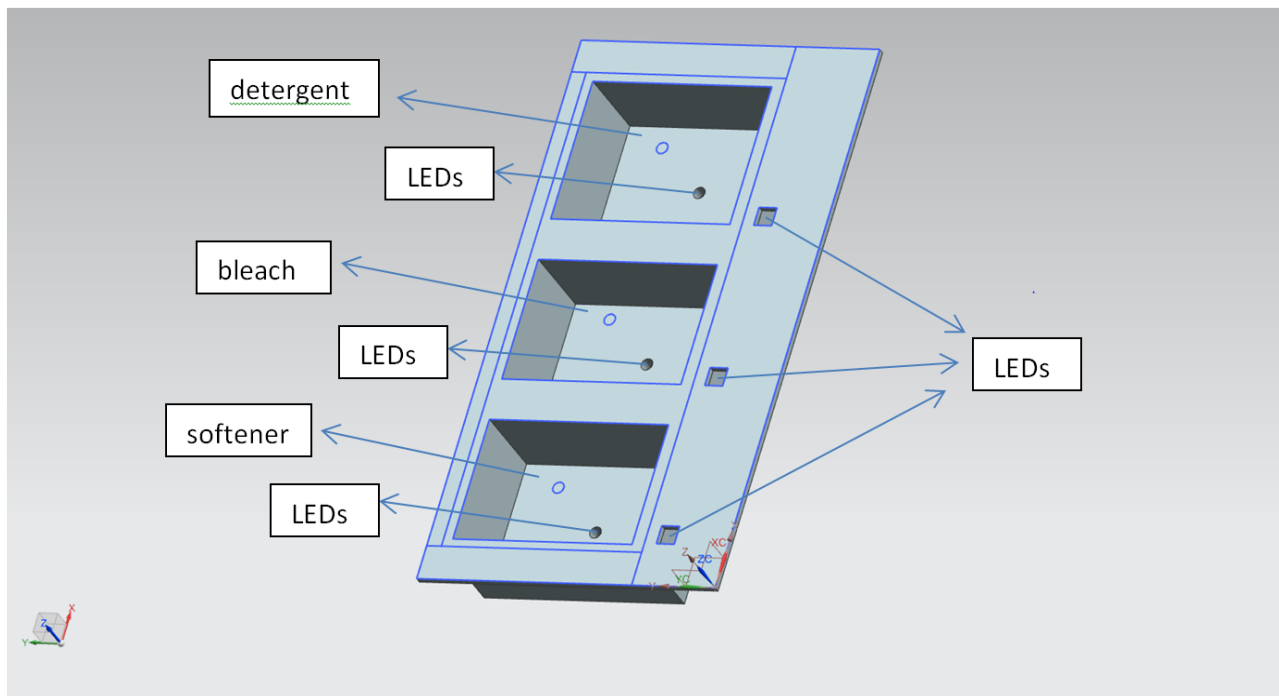


Figure 8. Modified Dispenser Cup

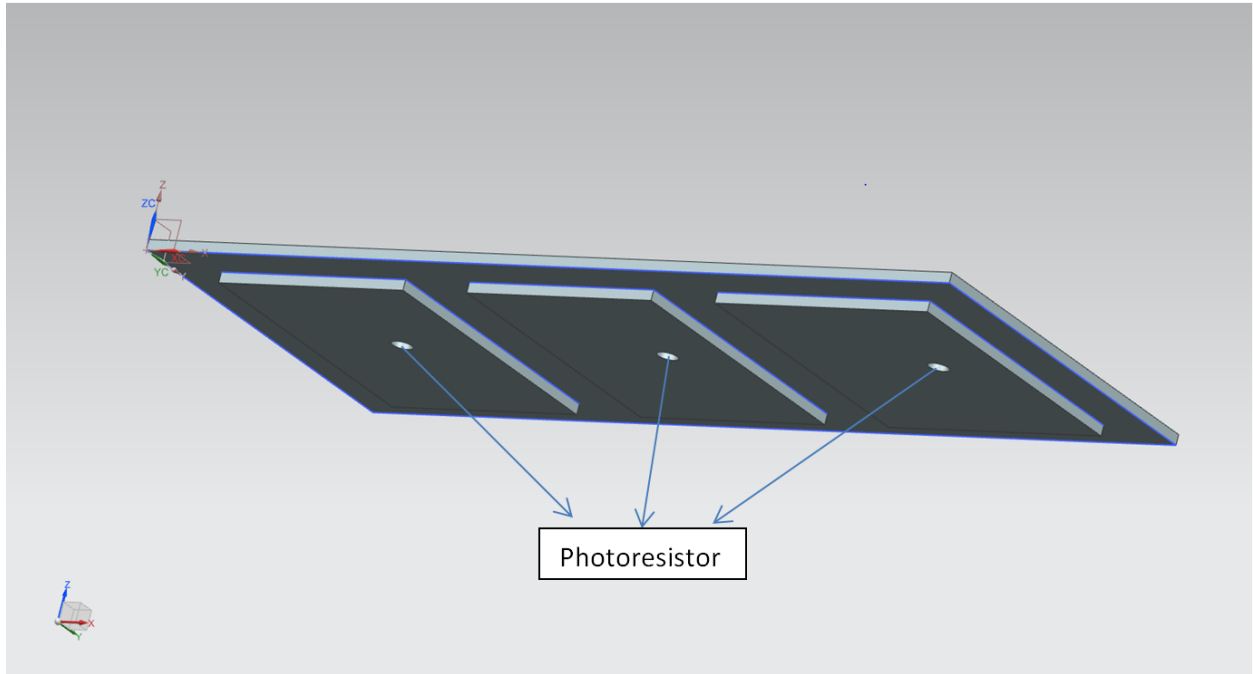


Figure 9. Modified Dispenser Cup Lid