PES UNIVERSITY

END SEMESTER ASSESSMENT (ESA)
B.TECH. (CSE) IV SEMESTER

UE20CS252 – MICROPROCESSOR AND COMPUTER
ARCHITECTURE LABORATORY

PROJECT
REPORT ON

OBSTACLE AVOIDANCE AND FLAME DETECTION ROBOT

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JANUARY-MAY 2022

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ABSTRACT OF THE PROJECT

Project Description:
This robot is built with an Arduino development board on which microcontroller is placed. Arduino board is connected with DC Motor through Motor driver which provides power to the actuators. Actuators are used to move robot in Forward, Backward, Left and Right directions.

The robot shows a warning in the form of flashing led when heat/fire is detected and also detects when it is placed in the dark or light and gives feedback in the form of led (analogous to auto turn on/off headlights).

Sensors Used:
1. <u>Ultrasonic sensor</u>: Used to detect presence of obstacles along the path of the robot and trigger the motor driver via the Arduino to change direction.
2. <u>Light sensor:</u> Used to detect presence of light and trigger the LED to turn on/off depending on the level of darkness.
3. <u>Flame sensor:</u> Detects heat/fire close to the robot and triggers a warning signal in the form of flashing led.

Working of the project:
The movement of robot is stopped whenever there is an obstacle is present on its path which is detected by ultrasonic sensors.

Ultrasonic sensors give time in length to the microcontroller as a input for further actions.

- The brief description of inputs pins connected to the motor driver via the Arduino board for movement of robot is given below.

Movement	Pin 10	Pin 11	Pin 12	Pin 13
Forward	1	0	0	1
Backward	0	1	1	0
Left	1	0	1	0
Right	0	1	0	1

In the absence of an obstacle the Arduino is programmed to power both the left and right motors through the motor driver and If an obstacle is detected, power is sent only to only one wheel turning the robot in order to avoid the obstacle.

When the LDR detects a light over certain intensity, the Arduino will trigger the LED to turn off. When the intensity of light decreases, the LED is turned off.

A Infrared flame sensor is used that detects if heat or fire is present close to it and sets off a warning in the form of flashing LED.

CIRCUIT DIAGRAM
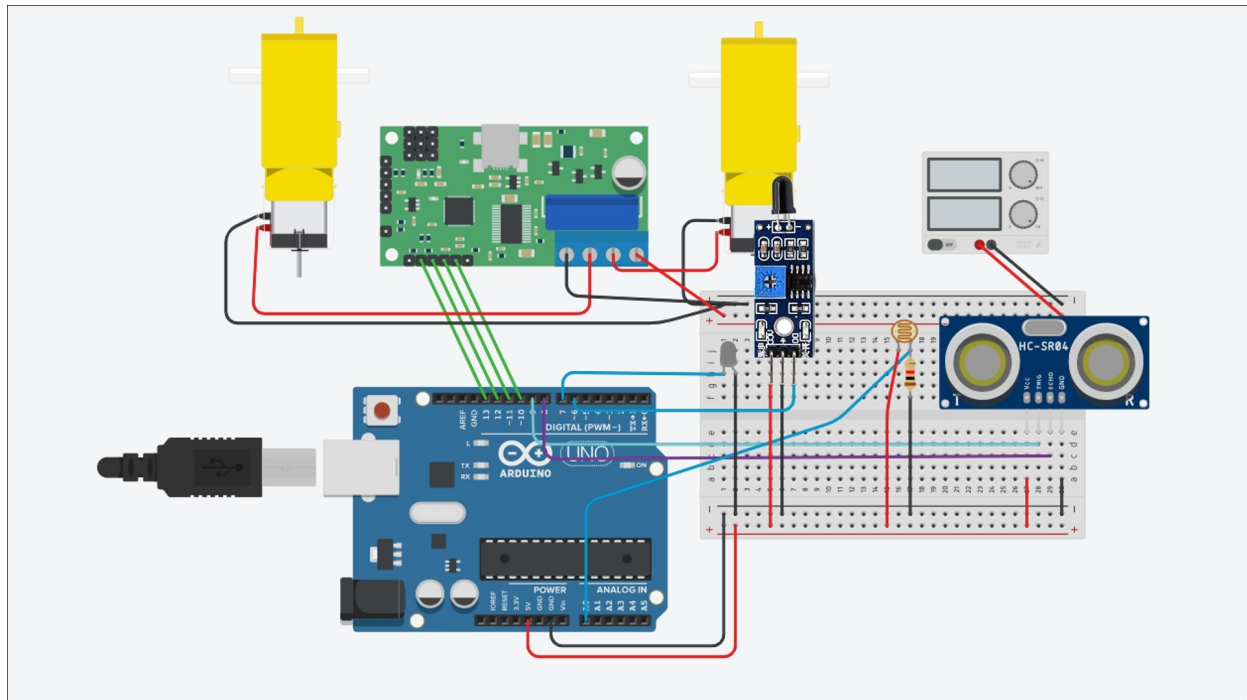
ARDUINO CODE

```
const int trigPin = 9; // Trig Pin Of HC-SR04
const int echoPin = 8; // Echo Pin Of HC-SR04
const int revleft4 = 10; // Motor Pins
const int fwdleft5 = 11;
const int revright6 = 12;
const int fwdright7 = 13;
const int ledPin = 7;
const int ldrPin = A0;

const int buzzerPin = 5;
const int flamePin = 6;
int Flame = HIGH;

long time, distance;
void setup() {
Serial.begin(9600);
pinMode(revleft4, OUTPUT); // Set Motor Pins
//As O/P
pinMode(fwdleft5, OUTPUT);
pinMode(revright6, OUTPUT);
pinMode(fwdright7, OUTPUT);
```

```
pinMode(trigPin, OUTPUT); // Set Trig Pin As
//O/P To Transmit Waves
pinMode(echoPin, INPUT); //Set Echo Pin As
//I/P To Recieve Reflected Waves
Serial.begin(9600);
pinMode(ledPin, OUTPUT);
pinMode(ldrPin, INPUT);

  pinMode(buzzerPin, OUTPUT);
  pinMode(flamePin, INPUT);
  Serial.begin(9600);

}
void loop() {
digitalWrite(trigPin,LOW);
delayMicroseconds(2);
digitalWrite(trigPin,HIGH);
delayMicroseconds(10);
digitalWrite(trigPin,LOW);
delayMicroseconds(2);
time=pulseIn(echoPin,HIGH);
distance=time*340/20000;
delay(10);
if (distance > 5) // Condition For Absence Of
//Obstacle
{
digitalWrite(fwdright7,HIGH); // Move
//Forward
digitalWrite(revright6,LOW);
digitalWrite(fwdleft5,HIGH);
digitalWrite(revleft4,LOW);
}
if (distance < 5) // Condition For Presence Of
//Obstacle
{
digitalWrite(fwdright7,LOW);//Stop
digitalWrite(revright6,LOW);
digitalWrite(fwdleft5,LOW);

digitalWrite(revleft4,LOW);
delay(500);
digitalWrite(fwdright7,LOW);// Move
//Backward
digitalWrite(revright6,HIGH);
digitalWrite(fwdleft5,LOW);
digitalWrite(revleft4,HIGH);
delay(500);
digitalWrite(fwdright7,LOW);//Stop
digitalWrite(revright6, LOW);
digitalWrite(fwdleft5,LOW);
digitalWrite(revleft4,LOW);
delay(100);
digitalWrite(fwdright7,HIGH);// Move Left
digitalWrite(revright6, LOW);
digitalWrite(revleft4,LOW);
digitalWrite(fwdleft5,LOW);
delay(500);}

int ldrStatus = analogRead(ldrPin);

if (ldrStatus <= 400)
{
    digitalWrite(ledPin, HIGH);
```
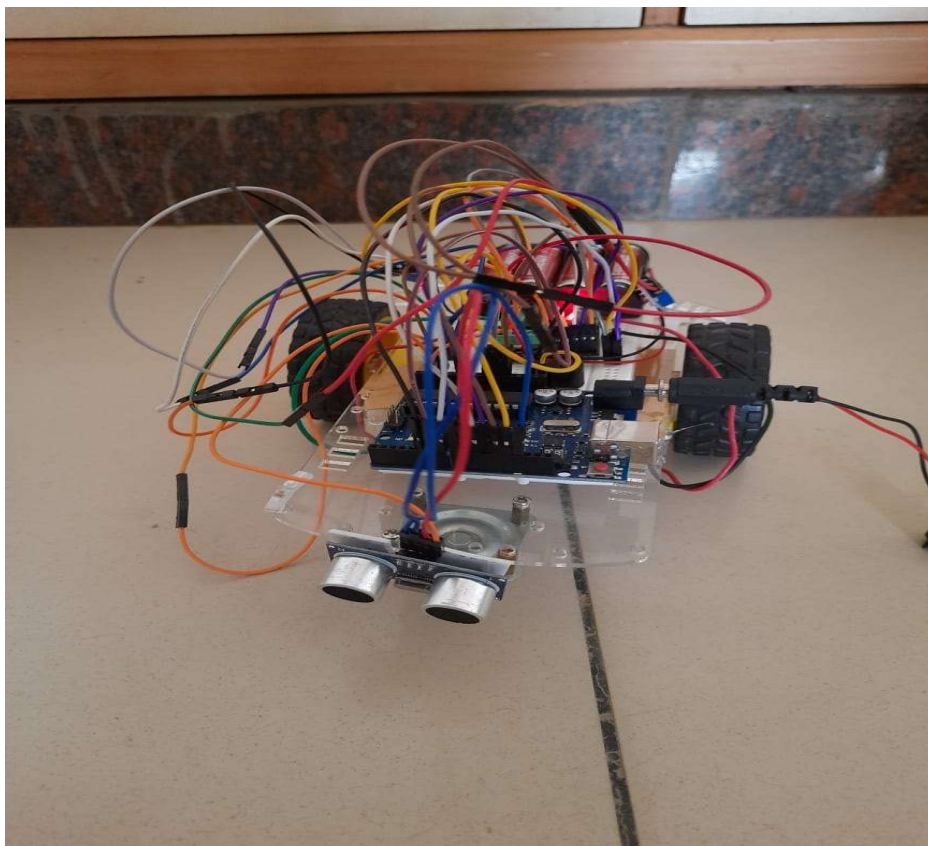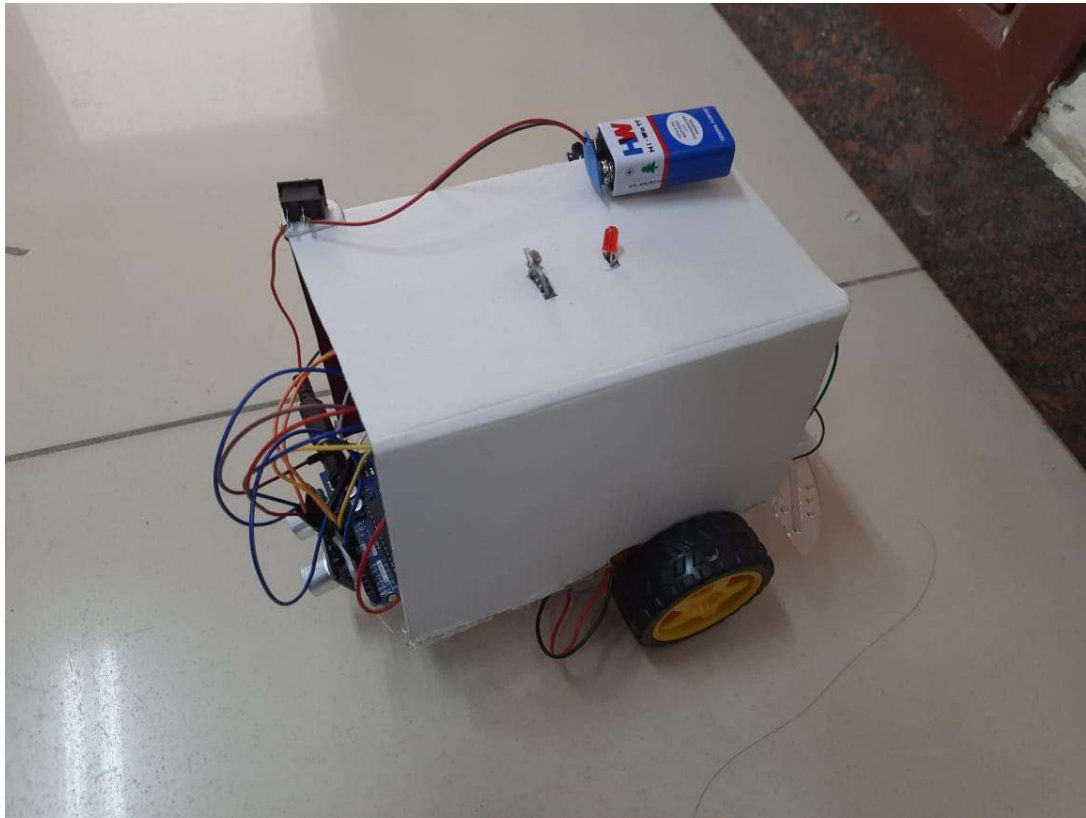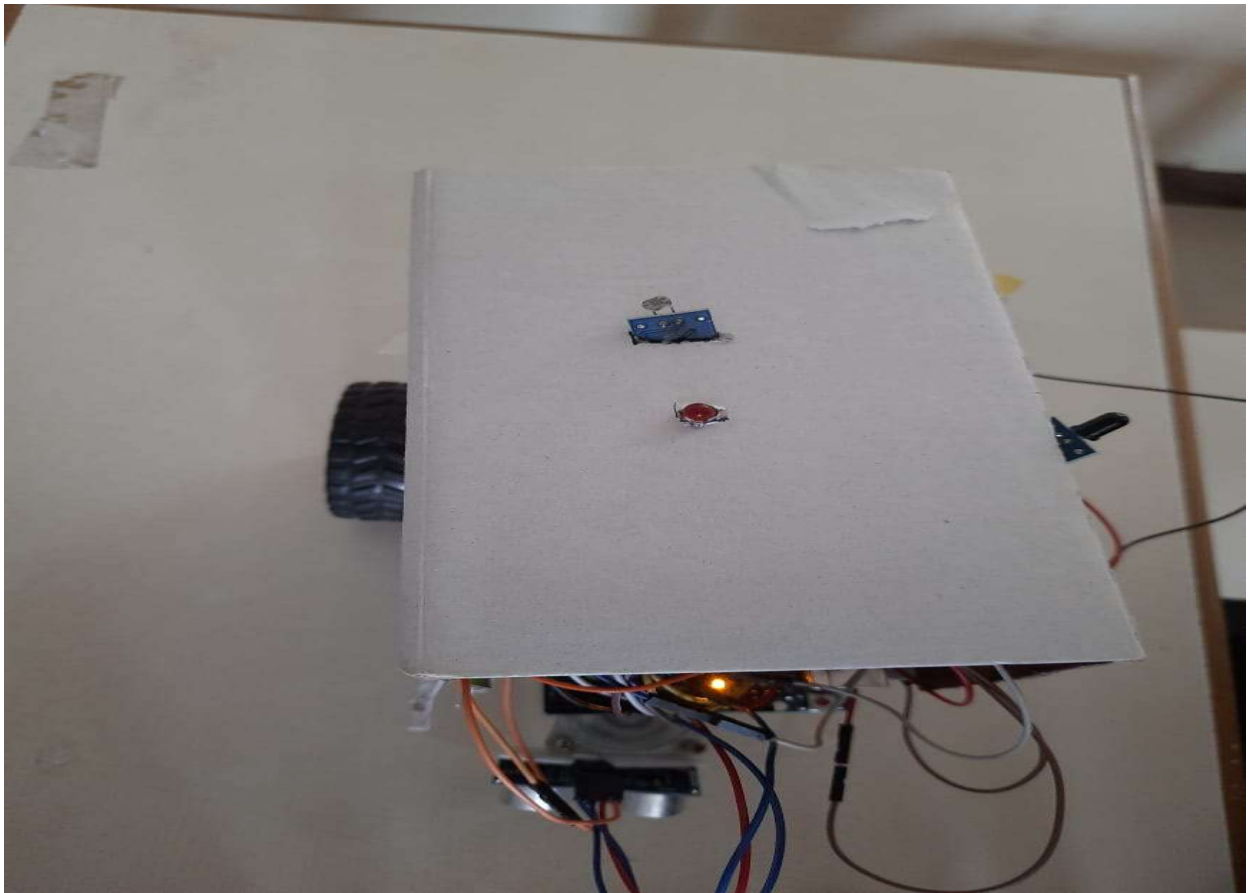
```
}
else
{
    digitalWrite(ledPin, LOW);

}

  Flame = digitalRead(flamePin);
  if (Flame== LOW)
  {

    digitalWrite(buzzerPin, HIGH);
  }
  else
  {

    digitalWrite(buzzerPin, LOW);
  }
}
```

PHYSICAL MODEL STRUCTURE

SCREENSHOTS OF THE OUTPUT

1. Light sensor detects ambient light and led stays off.

2. Light sensor detects darkness and led turns on.