KAMPUS CAWANGAN

MALAYSIAN SPANISH INSTITUTE

STB36403

INTERNET OF THINGS (IOT) TECHNOLOGY

Vehicle Reverse Sensing System

PRACTICAL TEST 1
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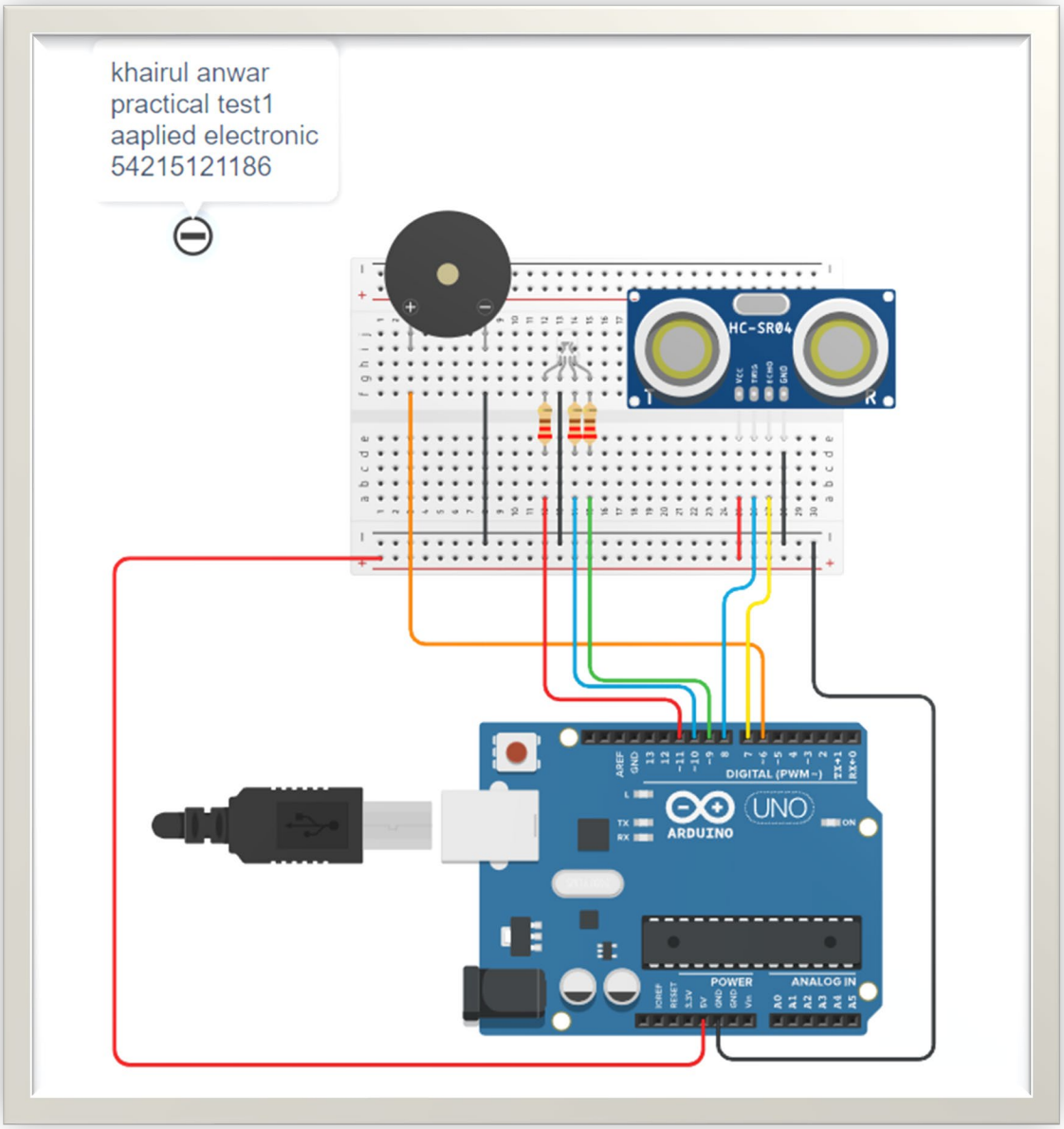
ii. Circuit Layout Diagram (print screen & crop)



```
// C++ code
//
#include "Adafruit_LEDBackpack.h"

int x = 0;

long readUltrasonicDistance(int triggerPin, int echoPin)
{
  pinMode(triggerPin, OUTPUT);  // Clear the trigger
  digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);
  // Sets the trigger pin to HIGH state for 10 microseconds
  digitalWrite(triggerPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin, LOW);
  pinMode(echoPin, INPUT);
  // Reads the echo pin, and returns the sound wave travel time in microseconds
  return pulseIn(echoPin, HIGH);
}

Adafruit_7segment led_display1 = Adafruit_7segment();

void setup()
{
  pinMode(11, OUTPUT);
  pinMode(9, OUTPUT);
  pinMode(6, OUTPUT);
  Serial.begin(9600);
  pinMode(10, OUTPUT);
  led_display1.begin(112);
  pinMode(0, OUTPUT);
}

void loop()
{
  x = 0.01723 * readUltrasonicDistance(8, 7);
  Serial.print(x);
  if (x < 25) {
    analogWrite(11, 255);
    analogWrite(9, 0);
    analogWrite(9, 0);
    tone(6, 523, 100000); // play tone 60 (C5 = 523 Hz)
    Serial.println("    DANGER - YOU ARE TOO CLOSE");
  }
  if (x >= 25 && x <= 50) {
    analogWrite(11, 255);
    analogWrite(9, 255);
    analogWrite(10, 0);
    tone(6, 523, 1000); // play tone 60 (C5 = 523 Hz)
    delay(700); // Wait for 700 millisecond(s)
    analogWrite(11, 0);
    analogWrite(10, 0);
    analogWrite(9, 0);
    delay(700);
    noTone(6);
    led_display1.blinkRate(1);
    Serial.println("    CAUTION - WATCH YOUR DISTANCE");
  }
  if (x > 50) {
    analogWrite(11, 51);
    analogWrite(9, 204);
    analogWrite(10, 0);
    tone(0, 16, 1000); // play tone 0 (C0 = 16 Hz)
    Serial.println("      SAFE - MAINTAIN YOUR DISTANCE");
  }
}
```

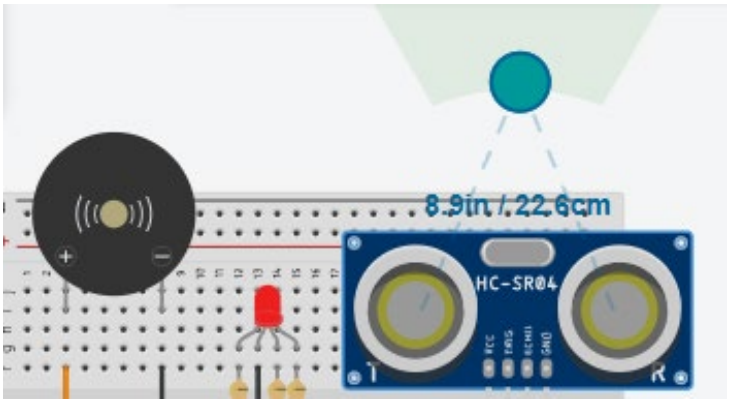
v. Circuit link

https://www.tinkercad.com/things/4rVi7ziz7nv-vehicle-reverse-sensing-system?sharecode=rt6ALXEH_7tG-AUiId_EPmfNcMPCjSed1PUzi5hLflM

vi. Results

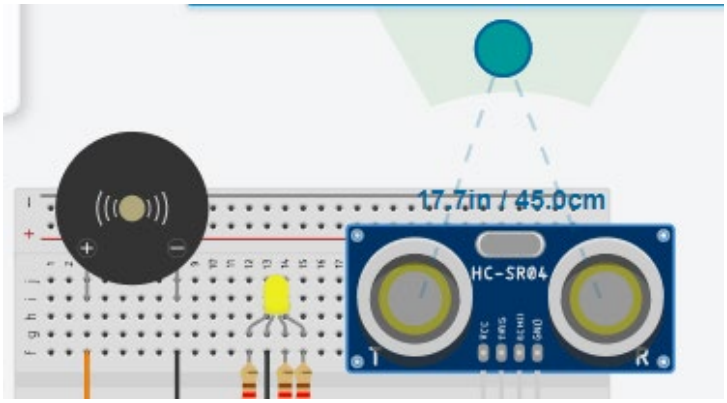
1. when the ultrasonic sensor detects a distance less than 25cm

Hardware	Condition
RED LED:	**ON**
Buzzer:	**ON continuously**



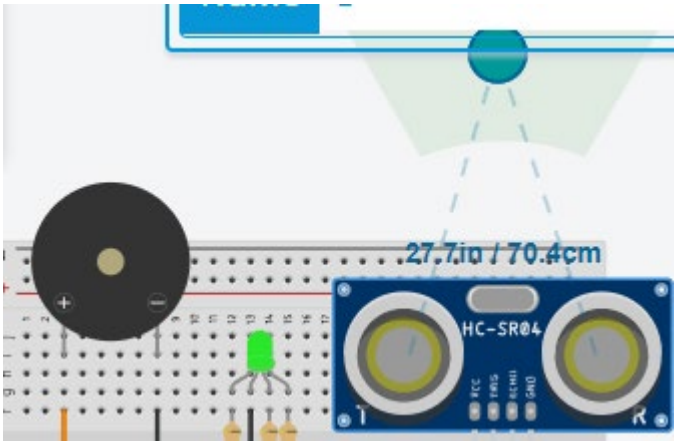
2. when the ultrasonic sensor detects a distance between 25cm to 50cm

Hardware	Condition
YELLOW LED:	**BLINKING**
Buzzer:	**ON intermittently**



3. when the ultrasonic sensor detects a distance above 50cm.

Hardware	Condition
GREEN LED:	**ON**
Buzzer:	**OFF**



vii. Conclusions

In the innovation of enhancing vehicle safety and maneuverability, the development and simulation of a Vehicle Reverse Sensing System using Tinkercad have provided valuable insights and practical applications. Through the integration of ultrasonic sensors and Arduino-based control systems, several notable conclusions can be drawn.

- Enhanced Safety.
  The implementation of ultrasonic sensors has significantly improved the safety of vehicle reverse maneuvers. Real-time detection of obstacles enables timely warnings and assists drivers in avoiding collisions.

- Improved car control
  The system contributes to increased car control, especially in confined spaces. The ability to detect obstacles behind the vehicle allows for more confident and precise reversing.

- Reliability of Tinkercad Simulation
  The Tinkercad platform has proven to be a reliable and accessible tool for simulating electronic systems. It provides a virtual environment for testing and validating sensor responses and system behavior.

- User-Friendly Design
  The system has been designed with user-friendliness in mind. Visual and audible alerts provide intuitive feedback to the driver, enhancing the overall user experience.

- Adjustable
  The system architecture is adjustable, allowing for potential expansions such as incorporating multiple sensors or integrating with other vehicle safety systems.