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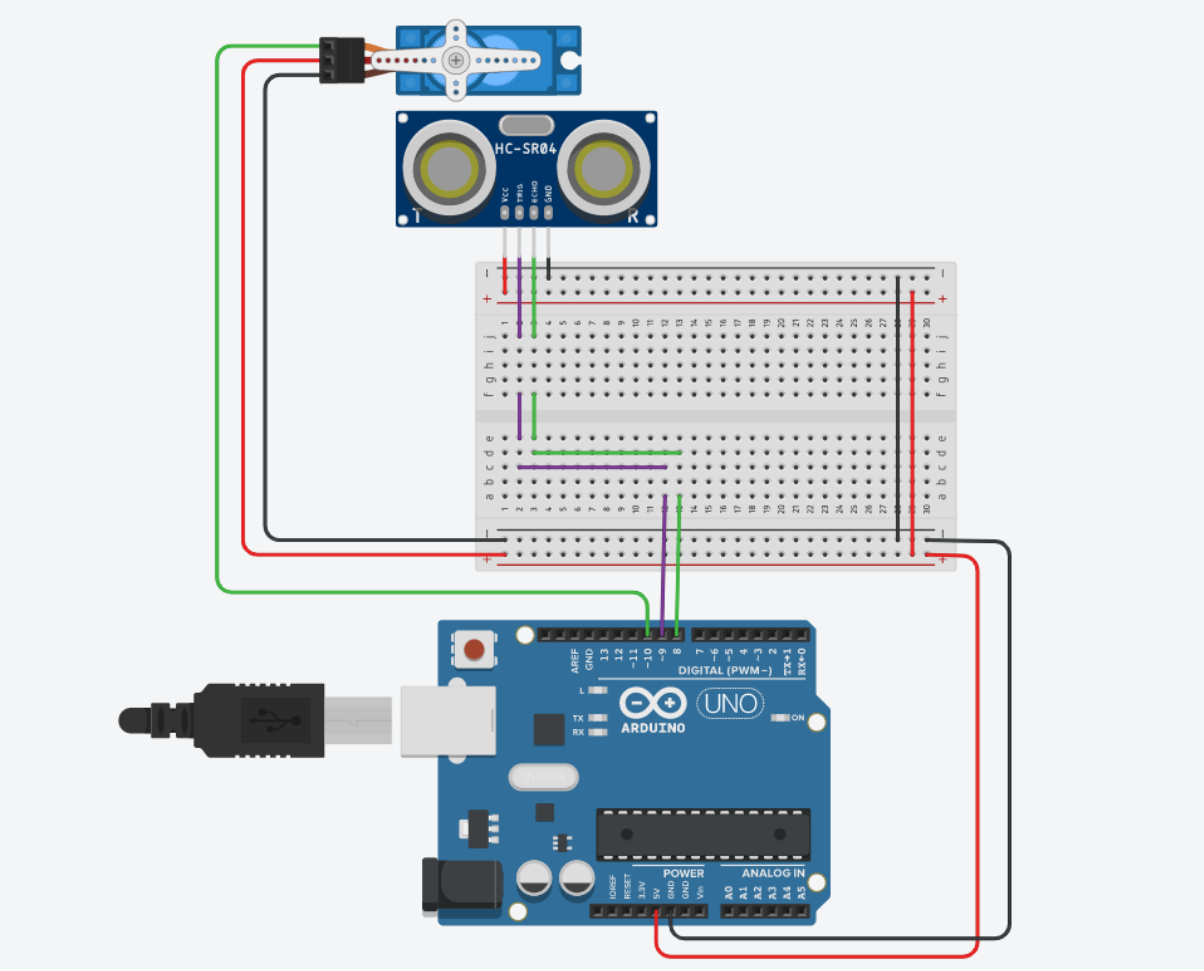
AUTOMATIC GARAGE DOOR OPENING SYSTEM

AIM: To Develop an Automatic garage door opening system using an Ultrasonic sensor to detect if there is a vehicle in front of the garage. if any vehicle is detected open the garage door (rotate the servo motor) for some time and close it.

SYSTEM SCHEMATIC:



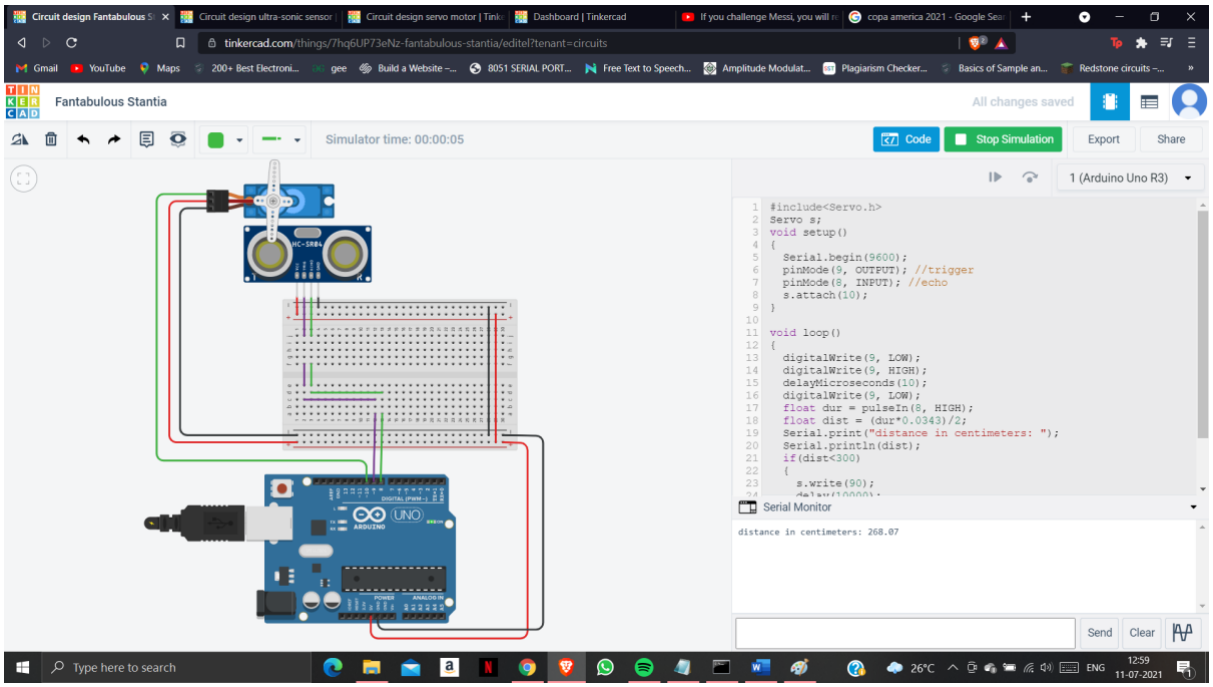
PROGRAM:

(The threshold distance used in this code to open the gate is 3 meters and the time that the garage door stays open is 10 seconds)

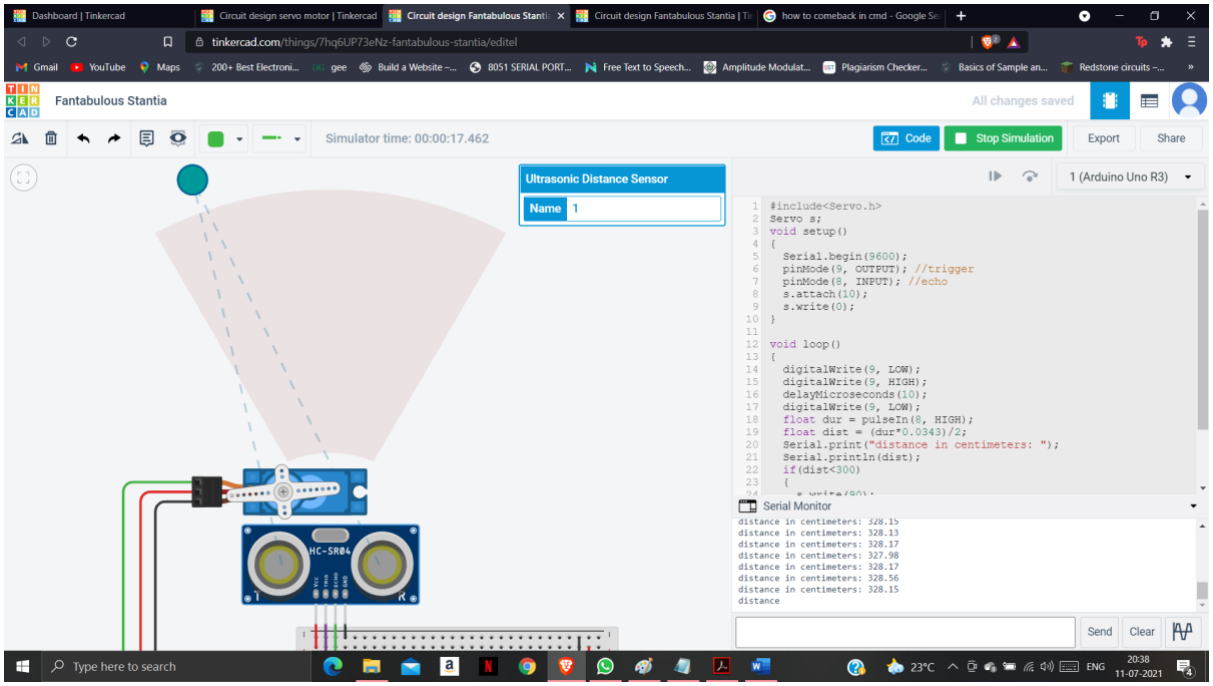
```
#include<Servo.h>
Servo s;
void setup()
{
  Serial.begin(9600);
  pinMode(9, OUTPUT); //trigger
  pinMode(8, INPUT); //echo
  s.attach(10);
  s.write(0);
}
void loop()
{
  digitalWrite(9, LOW);
  digitalWrite(9, HIGH);
  delayMicroseconds(10);
  digitalWrite(9, LOW);
  float dur = pulseIn(8, HIGH);
  float dist = (dur*0.0343)/2;
  Serial.print("distance in centimeters: ");
  Serial.println(dist);
  if(dist<300)
  {
    s.write(90);
    delay(10000);
    s.write(0);
  }
}
```

SIMULATION:

tinkercad simulation:

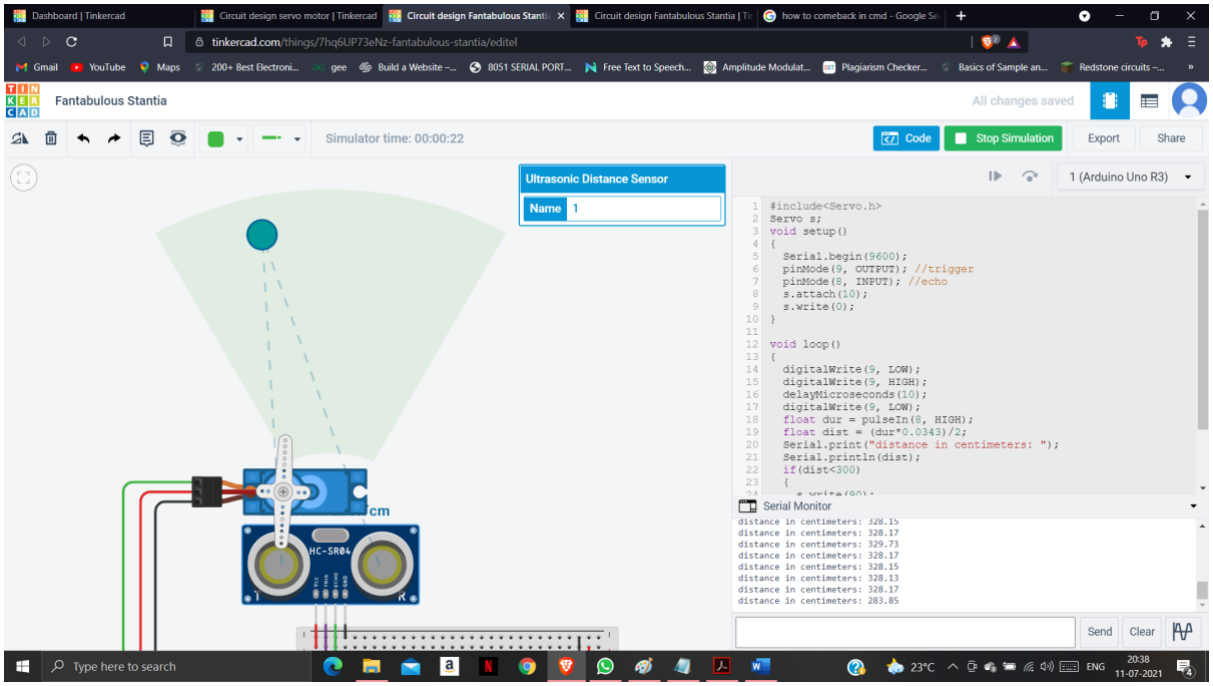


when the car is out of sight(>3meters):



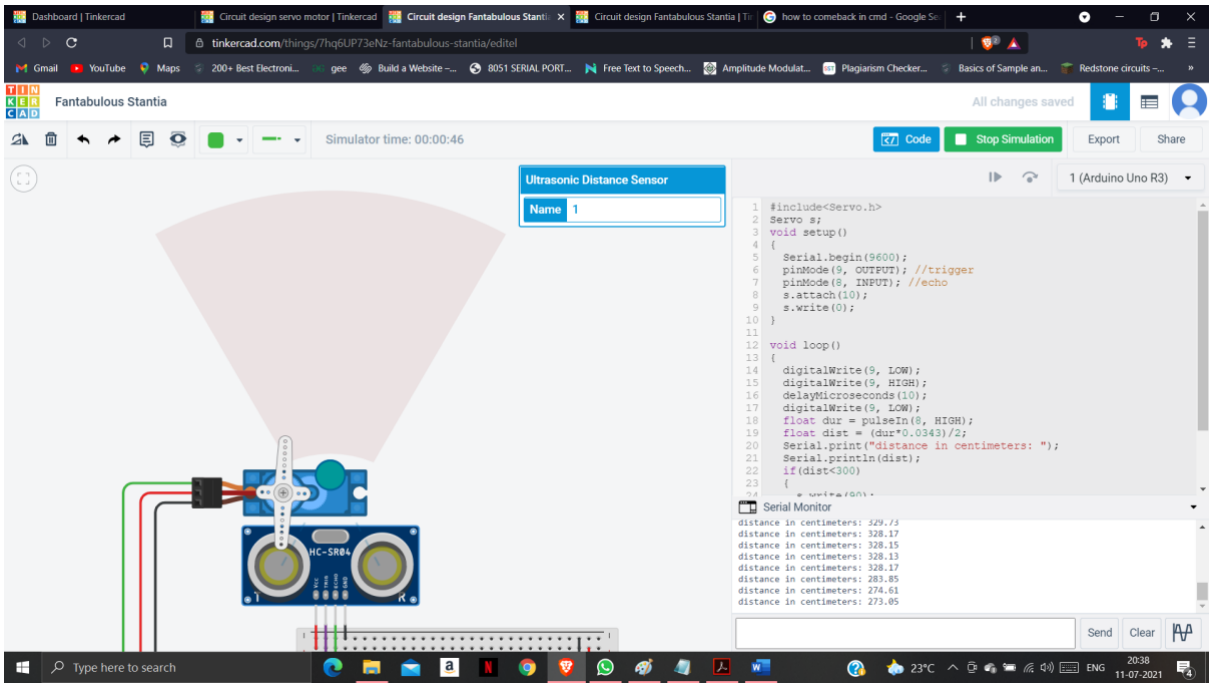
Since the car is out of sight, the garage door(servo) is set to closed state(set to 0 degrees).

when the car approached the garage door(<3meters):



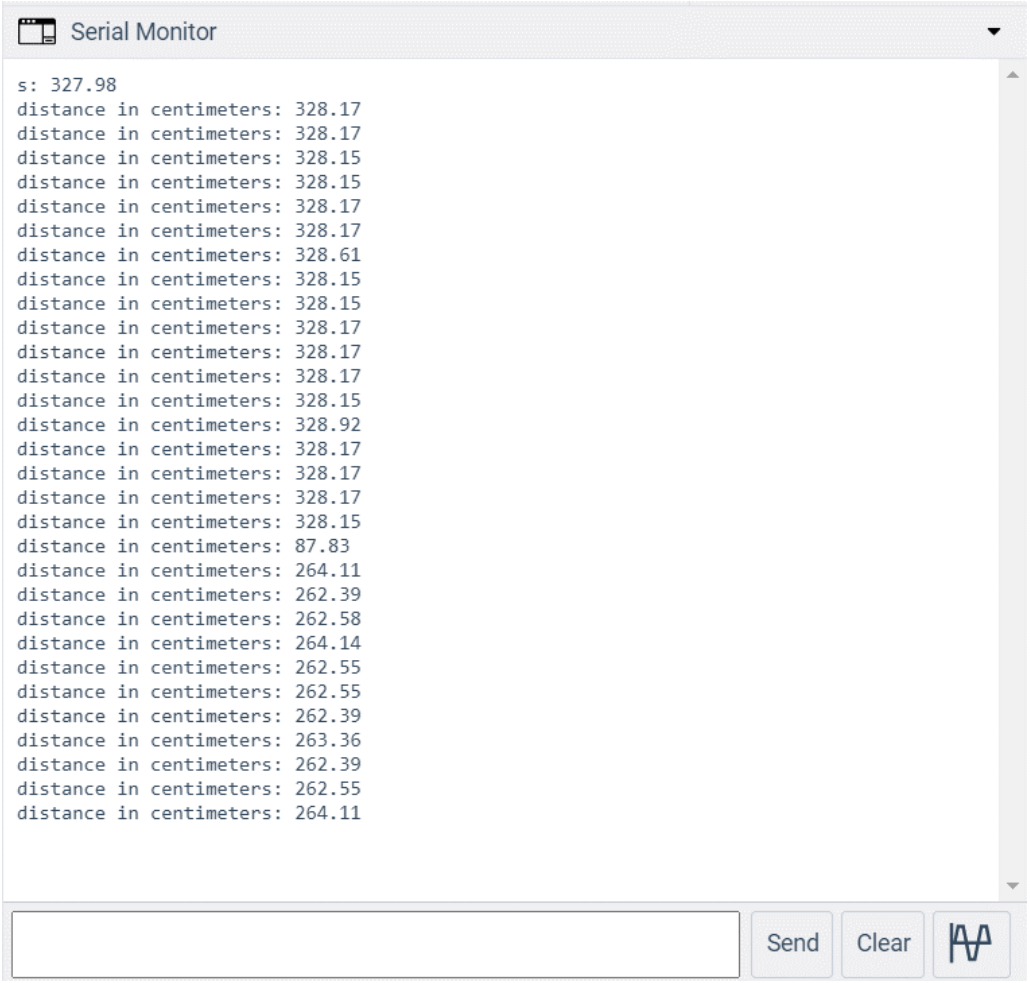
By the time the car reaches a distance which is less than 3 meters from the door, the door(servo) is opened(set to 90 degrees).

after the car goes inside the garage:



And when the car goes inside, as it goes out of sight the door is set back to closed stated

Distance on the Serial Monitor:



The live distance is being displayed on the Serial Monitor.

INFERENCE: It is observed that the ultrasonic sensor works by sending trigger pulses and receiving the echoes and calculating the distance with the time elapsed between the trigger and echo. So, the servo motor which is assumed as the garage door is programmed in a way that when the car approaches a distance less than 300 meters, it turns by 90 degrees depicting the opening of the door and waits stays open for 10 seconds and when the car moves out of sight the servo rotates to 0 degrees depicting the closing of the door.

RESULT: Hence, the Automatic garage door opening system is developed using an Ultrasonic sensor and a servo motor.