Ultrasonic Sensor

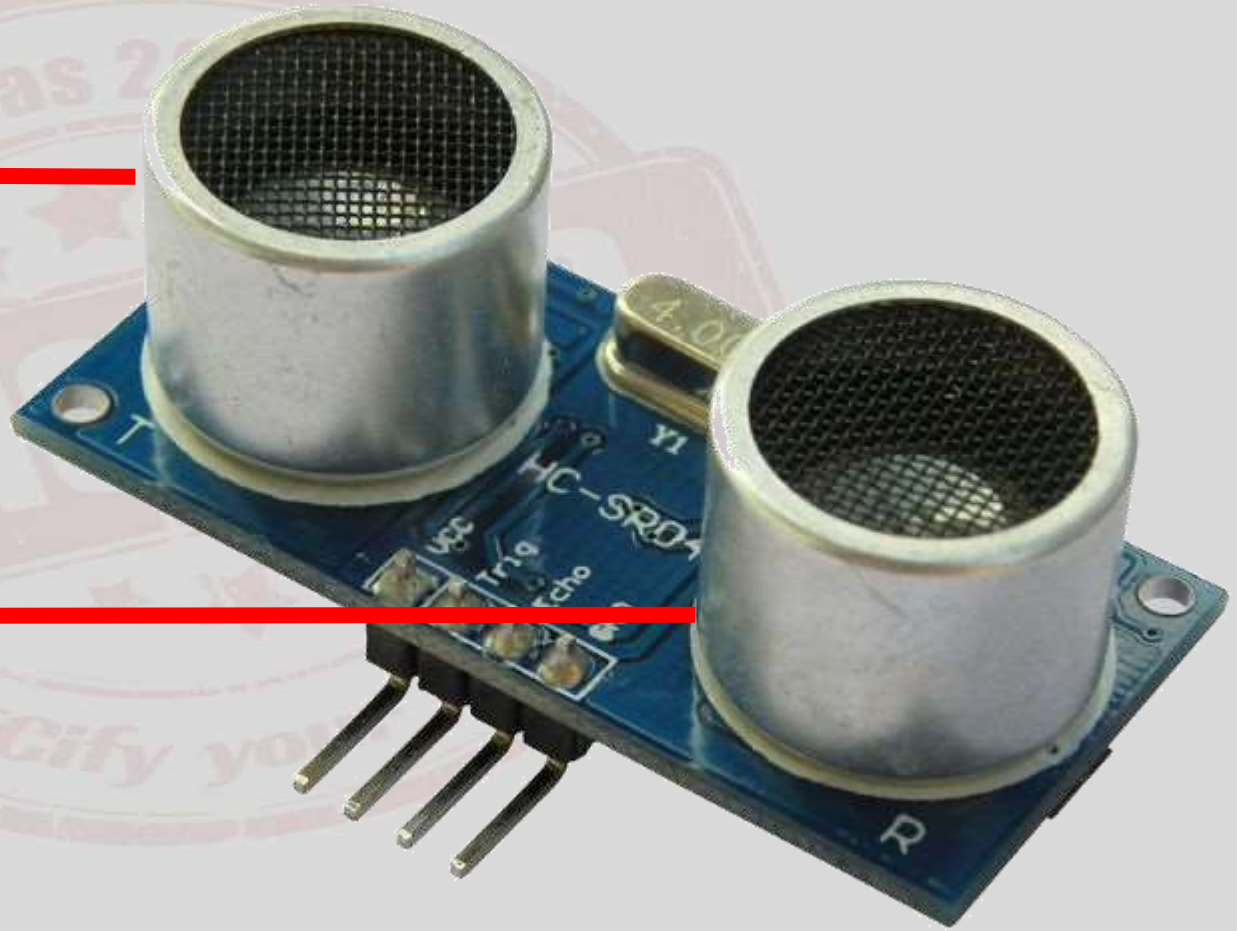
What is an Ultrasonic Sensor ?

- The Ultrasonic Sensor is a Transceiver Module (Transmitter + Receiver).
- It transmits High Frequency Ultrasonic Waves of frequency greater than 20 KHz.
- Intercepts the waves reflected by an obstacle.
- Electrical Signals ↔ Ultrasonic Signals ↔ Electrical Signals

HC-SR04

Transmitter

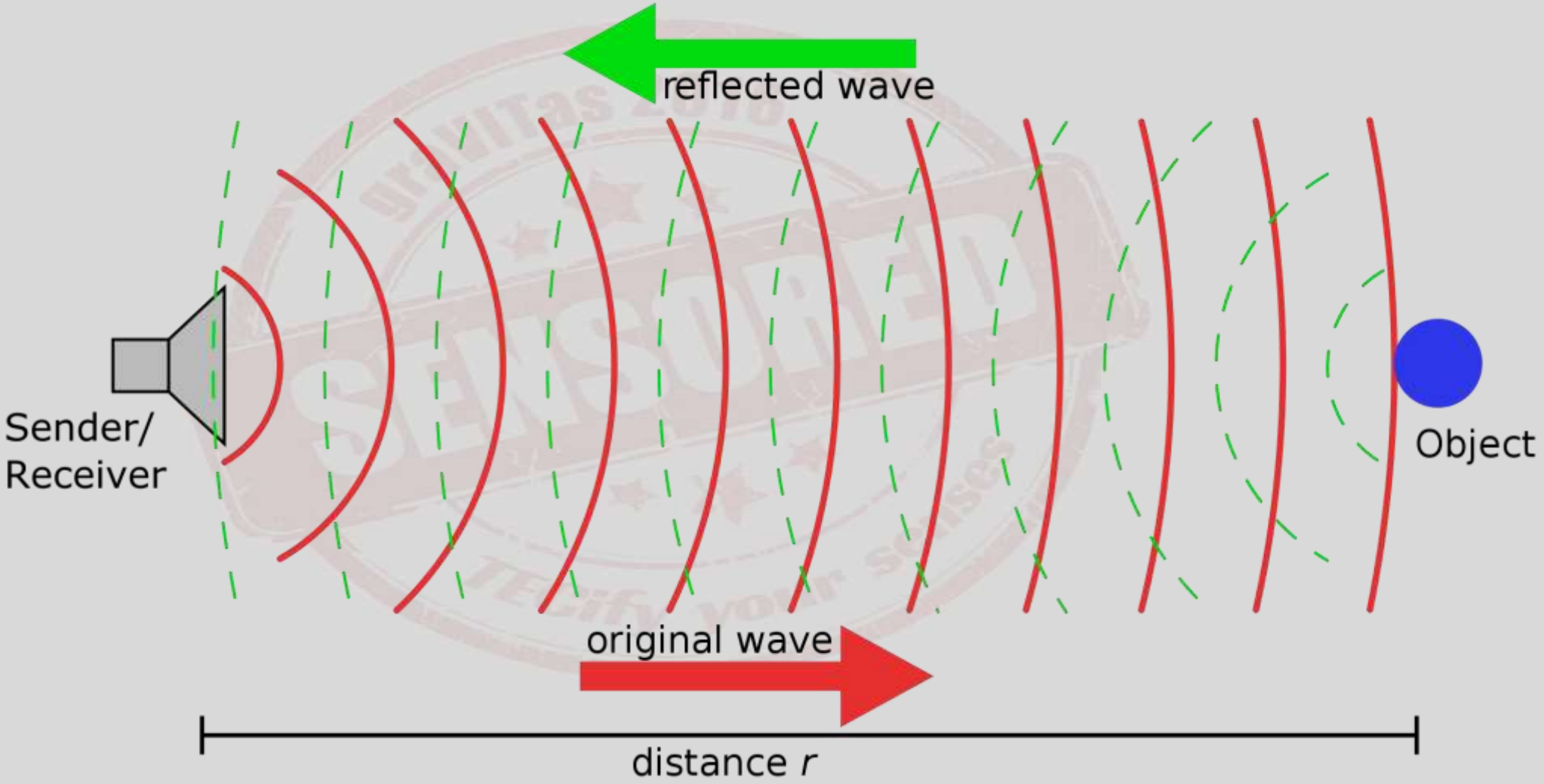
Receiver



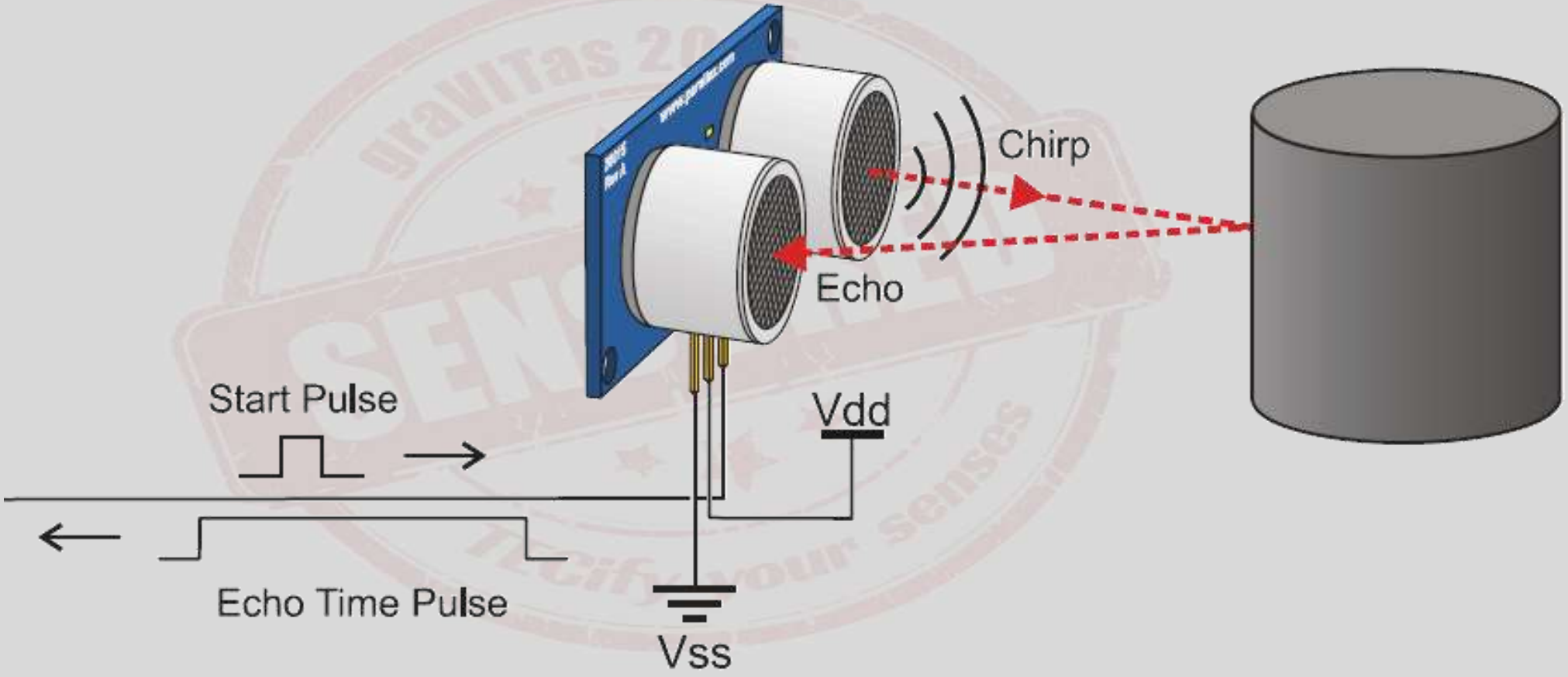
HC-SR04 (Specifications)

- ✓ It provides 2 - 400 cm non-contact measurement function.
- ✓ Operating Voltage : 5V
- ✓ Working Frequency : 40 KHz
- ✓ Trigger Input Signal : 10µs TTL pulse

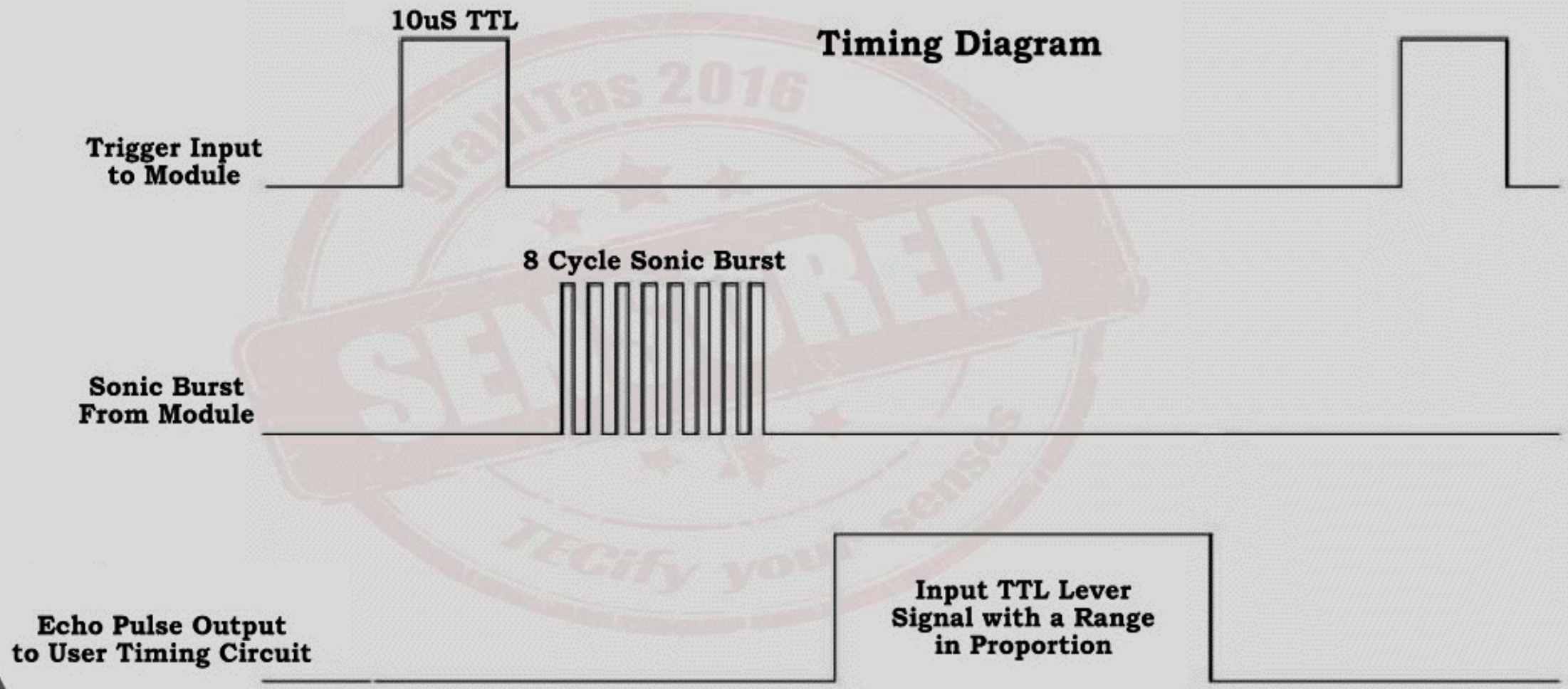
Working Principle



Working Principle



Working Principle



Pin Configuration

Connect to +5 V pin on Arduino

TRIGGER : connect to Digital Pin 4

ECHO : connect to Digital Pin 2

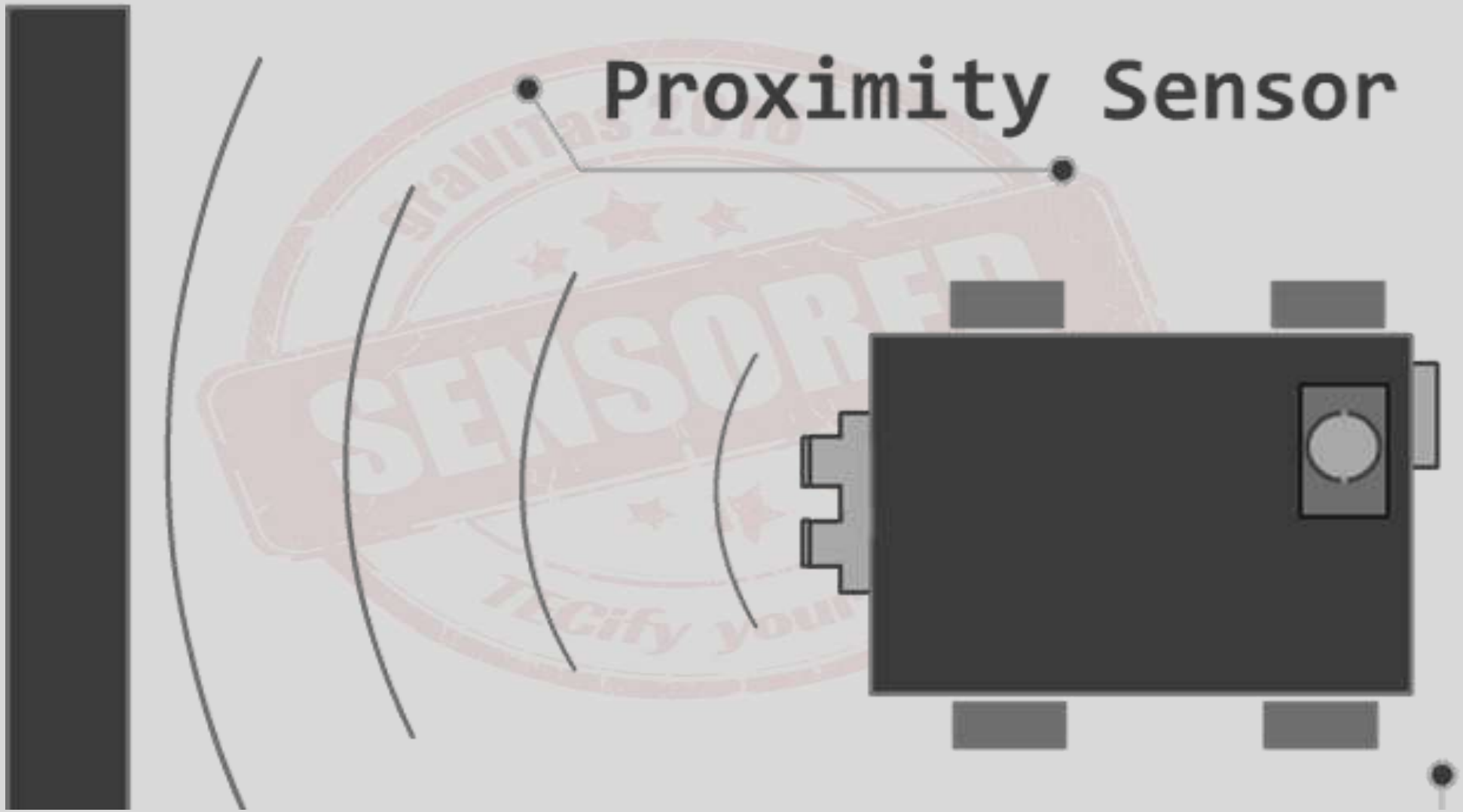
Connect to GND pin on Arduino

Applications

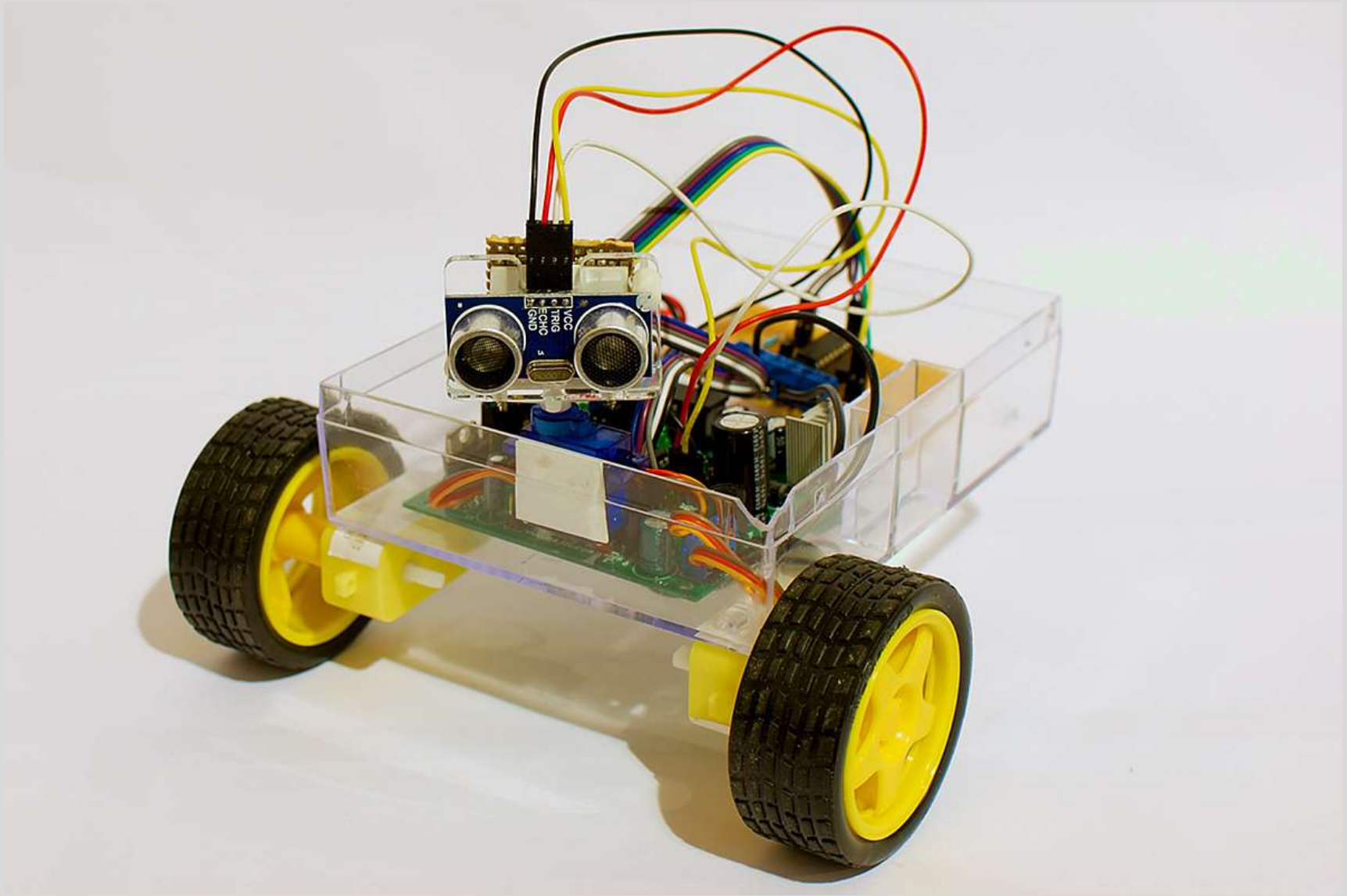
Ultrasonic sensors can measure the following parameters, without even getting in contact with the medium which is to be measured :

- Distance
- Level
- Presence
- Diameter
- Position

Proximity Sensors

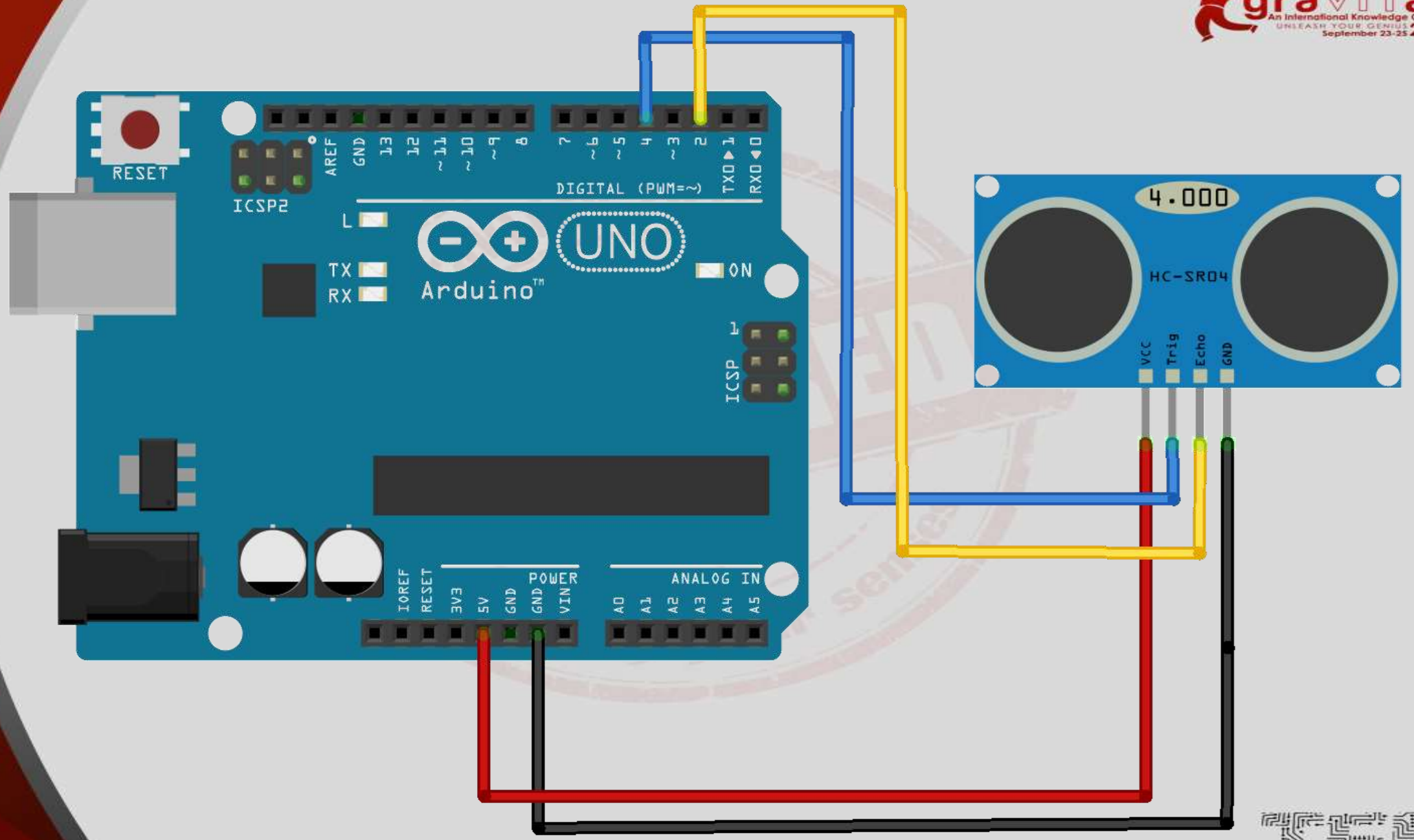


Obstacle Avoiding Robot



Advanced Parking Assistance

Circuit Diagram


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM=~)
L
TX
RX
Arduino™
UNO
ON
ICSP
POWER
IOREF
RESET
3V3
5V
GND
GND
VIN
ANALOG IN
A0
A1
A2
A3
A4
A5
4.000
HC-SR04
VCC
Trig
Echo
GND

Arduino Code

```
const int trigPin = 4;
const int echoPin = 2;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  Serial.begin(9600);
}

void loop() {
  long duration, distance;
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
```

```
  duration = pulseIn(echoPin, HIGH);
  distance = (duration/2) / 29.41;
  if (distance >= 200 || distance <= 0){
    Serial.println("Out of range");
  }
  else {
    Serial.print(distance);
    Serial.println(" cm");
  }
  delay(500);
}
```