To: Dr. Lancaster

From: Team 71 – Eric Valdez & Emily Hernandez

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Subject: CPE 301 Handwashing Machine Design Report

Overview and Details

The purpose of this project was to design a system, using Arduino, which allows people to wash their hands, using guidelines like using warm water, and washing for at least 30 seconds. The hardware involved was a Servo Motor, ultrasonic sensor, a DHT temperature sensor, a fan, and a LCD screen. These devices are programmed together using a primary use case function and alternate flows.

Servo Motor

For this project, the servo motor simulated the faucet. With the *servo.write* function, we were allowed to have an open/closed situation with the faucet. We were able to create a function that allowed us to reset the system and return the servo-motor to its original position to simulate a "closed" faucet set.

Ultrasonic Sensor

An ultrasonic sensor allowed us to receive an output pulse in the form of time. A function was created to convert it into centimeters. In order to detect hand placement better, two functions were created to sense whether hands were in or out of range every second. A 20cm boundary was established along with a 10 second hold to let enough time pass before resetting the system. The distance is managed inside the distance_check() function which simultaneously adds a 1 second delay.

DHT sensor

The DHT sensor is used to measure the temperature every second throughout the hand washing process. The printTemp() function is used to record and print the temperature in Celsius on the LCD screen.

Fans

The fan remains off in the beginning and is programmed to start drying for fifteen seconds once the hands are completely cleaned. The analogWrite function is used to turn fans on and off, and one second delays are used to count to fifteen.

LCD Screen

It also updates and displays the temperature received from the DHT sensor every second. Once the hand is placed under the faucet, a 30 second timer will show up on the screen. If the hands are out of range, the timer will reset on the screen once they're back in range.