An
Activity Report
Submitted for

ENGINEERING DESIGN-II (UTA014)

Assignment-2

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BE Second Year

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Submitted to-

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Objective: Social Distancing Detector.

Hardware used in Simulator:

1. Piezo Buzzer (1)
2. LED (1)
3. Arduino Uno (1)
4. Ultrasonic HC-SR04 module (1)
5. 330 Ω resistors (2)

Software Used:- TinkerCAD (with built in Arduino IDE).

Theory: The social distancing detector relies on ultrasonic sensor HC-SR04. It is a 4 pin sensor module, in which V_{CC} is connected to 5V, GND (or ground) is connected to GND. The trigger pin of the ultrasonic sensor module is connected to any of the digital pins, and echo pin is connected to any of the analog input pins or a PWM pin (PWM pins on arduino are digital pins 3, 5, 6, 9, 10 and 11). In this case, we have connected trigger to arduino pin number digital pin D4 and echo pin to PWM pin, pin no. D6.

Initially, we set the trigger pin to high for a period of 10 ms, after which we set it to LOW again. During this time period, it has transmitted several pulses, each of frequency 40 KHz and speed = 344.41 m/s.

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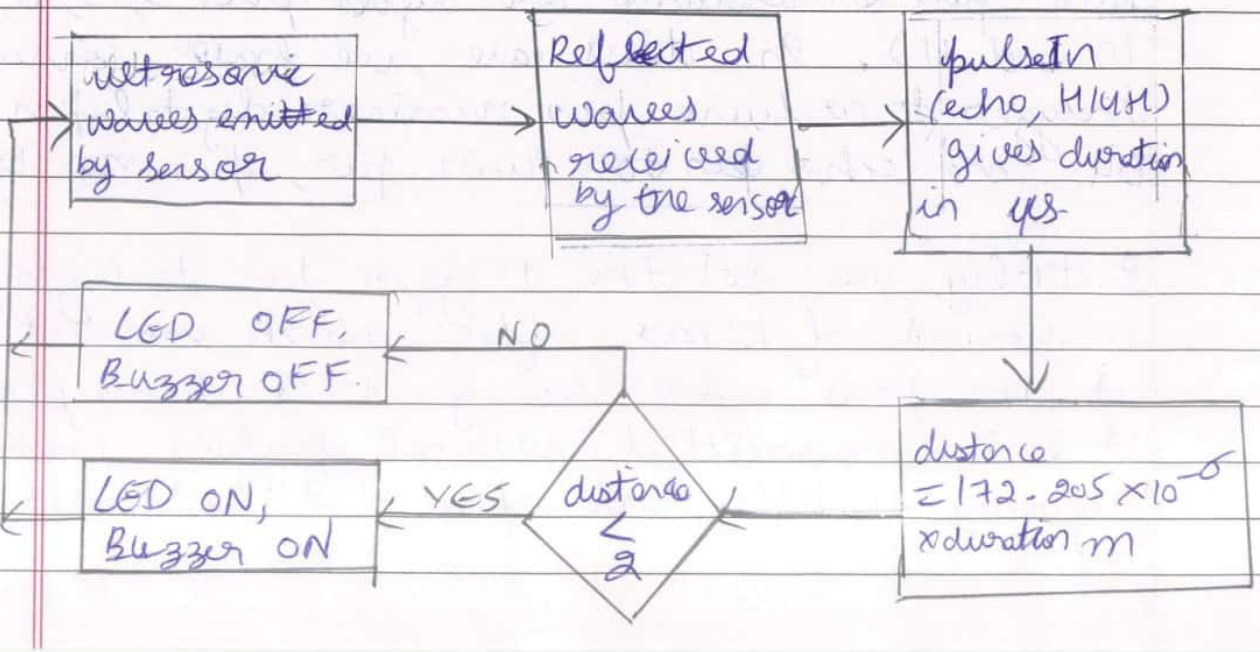
These ultrasonic waves are reflected from the surface and are received by the echo pin. This echo pin receives the ultrasonic waves and sends a pulse to the arduino that corresponds to the time required for the ~~waves~~ to be ~~trans~~ received after its transmission. This time difference or duration can be used to calculate the distance. This time difference is obtained using pulseIn(echo, high).

$2 \times \text{distance} = \text{speed} \times \text{duration}$.

2 x distance because of d for incidence and d for reflection.

$$\text{here distance} = \frac{344.41 \times 10^{-6}\ \text{m/us} \times (\text{duration in us})}{2}$$

If this distance is less than 2m, the piezo buzzer will buzz and LED will remain on ~~when~~ as long as the person breaches the safe distance of ~~2~~ m.



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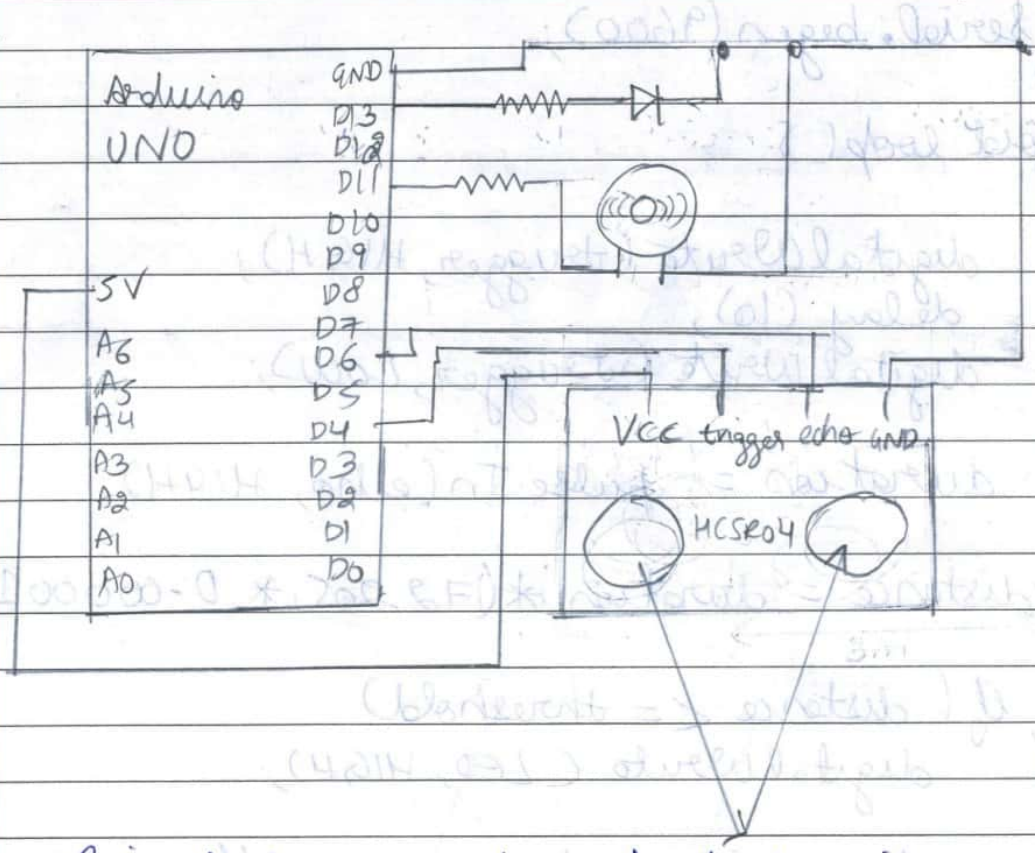

Circuit diagram Around Arduino

Code :-

```
#define trigger 4
#define echo 6
#define LED 13
#define SPK 11

double duration, distance, threshold = 2.00 ;

void setup()
{ pinMode (trigger, OUTPUT);
  pinMode (echo, INPUT);
  pinMode (LED, OUTPUT);
  pinMode (SPK, OUTPUT);
```

```
Serial.begin(9600);
}
void loop() {

digitalWrite(trigger, HIGH); delay(10);
    digitalWrite(trigger, LOW);

duration = pulseIn(echo, HIGH);

distance = duration * (172.205 x 0.00001);

if (distance <= threshold) {
  digitalWrite(LED, HIGH);
    tone(SPK, 1000); } //with tone function we can
else {    //control the frequency of buzzer.
  digitalWrite(LED, LOW); noTone(SPK); } }
```

Simulator link :- tiny.cc/10180362 1/A-2

Result Analysis :

→ The ultrasonic sensor HC-SR04 can measure distances between 2cm and 300 cm.

→ The social distance detector can be used as a wearable device, which can be clipped to the belt, attached to cap, or as a pendant in neck. It will buzz if the person breaches its space of 2 metres.

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Video Simulation Link:

https://drive.google.com/file/d/1V_yb1WsUHxQaba76GcyByhmIQSMOkNzA/view?usp=sharing

Shortened URL of above link:

http://tiny.cc/101803621-A2