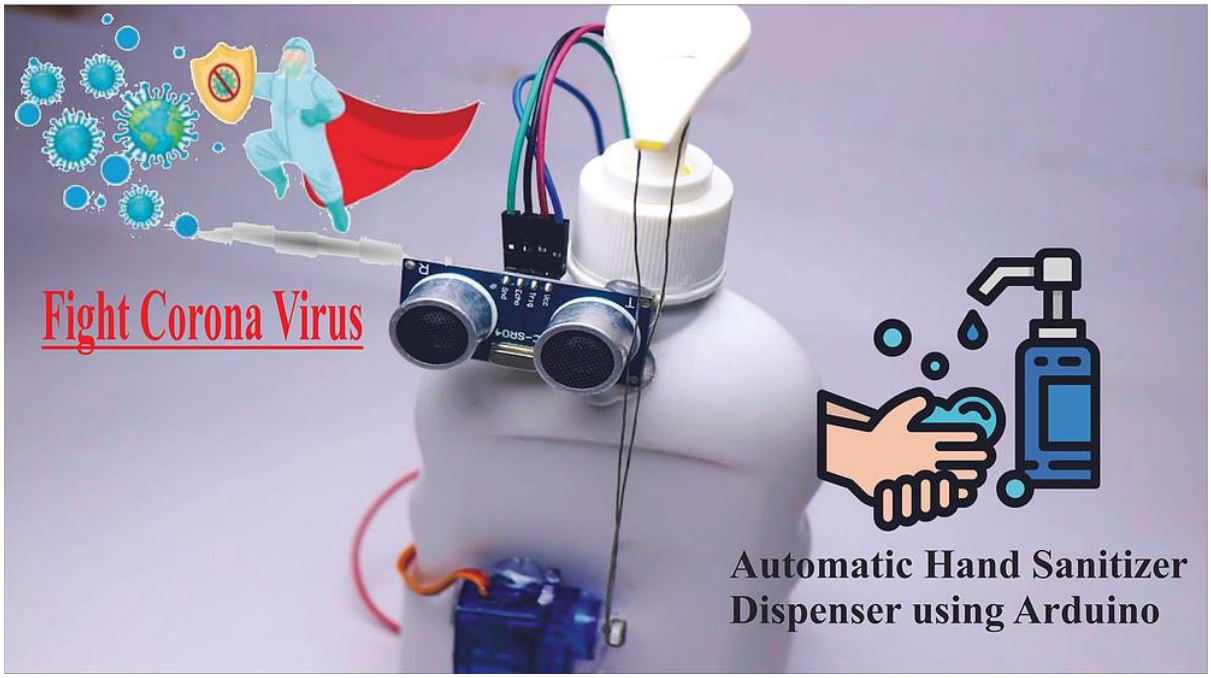
Report

Automatic Hand Sanitizer

Cs-225 mini project



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Objective

The aim of this project is to create an automatic hand sanitizer. Whenever a person will bring his hands within a distance of 10cm from the sanitizer the sanitizer will automatically pump the sanitizer through the outlet. The delay is strategically set to 1 sec so that the sanitizer does not unnecessarily pump continuously.

Components required

This project is made using the following components: -

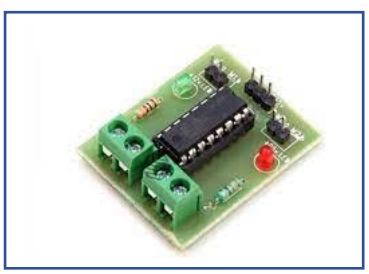
Arduino UNO R3 using ATMega328 Microcontroller

1. USB port
2. Barrel Jack
3. Ground pin
4. 5v pin
5. 3.3v pin
6. Analog IN

7/8. Digital In

9. AREF Analog reference
10. Reset Button

l293d motor driver



Ac-dc Convertor

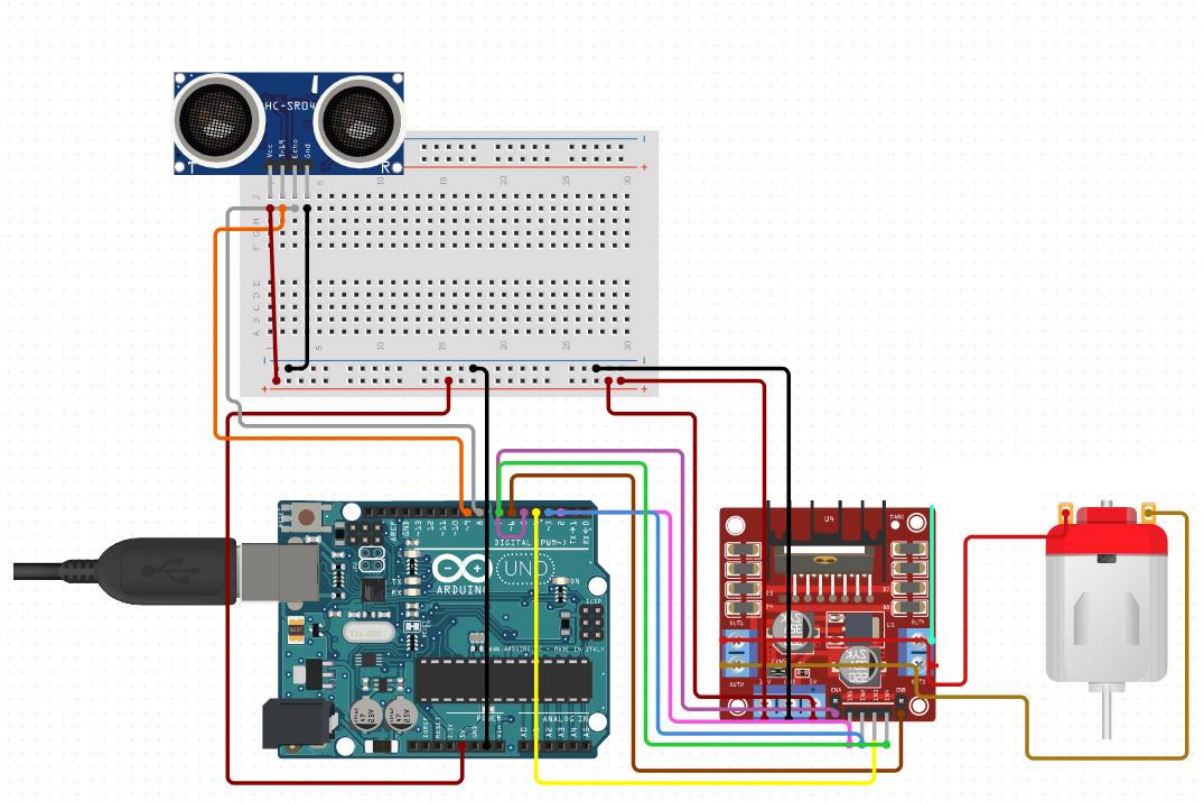
Jumper wires(m-m ,m-f, f-f)

Pipe

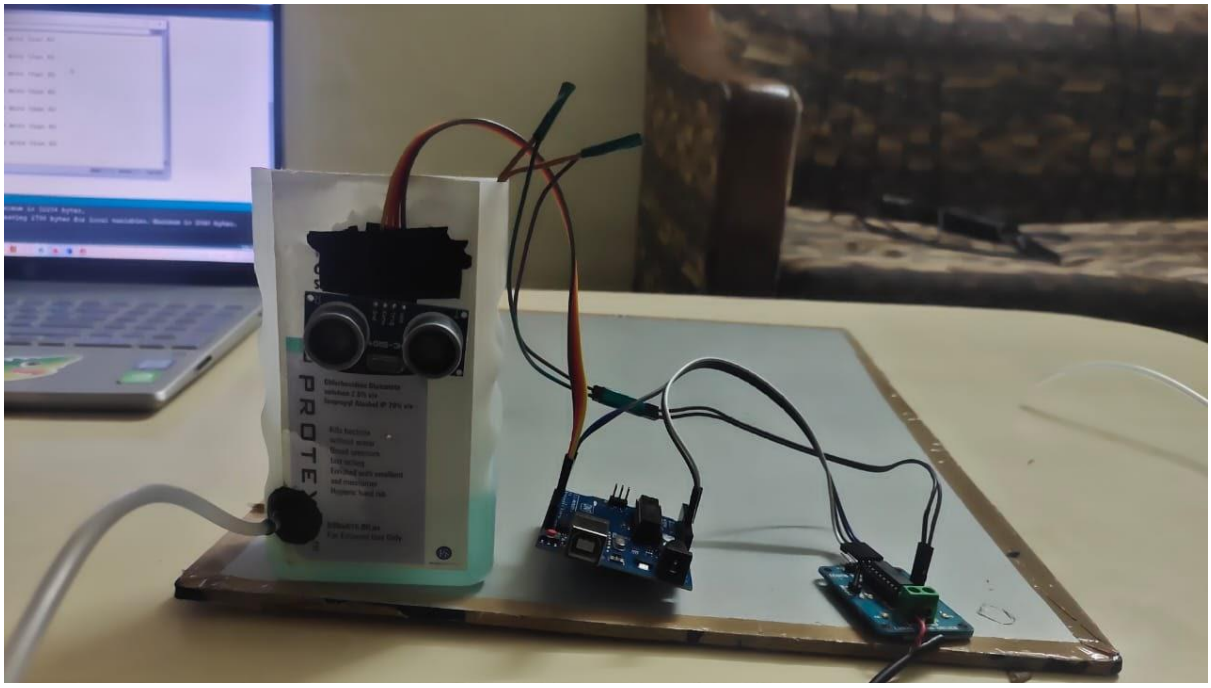
Ultrasonic Sensor -HC-SR04(Generic)

Water Pump Dc 5v-12v

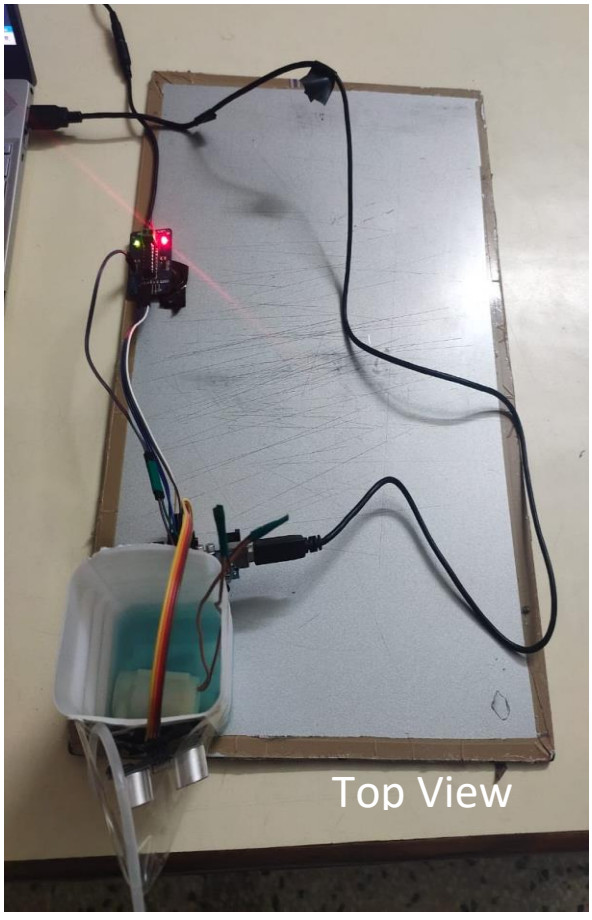
Setup



Initial Setup and Wiring



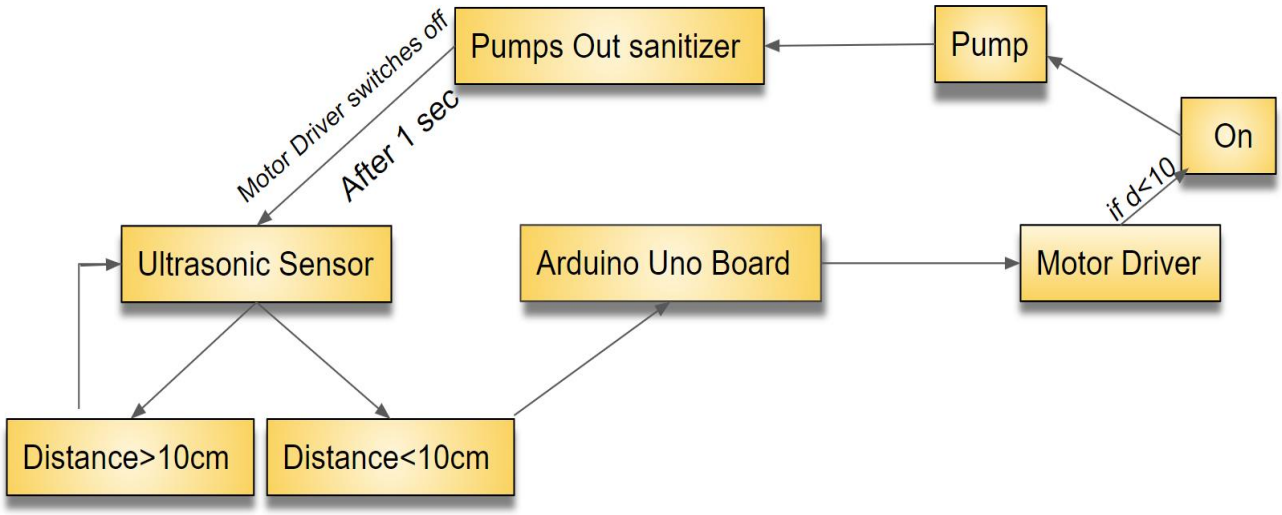
Final Setup



Top View

Front view

Working Principle



Code Snippets & explanation

Auto_Hand_Snatizer §

```
//these connect the ultrasonic trigpin and ecopin
//to the arduino board port 12 and 13
#define trigPin 12
#define echoPin 13

//these are used to connect the motor driver to arduino board
#define motorA1 10
#define motorA2 9
//vcc is defined at port11
#define vcc 11

void setup() {
Serial.begin (9600);
//here the outputs and inputs are declared
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(motorA1, OUTPUT);
pinMode(motorA2, OUTPUT);
pinMode(vcc, OUTPUT);
digitalWrite(vcc, HIGH);
}
```

Arduino pins are connected to the ultrasonic sensor and motor driver

Input and output states are defined for various pins.

```
Auto_Hand_Snatizer §
void loop() {
 //duration and distance are defined for the ultrasonic sensor
long duration, distance;

//when trigpin is low it is on off condition
//and it tajes 2 microseconds hault
digitalWrite(trigPin, LOW);
delayMicroseconds(2);

//in high condition it is on
//and sends 10 microsecond wave
//to measure the distance
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);

//distance is calculated by dividing
//with the speed of sound
//in cm/s units
distance = (duration/2) / 29.1;
```

At first the ultrasonic sensor sends pulse to detect the distance

It sends pulse every 2 microseconds and then measures the distance by dividing with the speed of light

```
Auto_Hand_Snatizer §
//if the distnace is less than 10cm
//we enter this if loop
if (distance < 10) {
Serial.println("The distance is less than 10");

//motor A1 is set to high
//and motor A2 is set to low
//This is basically the on position of the motor
//and here is gives the pump the current
//and sanitiser is pumped out
digitalWrite(motorA1, HIGH);
digitalWrite(motorA2, LOW);

//it also prints the distance
Serial.print(distance);
Serial.println(" cm");

//after one pump it will be tured off
//and detect again if hand is still there or not
digitalWrite(motorA1, LOW);
digitalWrite(motorA2, LOW);
```

When obstacle distance is less than 10cm it enters the if loop

Motors and set to high and low condition so that they send current to the pump

It also writes down the distance on the COM

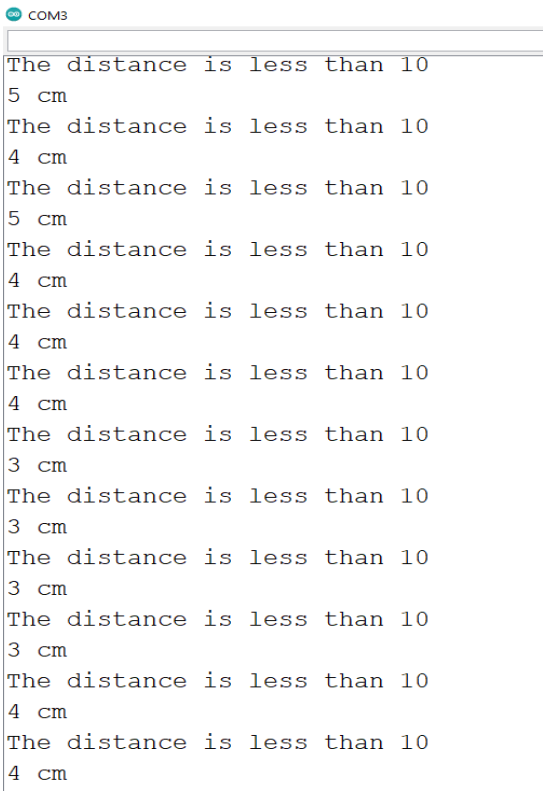
After one pump it will off the motor sensor to ensure there is no wastage and the setup will run again

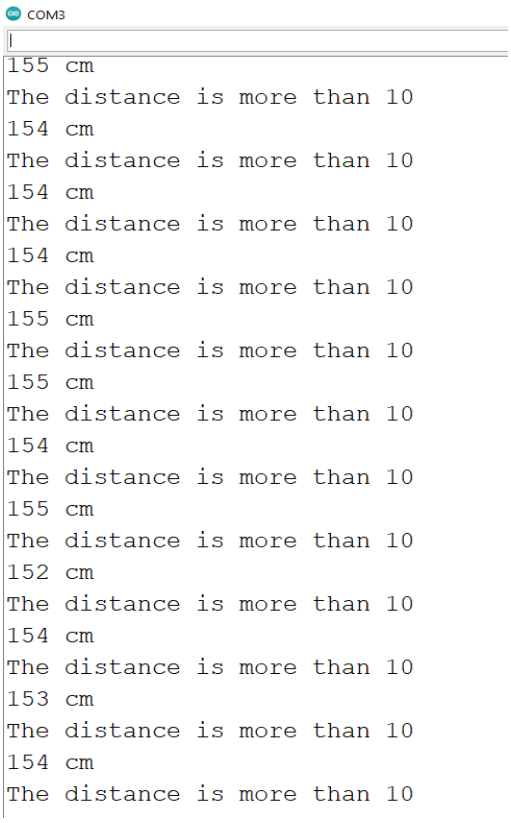

```
//if distance is greater than 10cm
//it enters the else loop
else {
Serial.println("The distance is more than 10 ");

//both the motor are in low mode
//and power is not given to the pump
//and the ultrasonic sensor again
//checks the distance and the process is continousely run
digitalWrite(motorA1, LOW);
digitalWrite(motorA2, LOW);
Serial.print(distance);
Serial.println(" cm");
}
}
```

If obstacle is detected 10cm further from the sensor it enters the else loop

The motors sensor received a low input and hence it does not send any current to the pump and the whole setup is run again for obstacle detection

Here are the screenshots of the distance measured by the ultrasonic sensor





Conclusion & Future scope

This project is made by keeping in mind the current situation of the world. So as to minimize the contact between people this project can be installed in public places to ensure proper sanitization. The project can be further extended by installing a simple led which indicates if the sanitizer bottle is less than 20 percent left and needs refilling.

Video Demonstration: -

https://drive.google.com/file/d/15psNiFYlDrfyiH77cew7qLd-3_noKf9N/view?usp=drivesdk

References:

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- https://maker.pro/arduino/tutorial/how-to-connect-an-ultrasonic-sensor-to-an-arduino