BUILDING AN ARDUINO BASED

AUTOMATIC HAND SANETIZER DISPECER

INTISHER ISLAM

COMPUTER SCIENCE 207

TREVOR TOMESH

APRIL 11,2021

Table of Content

-APPENDIX 5

INTRODUCTION

This is an Arduino based Automatic Hand Sanitizer Dispenser project. This project will help people to use Hand Sanitizer automatically. The world is going through a critical time. Everyday we are fighting against this COVID-19. Hand Sanitizer plays a vital role to keep people disinfected from this virus. But while using a Hand Sanitizer it is not even safe to touch it. That is why an Automatic Hand Sanitizer is the best solution.

This Arduino Base Hand Sanitizer works with an Ultrasonic sensor which is attached to a motor which help the Hand Sanitizer to pull it down and serves the Sanitizer. When someone put his/her hand in front of the Hand Sanitizer Bottle the ultrasonic sensor detects the movement and the system is activated.

In this process of making the Automatic Hand Sanitizer it is very power efficient as only four AAA batteries are used which is easy to use and change when needed. Again, it dose not require any extra source of power. So, the whole system is vey easily maintainable.

These days there are a lot of manufactures make this Touchless Hand Sanitizer. Those Hand Sanitizer machines are costly. In this case the project I am working on is a lot cheaper and easy

to maintain. I have added a buzzer to help people that it will make sure people are placing their hand in the right place then the system will make a sound.

INSPIRATION

Now a days it is a mandatory tusk to sanitize our hand almost every now and often. That is why I decided to choose this project. The idea of making an Automatic Hand Sanitizer is simple and easy and it is also a lot less costly. Many developers have made such Automatic Hand Sanitizer with different kind of facilities. In some sample there is a display which shows some sorts of messages or greetings. In different machines different type of kits have been used some of the seemed a little less efficient and some of them seemed a lot useful.

The original project from which I have got my inspiration is made by Akshay Joseph on create.arduino.cc.[1] In his project he has made a Automatic Hand Sanitizer using Arduino with very simple and understandable steps. The materials used in his projects are also very easy to get and the sent up is easy as well.

With all the materials in my hand and the with the inspiration from this original project I was ready to develop my own project. In my project I have added some extra features like the sound system and a extra motor to run the system smoothly. I have installed the whole system in a box which makes my Automatic Hand Sanitizer portable and handy.

DESIGNING

The main design of this Automatic Hand Sanitizer is simple. Here two motors are used which pulls a string and the Hand Sanitizer is pressed with that force to serve the sanitizer. The other equipment which are used in this system are ultrasonic sensors, a breadboard, the Arduino UNO, one piezo buzzer, AAA batteries. The whole thing is placed inside a box.

The circuit is made first by joining all the kits with the breadboard with jumper wire. Then the ultrasonic sensor is added. At first I was planning to run this system with one servo motor and I placed the motor at the back of the Sanitizer bottle attached to a wire with the top part of Sanitizer bottle. Then I realized that one motor is not supporting the system smoothly. And sometimes the motor freezes. Then I had to make a change of this motor and I have added two motors instead. With some trials I have got the idea to place all these into a box.

In the box I placed the servo motors in two side and the Hand Sanitizer Bottle in the middle. The ultra sonic sensor is placed in front of the bottle so that it can be able to detect any movement of hand very easily.

BILDING PROCESSS

The building process of an Automatic Hand Sanitizer in the most challenging part. During this process I had to make some changes in the design also. Here is the list of materials required for this project.

-Arduino UNO

-Breadboard

-Jumper wires

-Two Servo motors

-Ultrasonic sensor HC-SR04

-Hand Sanitizer Bottle

-Piezo buzzer

Arduino Uno

This is the main microcontroller for this whole project. Power source for Arduino Uno is 5V and it works both with batteries or USB. The other sensors and materials are connected to it through the breadboard. Here the breadboard is connected to servo motor, buzzer, and ultrasonic sensors .In my project I have added all the materials in the digital pins(2,3,4,5,9). In APPENDIX [2] there is given the connection of the pins of Arduino and its pins.

Servo Motor

Servo Motor helps to pull down the string attached to the Hand Sanitizer Bottle and with that pressure the hand sanitizer is released. So, when the ultrasonic sensor detects any movement in front of the bottle it activates the system, and those two servo motors starts functioning. At first the servo motors are programmed to turn 180-degree angle but that was not that efficient because sometimes the motor freezes in the middle. Then I have set both of the motors to move 100-degree angle and it works perfectly .

Two servo motors are placed in both sides of the bottle. I have glued the motor with the surface of the box so that the motors get enough support to function properly. Then the motors are attached to its fans and a string is attached to those fans. The picture of the servo motor is in APPPENDIX[3]

Ultrasonic Sensor- HC-SR04

This ultrasonic sensor is the only input device for my project. The ultrasonic sensor detent any kind of movement in front of it and it can measure the distance of that object accordingly. It has total four pints tow of them are the power pins and the other two is Trig and Echo. These two pins are connected in pin 2 and 3 in the Arduino Uno. Here the Trig pin triggers the sound and Echo pin produces a sound when the reflected signal is received. Then the distance is calculated with the time duration and the distance travelled by that sound.

In my project the sensor is attached in front of the Hand Sanitizer Bottle facing the sensor at the pint where people will usually place their hand to take the sanitizer in hand. So any movement at that point will activate the system.

Piezo Buzzer

Piezo Buzzer works as a sound system in my project. It can change its sound frequency with the change of voltage in its system. In my project the buzzer in fixed in pin 9 of the Arduino Uno. Whenever the ultrasonic Sensor detects any object in it is mentioned distance the buzzer starts making noise and it stops when the object is removed.

User Manual for Automatic Hand Sanitizer Dispenser

After completing the setup, we have to upload the code in the system. In APPENDIX *** there is mentioned about the code. In APPENDIX *** there is given the connection of the pins of Arduino and its pins.

1.At first the power source is connected to the Arduino. The GND 5V is connected to the breadboard rails.

2.Then the servo motors are connected to the Arduino, as the servo motors have three wires, yellow ones goes to the pin 4 and 5 respectively. And the other wire is connected to the rail of breadboard as 5V and GND.

3.Then it is the connection for the Ultrasonic Sensor. It has total four wires. The Trig and Echo wires go to the pin 3 and 2 on Arduino and the other two wire VCC goes to the connection of 5V and finally GND wire is connected to the ground.

4.The piezo Buzzer has two pins. One of them is connected to the Arduino pin 9 and the other one is connected to the ground.

Failures and Overcomes

During the project I had to go through a lot of attempts to get the best result. I had to change the design twice. At first I was planned and fixed a single Servo motor at the back of the Hand Sanitizer bottle and fixed a wire with it which is connected to the head of the Hand Sanitizer Bottle. But it did not work properly. Then I changed the plan and put then in a box. I placed two Servo motors in both side of the bottle and connected a single with it. But after few attempts the metallic wire seems a bit less functional. Then finally I change the metallic wire and replaced it with a Jumper wire with is attached to two strings and the strings attached to the motors respectively.

I had to work several times on the head of the Hand Sanitizer Bottle too. There I have attached a piece of plastic hook which can hold the wire during the movement.

In the sketch, at first fixed the motor to turn 180 degrees but with some trials it seemed the motor is not that functional and freezes in the middle sometimes. The with few trials I decided to make it 100 degrees.

The main drawback I have faced during this project is working alone. In some of the task there required some hands, for example while attaching the string with the servo motor and Hand Sanitizer bottle, I had to struggle a lot, as I had to push the Hand Sanitizer down and put on the wire at the top of its head. But eventually I made it.

Milestones

I have tried to go through this whole project according to the milestone. Though I couldn't keep up with all the tasks in time for some cases. But with enough research and effort I have tried to make this project successful.

I took a lot of time to make the sketch working. I had to fix the errors and make the code working with my machine.

Conclusion

Overall, this was an interesting project. I have learned a lot of thing while doing it. I had to face a lot of problems the I had to find the solution, it took a lot of trials and I succeeded finally. So through out the project I had an unique experience that how can I overcome through the problems I am facing.

It was a hard project specially if it is done alone. But overall it was fun doing it. I felt like finally I have utilized the things which I have learned from the classes and lab. And making this project a success is the best thing ever.

References

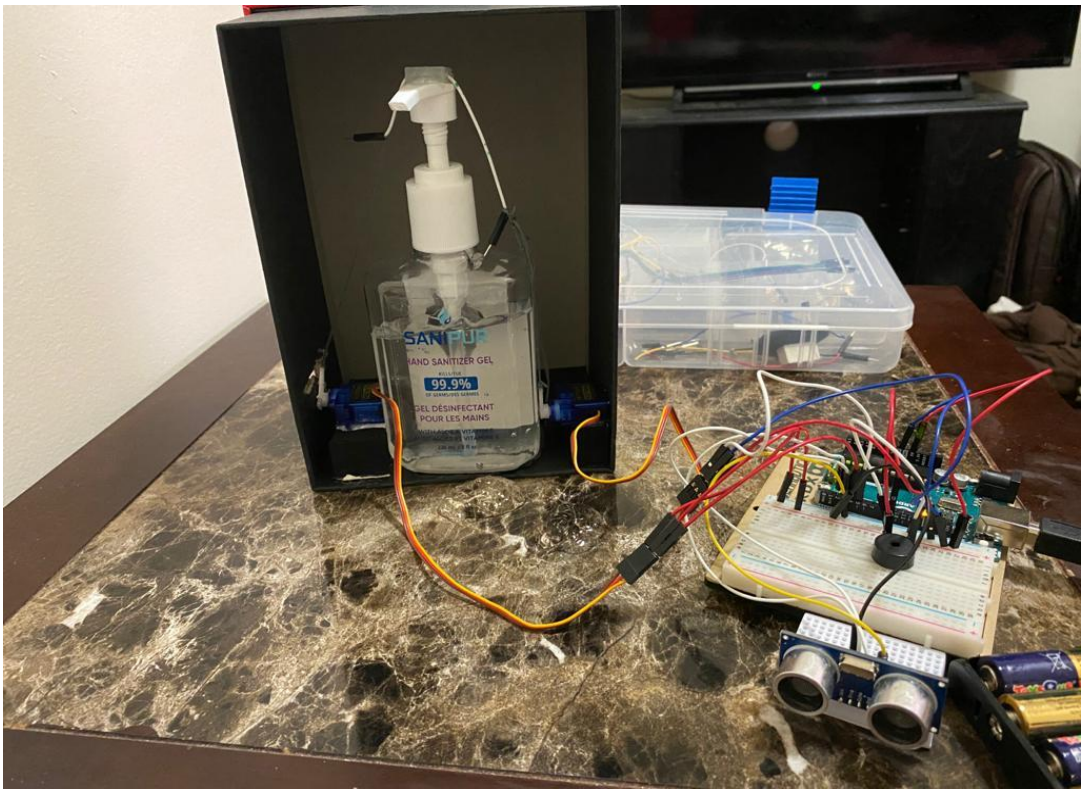
[1] Admin: create.arduino.cc . 21 April,2020.

Project link: https://create.arduino.cc/projecthub/akshayjoseph666/covid-19-automatic-hand-sanitizer78cf6b

[2] Github repository link: https://github.com/akshayjoseph666/automatic_hand_sanitizer

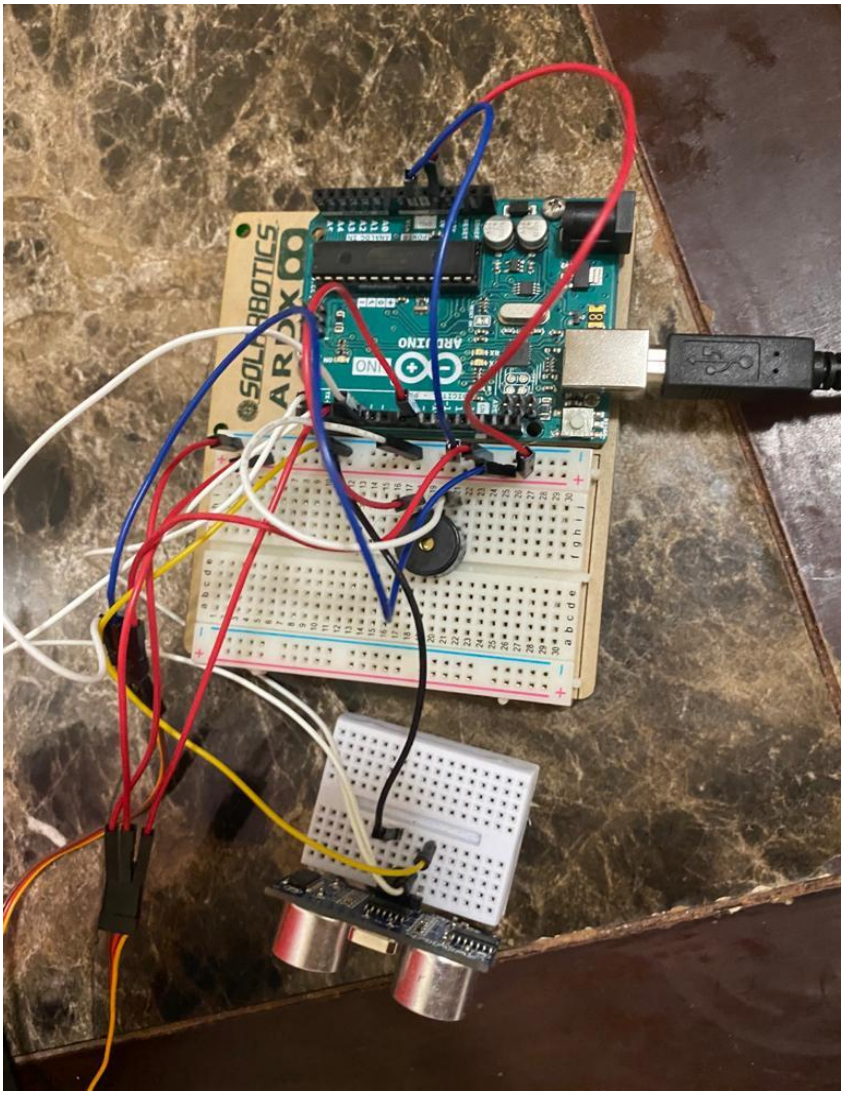
APPENDIX

APPENDIX[1]- Design Outlet



This is the final hardware layout before putting everything into the box and sennting up the ultrasonic sensor at its place.

APPENDIIX[2] – Arduino setup with Breadboard and Digital pins



APPENDIX[3] – Servo motors setup with String

d

Appendix[4]- Link and QR code for this Project

QR code -

Github link for the Project: https://github.com/Intisher-1764/Final-Project

Video link: https://youtube.com/shorts/hTJMEICq-wo?feature=share

APPENDIX[5]- Final Set

This is the Final set up after putting everything in the box.