

RESCUE-ROBOT

USING ARDUINO

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LOGIC CIRCUITS II

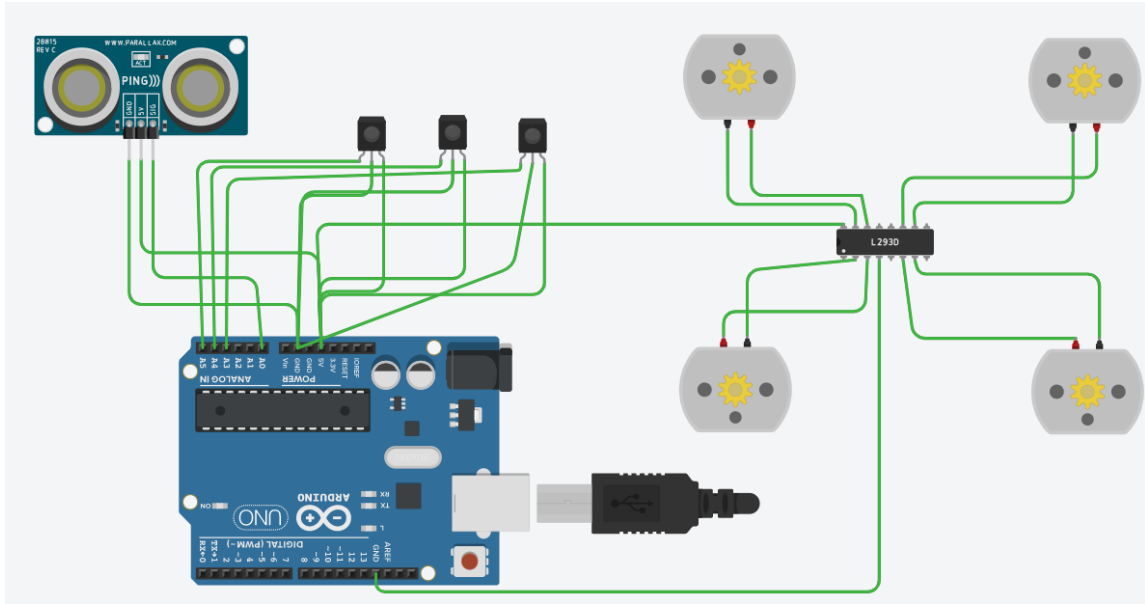
1.INTRODUCTION:

1.1 Abstract : This is a Rescue-Robot Arduino project, that simulates a real life robot used in crisis and earthquake environments that avoid obstacles that block it's path such as (Rocks or wreckage), searching for objects (victims or anything to be saved) and carrying them to the safety line also known as The end-zone.

1.2 Hardware: The robotic body consist of a black chassis (14cm x 9cm) where the Arduino is mounted above and a gripper mounted on a servo motor for opening and closing with an IR sensor just right above it to detect object to be saved (*gripper feature*) ,also two Infrared sensors are attached below the car to follow the specific path marked by the black line (*line-following feature*), and finally an ultrasonic sensor attached to a higher level above the chassis to detect obstacles as high rocks or anything else (*obstacle-avoiding feature*),the car movement is powered by 2 li-ion batteries controlled by a switch these powers 4 DC motors into motion controlled by L293 motor shield on the Arduino Uno used.

2.CODE & CONNECTIONS:

2.1 connections:



2.2 code:

```
#include <NewPing.h>
#include<Servo.h>
#include <AFMotor.h>
#define lefts A4
#define rights A3
#define TRIG_PIN A0
#define ECHO_PIN A1
#define objectIR A5
NewPing ultrasonic(TRIG_PIN, ECHO_PIN, maxDistance);
Servo myservo;
AF_DCMotor motor1(1, MOTOR12_1KHZ);
AF_DCMotor motor2(2, MOTOR12_1KHZ);
AF_DCMotor motor3(3, MOTOR34_1KHZ);
AF_DCMotor motor4(4, MOTOR34_1KHZ);
const int MIN_DISTANCE_FROM_OBJECT = 20;
int pos = 180;
const int maxDistance = 200;
int sensitivity_offset = 30;
int LEFT;
```

```

int RIGHT;
int Object;
int flag = 0;
int flag2 = 0;
int flagEnd = 0;
void setup() {
  pinMode(lefts, INPUT);
  pinMode(rights, INPUT);
  pinMode(objectIR, INPUT);
  myservo.attach(10);
  Serial.begin(9600);
}
void loop() {
  motor1.setSpeed(100);
  motor2.setSpeed(100);
  motor3.setSpeed(100);
  motor4.setSpeed(100);
  if (flag == 0) {      //flags for opening and closing the gripper
    openServo();
  }
  if (flag == 1) {
    flagEnd = 2;
  }
  LEFT = (analogRead(lefts));
  RIGHT = (analogRead(rights));
  Object = (analogRead(objectIR));
  if (!hasObstacle()) { //greater than 400 on black less than 400 on white

    if (foundObject() && flag2 == 0) {
      stopMoving();
      delay(15);
      closeServo();
      if (LEFT < 400 && RIGHT > 400) { // turn left    // right on black an left on white.
        turnLeft();
      }
      else if (LEFT > 400 && RIGHT < 400) { //turn right
        turnRight();
      }
      else if (LEFT >= 400 && RIGHT >= 400) { // both on black
        stopMoving();
        if (flagEnd == 2) {
          openServo(); //reached the end
          flag = 2;
          flagEnd = 3;
        }
      }
    }

    else if (LEFT < 400 && RIGHT < 400) { // both on white
      moveForward();
    }
  }
}

```

```

}
else
{
    if (LEFT < 400 && RIGHT > 400) { // turnleft    // right on black an left on white.
        turnLeft();
    }

    else if (LEFT > 400 && RIGHT < 400) { //turn right

        turnRight();
    }

    else if (LEFT >= 400 && RIGHT >= 400) { // both on black
        stopMoving();
        if (flagEnd == 2) {
            openServo(); //reached the end
            flag = 2;
            flagEnd = 3;

        }
    }

    else if (LEFT < 400 && RIGHT < 400) { // both on white
        moveForward();
    }
}
else {    //el ultrasonic shayef obstacle ba3ade menha
    for (int i = 0; i <= 2; i++) {
        stopMoving();
        delay(200);
    }
    for (int i = 0; i <= 3; i++) {
        turnLeft();
        delay(200);
    }
    stopMoving();
    delay(200);
    for (int i = 0; i <= 2; i++) {
        moveForward();
        delay(200);
    }
    stopMoving();
    delay(200);
    for (int i = 0; i <= 2; i++) {
        turnRight();
        delay(200);
    }
    for (int i = 0; i <= 1; i++) {
        moveForward();
    }
}

```

```

    delay(200);
}
stopMoving();
for (int i = 0; i <= 1; i++) {
    turnRight();
    delay(200);
}
stopMoving();

for (int i = 0; i <= 1; i++) {
    moveForward();
    delay(200);
}
stopMoving();
for (int i = 0; i <= 2; i++) {
    turnLeft();
    delay(200);
}

for (int i = 0; i <= 2; i++) {
    stopMoving();
    delay(200);
}
motor1.setSpeed(90);
motor2.setSpeed(90);
motor3.setSpeed(90);
motor4.setSpeed(90);
}
}
boolean hasObstacle() {
    int distance = ultrasonic.ping_cm();
    // Check if distance different of 0, because NewPing library returns 0 if
    // the distance is greater than the specified
    return distance > 0 && distance <= MIN_DISTANCE_FROM_OBJECT;
}
void moveBack() {
    motor1.run(BACKWARD); // move back
    motor2.run(BACKWARD);
    motor3.run(BACKWARD);
    motor4.run(BACKWARD);
}
void moveForward() {
    motor1.run(FORWARD);
    motor2.run(FORWARD); //forward
    motor3.run(FORWARD);
    motor4.run(FORWARD);
}
void turnLeft() {
    motor3.run(FORWARD); // turn left
    motor4.run(FORWARD);
}

```

```

    motor1.run(BACKWARD);
    motor2.run(BACKWARD);
}
void turnRight() {
    motor1.run(FORWARD);        // turn right
    motor2.run(FORWARD);
    motor3.run(BACKWARD);
    motor4.run(BACKWARD);
}
void stopMoving() {
    motor1.run(RELEASE);        //stop
    motor2.run(RELEASE);
    motor3.run(RELEASE);
    motor4.run(RELEASE);
}

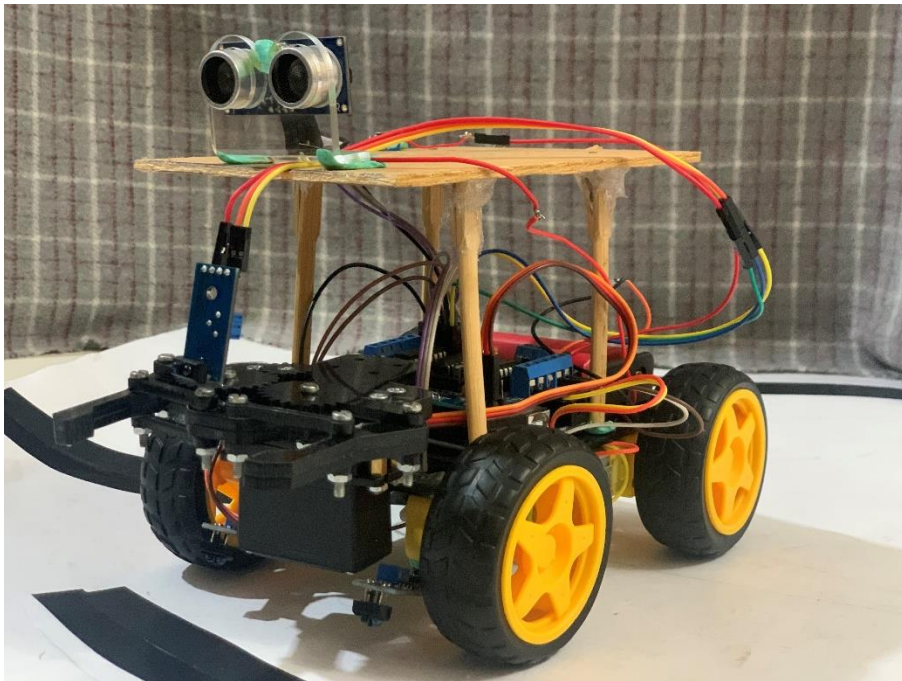
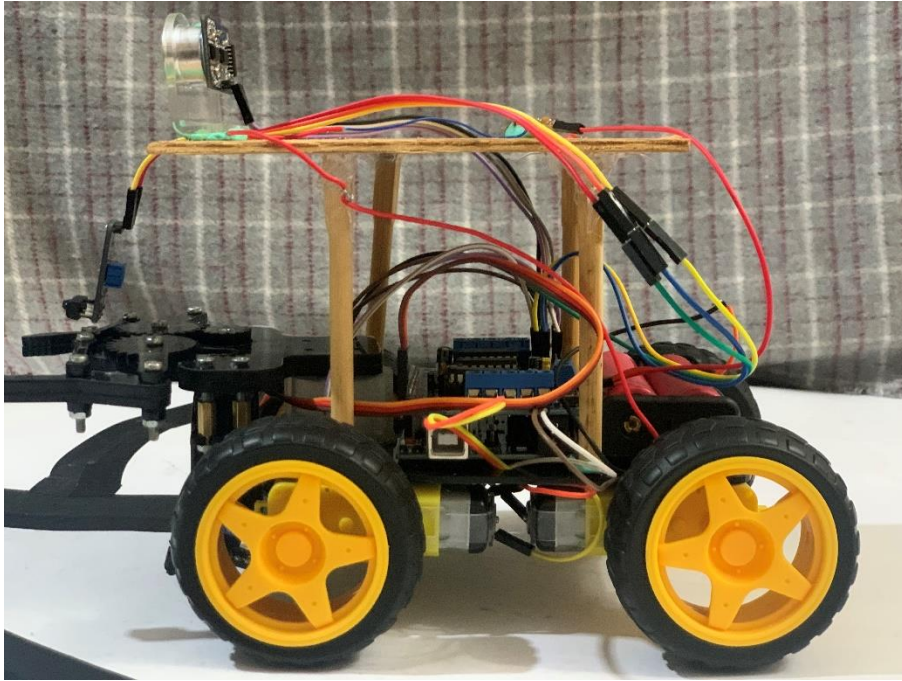
boolean foundObject()
{
    if (!hasObstacle() && Object <= 500 ) { //found the object
        return true;
    }
    else {
        return false;
    }
}

void openServo() {
    flag = 1;
    flagEnd = 1;
    for (pos = 30; pos <= 180; pos += 1) { // goes from 0 degrees to 180 degrees
        // in steps of 1 degree
        myservo.write(pos);        // tell servo to go to position in variable 'pos'
        delay(15);                // waits 15ms for the servo to reach the position
    }
}

void closeServo() {
    flag2 = 1;
    for (pos = 180; pos >= 30; pos -= 1) { // goes from 180 degrees to 0 degrees
        myservo.write(pos);        // tell servo to go to position in variable 'pos'
        delay(15);                // waits 15ms for the servo to reach the position
    }
}

```

3.PICTURES:



4.LINKS:

4.1 REFERENCES:

- <https://www.hackster.io/FSantos97/line-follower-robot-with-obstacle-detection-ff4389>
- https://www.youtube.com/watch?v=1n_KjpMfVT0

4.2 CONTACT INFO:

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4.3 YOUTUBE VIDEO:

- <https://www.youtube.com/watch?v=As3GULNyEgQ&feature=youtu.be>