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EECS 1011 Major Project

INTRODUCTION:

For this project I created and programmed an automatic hand sanitizer or hand soap dispenser. My system is designed to dispense soap to a civilian when an ultrasonic sensor detects a distance in a given range. The system also includes led lights, buzzer, and a button to perform certain tasks when the system is running.

CONTEXT:

Automatic hand sanitizer or hand soap dispensers are seen in many different places around the world. They can be found anywhere from a school to an airplane. This system is my take on creating an effective dispenser which can be used for anyone who desires. This system was made for the reason to help protect families and loved ones from catching different bacterial diseases that could be transmitted through public spaces. The system uses an ultrasonic sensor to detect a person's hand and uses indicators to ensure that the system is working, and the solution is then pumped through the water pump and given to the person.

TECHNICAL REQUIREMENTS/SPECIFICATIONS:

System Requirements:

- Detect an object (person's hand) in a certain distance in front of the ultrasonic sensor.
- The water pump should dispense the solution to the object that is placed in front of the sensor.
- A green led light should start blinking if there is an object in the range of the distance set for the system to work.
- A buzzer should also start buzzing if there is an object in the range of the distance set for the system to work.
- If there isn't anything in the set range for the distance of the sensor, then a red led light should remain on.
- To close the system a button can be clicked to turn off all the hardware.

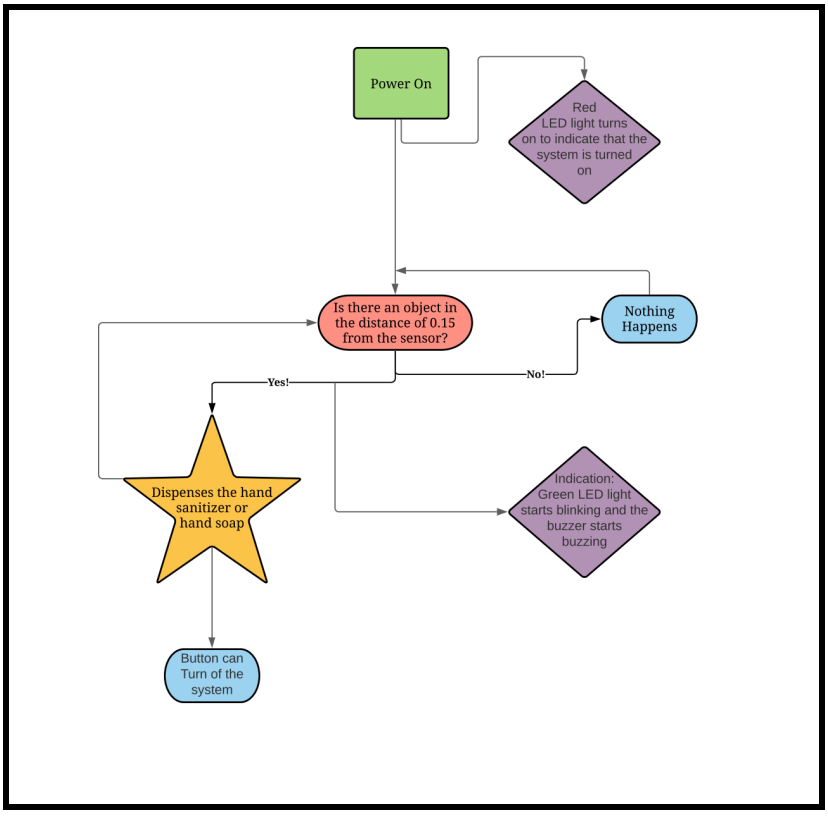

Figure 1: Flowchart of the things that system can do

COMPONENTS LIST:

- Grove Beginner Kit for Arduino (1)
- Mosfet Switch (1)
- 9 Volt Battery (1)
- Water Pump (1)
- Tube to deliver the solution (1)
- Led Lights (red - 1, green - 1)
- Resistors (2)
- Breadboard (1)
- USB cable (1)
- Jumper Wires (7)
- Container (1 - To keep hold of the solution dispensing)
- Tie wrap (1)

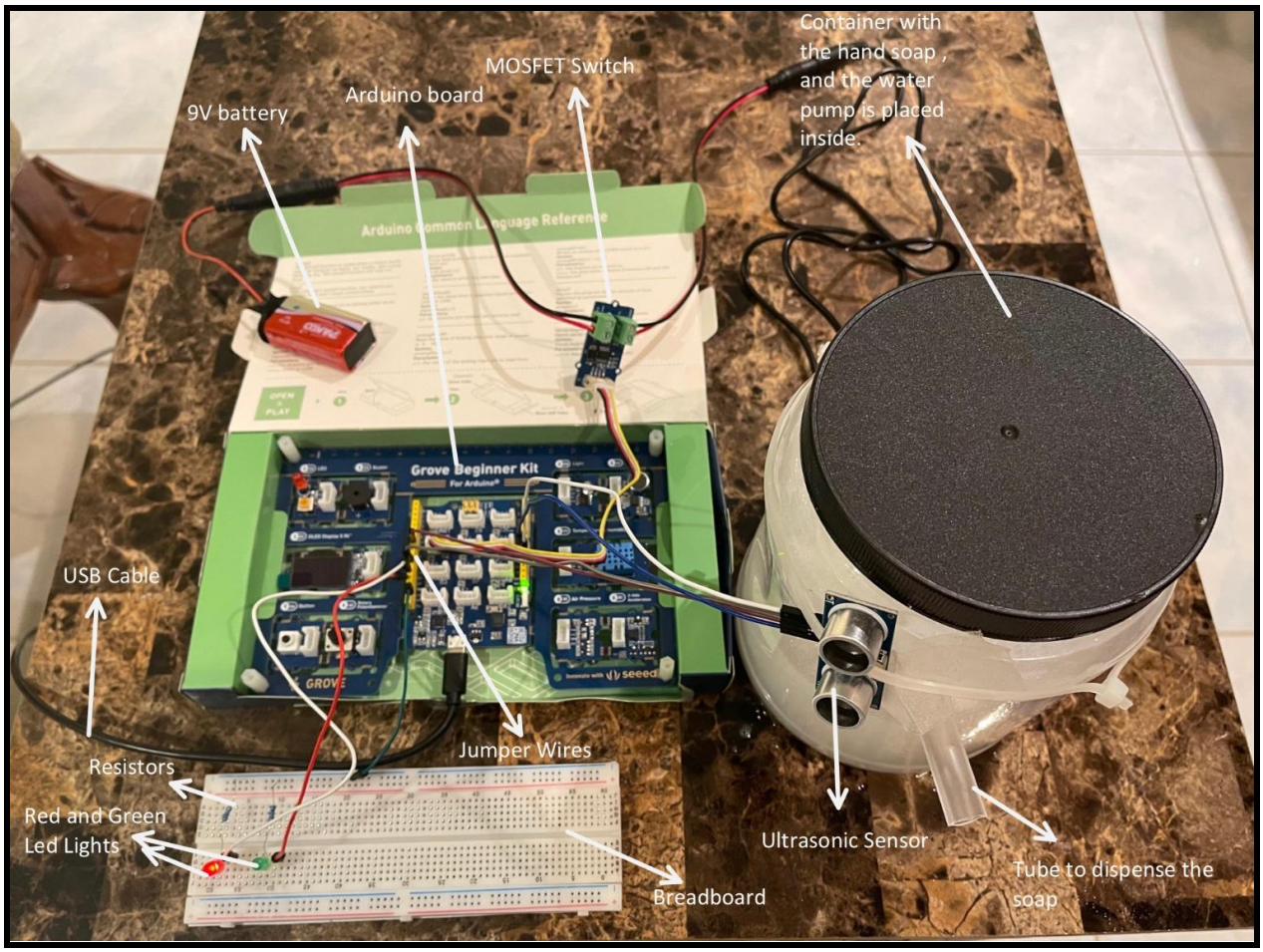

Figure 2: Labeled Diagram of my Automatic Dispenser

PROCEDURE:

Firstly, before actually coding or putting my hardware together, I did some research on the coding requirements to ensure that the ultrasonic sensor can effectively work. I also did some research of the different ports needed for the LED lights and the ultrasonic sensor. After finding things about how I can initialize my ultrasonic sensor, I started to put my hardware together. The first things which I equipped with the Arduino board were the things I already knew how to do. These were the mosfet switch with the 9V battery, water pump, and the tube. After I successfully equipped those hardwares, I started to create my led light mechanism. I first equipped the jumper wire to the negative side of the breadboard, and then I put my resistors onto the breadboard where one end was on the negative side. Next, I placed the two led lights on the breadboard, where the shorter end (negative) goes to the row where the resistor was, and the longer end (positive) was on the one adjacent to it. Then, I took two jumper wires and put them in a spot in front of the longer end of the led light and placed the other end of the jumper wire to the arduino board (D12- red, D13- green). After this led light mechanism was done I equipped my ultrasonic

into the board, with the following placements; VCC port to 5V on the Arduino board, Trig port to D10, Echo port to D7 and then the ground port to the ground pin on the Arduino board. Next, I organized my system by getting a container for the solution and tie wraps. I placed the water pump and tubing inside the container and brought a small end outside of a whole I made for the container. The tie wraps were used to tie the ultrasonic sensor to the container ensuring that it senses when someone brings their hand near the dispensing tube. With MATLAB I programmed the system to successfully follow the tasks that it is required to do. The programming successfully executed and allowed the system to run with no worries.

TEST:

The method which I used to test my system was putting my hand towards the ultrasonic sensor to see if it starts pouring water out to a separate container. During this time I also looked to see if the green led light starts blinking when the water pumping starts dispensing, and if the buzzer starts making noise when there's an object in front of the sensor. I also ensured that both the red led light and the button were working to their requirements.

CONTINGENCY:

Yes, before I decided on creating the automatic hand sanitizer or hand soap dispenser, the one idea which I wanted to execute but I couldn’t was a walking stick for people who are visually disabled. The reason for not executing this was because I couldn’t incorporate MATLAB into the system. As the walking stick was without attachment to a device with MATLAB, I had to code using the Arduino IDE. Without having a proper understanding of the Arduino IDE, I wasn't confident in taking this step and executing this project. Something that I would do differently to my automatic dispenser is adding an OLED Display which displays messages regarding if the system efficiently dispensed the choice of solution. I believe that would be a nice touch to make my system look aesthetically pleasing. A lesson that I learned which I could apply moving forward, is ensuring that I add many features to my programming and the system to make it efficient, and make it go above and beyond.

ADDITIONAL MATERIAL:

The general use of the automatic hand sanitizer and hand soap dispenser can be to protect everyone from spreading bacterial diseases. For example, using the dispenser can help decrease the spread of Covid 19 as it helps keep everyone's hands clean and bacteria free. As many health advisors say to decrease the spread of Covid 19, we should all wear our masks, and clean your hands. I believe that the use of the automatic hand sanitizer and hand soap dispenser will benefit and help everyone from caching bacterial diseases as it ensures that you automatically get solutions that allow you to keep your hands clean.

CONCLUSION:

Thus, I believe that executing this idea was an amazing step as it allowed me to gain knowledge of some things which I never used before. This project also helped me learn more about different functions and hardware with Arduino and MATLAB. The knowledge gained from this project will be beneficial to me moving on as it will allow me to believe in myself that I could execute anything that I put my mind into.

Reference:

ArduinoObj. (2020). Retrieved from https://www.mathworks.com/help/supportpkg/arduinoio/ref/arduinoio.ultrasonic.html