

## **AUTOMATIC HAND SANITIZER DISPENSER USING ARDUINO**

Bonafide record of work done by

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(Batch 13)

**19Z604 – EMBEDDED SYSTEMS**

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## **1. INTRODUCTION**

"Health is Wealth" comes from a proverb. In the recent years, still lying in the traces of the pandemic of COVID-19, protecting ourselves against the virus has become an important task for each of the citizens as being lethargic about the viral spread not just affects us but also the entire neighborhood and the people who fall in contact with us. Also, the sudden peaks in the spread resulting in back-to-back waves in various regions in the world have led to entire lockdowns in states which also has adverse effects on the livelihood of many people all around the world. Not just this, it has also affected the financial and economic statuses of various countries. Considering all these issues in the pandemic and post-pandemic situations, sanitization is one of the key measures prescribed to keep ourselves safe and sound. This has resulted in the increased demand for hand sanitizer dispensers in places of public gatherings.

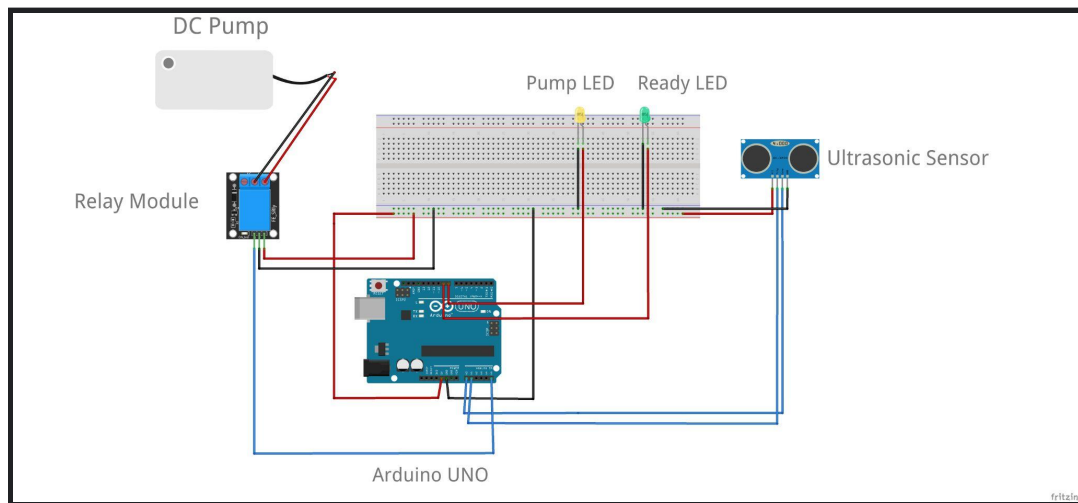
## **2. PROBLEM STATEMENT**

Normal hand sanitizer dispensers work on mechanical triggers such as pressing them manually. This involves physical contact with the sanitizer dispenser which may also result in contamination. As a solution, some of the mechanisms such as triggering the dispenser using a pedal by the foot were proposed but not that effective and user-friendly. In order to overcome the above limitations, as an effective, technologically feasible, and cost-effective solution, automated hand sanitizer dispensers that work with sensors that can sense the proximity of a person's hand and dispense the sanitizer are to be implemented. It should involve a mechanism that detects the person's hand using a sensor, uses the sensed distance, and checks with a threshold distance. If the measured distance falls under the threshold, it should trigger the pump which dispenses the liquid. Also, necessary conditions should be added such that even if a person places his hand continuously for a long time within the threshold distance, the pumping action should take place only for a small time and not for the entire duration the distance is under the threshold distance. Hence, the objective is to build an automated hand sanitizer dispenser using Arduino with the conditions specified.

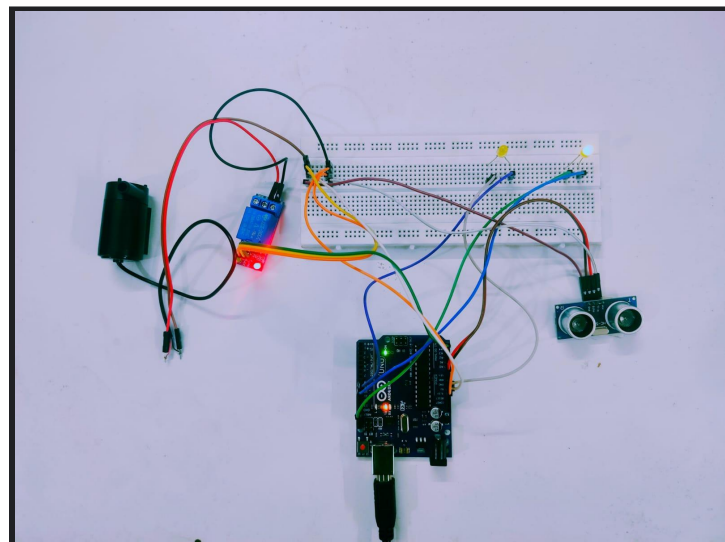
### **3. COMPONENTS REQUIRED**

- Bread Board
- Jumper Cables
- 12V DC Pump
- Arduino UNO
- Relay Module
- 2 x LEDs
- Ultrasonic Sensor

### **4. SCHEMATIC DIAGRAM**



### **SNAPSHOT OF PROJECT OUTPUT**



## **5. CODE**

**// Pins used for relay module, LEDs and ultrasonic sensor**

**const int RELAY\_PIN = A5;**

**const int LED\_PIN = 8;**

**const int READY\_PIN = 9;**

**int distance = 0;**

**int cont = 0;**

**// Function to measure the time taken to receive the echo**

**// after a sound is triggered**

**long readUSD(int trigger\_pin, int echo\_pin) {**

**digitalWrite(trigger\_pin, LOW);**

**delayMicroseconds(2);**

**digitalWrite(trigger\_pin, HIGH);**

**delayMicroseconds(2);**

**digitalWrite(trigger\_pin, LOW);**

**return pulseIn(echo\_pin, HIGH);**

**}**

**// Setting up the Arduino pins as Input/Output**

**void setup() {**

**pinMode(A0, OUTPUT);**

**pinMode(A1, INPUT);**

**pinMode(RELAY\_PIN, OUTPUT);**

**pinMode(LED\_PIN, OUTPUT);**

**pinMode(READY\_PIN, OUTPUT);**

**digitalWrite(LED\_PIN, LOW);**

**Serial.begin(9600);**

**}**

**// the loop function runs over and over again forever**

**void loop() {**

**// Computing the distance of the object using the time**

**// taken to receive the echo**

**distance = readUSD(A0, A1)/58.2;**

**Serial.println(distance);**

```

// If the hand is in a decent distance
// allow the pump to run
if(distance <= 10 && cont == 0) {
  digitalWrite(LED_PIN, HIGH);
  digitalWrite(RELAY_PIN, LOW);
  digitalWrite(READY_PIN, LOW);
  cont = 1;
  // time for which the pump pumps the sanitizer
  delay(250);
  // Stopping the motor by blocking the circuit using the relay module
  digitalWrite(LED_PIN, LOW);
  digitalWrite(RELAY_PIN, HIGH);
  // allow the users to use the sanitizer only after 2s of previous use
  delay(2000);
  digitalWrite(READY_PIN, HIGH);
}
else if(distance > 10) { // Allow the users to use the system again after moving out of the range
  cont = 0;
  digitalWrite(LED_PIN, LOW);
  digitalWrite(RELAY_PIN, HIGH);
  digitalWrite(READY_PIN, HIGH);
}
}

```

## **6. CHALLENGES FACED**

- One of the major obstacles faced during the development of the project was the insufficiency in the techniques to debug the errors in the project. Though Tinker cad acts as a tool to simplify this process, the lack of necessary components required to build the project in Tinkercad made the job tedious.
- Another issue encountered during the development phase was difficulties faced during the incorporation of the ultrasonic sensor and the relay module. The presence of faulty hardware was extremely hard to discover.

- The final challenge faced the lack of a precise environment to test the system. The system developed was tested in terms of the performance of the software i.e, taking into consideration only the feasibility of the code and its error-free nature. The system was not put into use to test the real-time performance.

## **7. CONTRIBUTION OF TEAM MEMBERS**

ROLL NUMBER	NAME	CONTRIBUTION
19Z306	ARAVIND M	Development of Software & Report
19Z307	BARATH KUMAR G	Development of Hardware and Debugging
19Z309	BHOOSHAAN A	Development of Hardware and Debugging
19Z321	HRITHIK B	Development of Software & Report

## **8. REFERENCES**

- Interfacing Arduino UNO with DC Pump  
<https://arduinogetstarted.com/tutorials/arduino-controls-pump>
- Relay Module with Arduino UNO  
<https://randomnerdtutorials.com/guide-for-relay-module-with-arduino/>
- DIY Alcohol Sanitizer Dispenser  
<https://youtu.be/MFMICxmj2Bs>

## **9. PLAGIARISM REPORT**

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