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ROBOT CAR ASSEMBLY TECHNOLOGY FOR OBSTACLE AVOIDANCE USING ARDUINO UNO AND L293D WITH HC-SR04 SENSOR

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Abstract: In this article, technology classes discuss the technology of assembling a robotic car that overcomes obstacles using digital software Arduino UNO and L293D with an HC-SR04 sensor.
Keywords: Arduino UNO, HC-SR04 sensor, L293D digital program.

Currently, a modern system of public education and higher education has been created in our republic. The main goal of the large-scale work carried out to improve the level of and increasing their efficiency, training them as devoted children of their country and creating all conditions for them to acquire sound knowledge.

PF-5847 dated October 8, 2019 of the President of the Republic of Uzbekistan "Development of the higher education system of the Republic of Uzbekistan until 2030", PF-6097 dated October 29, 2020 "Science until 2030 based on the development concept". The use of students' information technologies in robotics lessons, the fundamentals of science technology, the use of innovative technologies in the development of technical creativity.

Arduino is a small board with its own processor (microcontroller) and memory. There are many types of Arduino, for example: Arduino Yun, Arduino Uno, Arduino Duemilanove, Arduino Diecimila, Arduino Nano, Arduino Mega, Mega 2560, Mega ADK, Arduino Leonardo, Arduino Micro. Arduino is very useful for young people who are interested in robotics and electronics because this device can be used to create small and large programs, algorithms, perform various devices, robots and other interesting operations.

Building an Obstacle Avoidance Robot using Arduino Uno, L293D Motor Control Board and HC-SR04 Ultrasonic Sensor is a great project that combines programming and hardware. This robot can detect obstacles in its path and move independently to avoid collisions. This project uses a combination of sensors and the Arduino platform to demonstrate the flexibility and power of autonomous robotics.

Spare parts for robots

Arduino uno R3 board

4 Wheel Robot Car Kit

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L293D motor

SG90 Servo motor

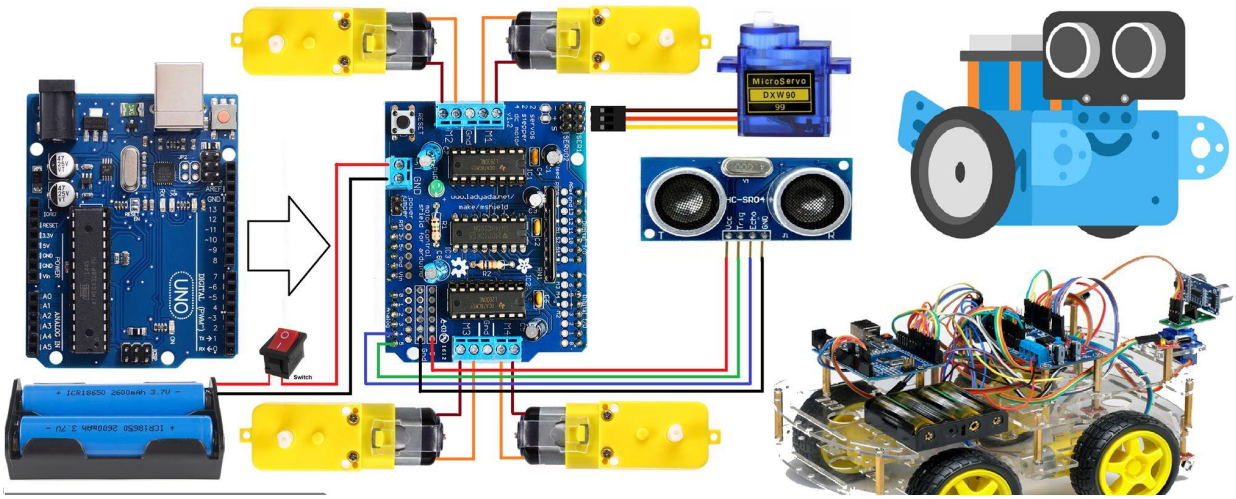
Ultrasonic sensor HC-Sr04

4500 battery 3.7V 2x

Electrical circuit

L293D Two 4500 7.4V battery cells connected to the motor driver power supply. This power source powers four DC motors that drive the wheels. The SG90 servo motor is connected to pin 10 on the Arduino and the ultrasonic sensor is connected to the Arduino UNO via trigger and echo pin. Arduino UNO carries out all the logic including distance measurement using an ultrasonic sensor and servo motor movement to avoid obstacles. The L293D motor driver controls the direction and speed of the motors.

Schematic view



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Arduino IDE code

```
#include <Servo.h>
#define echopin A4 // echo pin
#define trigpin A5 // Trigger pin
Servo myservo;
const int MOTOR_1 = 1;
const int MOTOR_2 = 2;
const int MOTOR_3 = 3;
const int MOTOR_4 = 4;
AF_DCMotor motor1(MOTOR_1, MOTOR12_64K
HZ); // create motor object, 64KHz pwm
AF_DCMotor motor2(MOTOR_2, MOTOR12_64K
HZ); // create motor object, 64KHz pwm
AF_DCMotor motor3(MOTOR_3, MOTOR12_64K
HZ); // create motor object, 64KHz pwm
AF_DCMotor motor4(MOTOR_4, MOTOR12_64K
HZ); // create motor object, 64KHz pwm
//=====================================
=====================================
======
// Initialization
//=====================================
=====================================
======
int distance_L, distance_F, distance_R;
long distance;
int set = 20;
 void setup() {
  Serial.begin(9600); // Initialize serial port
  Serial.println ("Start");
  myservo.attach(10);
  myservo.write(90);
  pinMode (trigpin, OUTPUT);
  pinMode (echopin, INPUT );
motor1.setSpeed(180); // set the motor speed to 0
-255
  motor2.setSpeed(180);
  motor3.setSpeed(180);
  motor4.setSpeed(180);
}
//=====================================
=====================================
// Main
//=====================================
=====================================
void loop() {
 distance_F = data();
 Serial.print ("S=");
 Serial.println (distance_F);
  if (distance_F > set){
   Serial.println ("Forward");
  motor1.run(FORWARD); // turn it on going forward
  motor2.run(FORWARD);
  motor3.run(FORWARD);
  motor4.run(FORWARD );    }
    else{hc_sr4();}}
long data(){
  digitalWrite (trigpin , LOW);
  delayMicroseconds (2);
  digitalWrite (trigpin , HIGH);
  delayMicroseconds (10);
  distance = pulseIn (echopin , HIGH);
  return distance / 29 / 2 ;}
void compareDistance (){
 if(distance_L > distance_R){
 motor1.run(BACKWARD);
// turn it on going left
 motor2.run(BACKWARD);
 motor3.run(FORWARD);
 motor4.run(FORWARD);
  delay(350);
}
else if(distance_R > distance_L){
 motor1.run(FORWARD); // the other right
 motor2.run(FORWARD);
 motor3.run(BACKWARD);
 motor4.run(BACKWARD);
  delay(350);
}
else{
 motor1.run(BACKWARD); // the other way
 motor2.run(BACKWARD);
 motor3.run(BACKWARD);
 motor4.run(BACKWARD);
  delay(300);
 motor1.run(BACKWARD);
// turn it on going left
 motor2.run(BACKWARD);
 motor3.run(FORWARD);
 motor4.run(FORWARD);
  delay(500); }}
void hc_sr4(){
   Serial.println("Stop");
   motor1.run(RELEASE);
// stopped
   motor2.run(RELEASE);
   motor3.run(RELEASE);
   motor4.run(RELEASE);

   myservo.write(0);
   delay(300);
   distance_R = data();
   delay(100);
   myservo.write(170);
   delay(500);
   distance_L = data();
   delay(100);
   myservo.write(90);
   delay(300);
   compareDistance();}
```

IDE Code Explained

The required libraries AFMotor for motor control and Servo for servo motor control are first included in the code. Then the echo and treg pins of the HC-SR04 ultrasonic sensor are detected. Four DC motors and a servo motor are activated. The motors are set to a 64 kHz switching frequency and connected to specific motor pins. The setup() method defines variables for the specified boundaries and distances.

Robot car testing

We attach each part according to the diagram. Using the Arduino IDE, we upload the Arduino code to the Arduino Uno. The robot is powered by a 4500 mAh battery. We can see how the robot reacts to obstacles in its path in the next video.

Build a self-propelled, obstacle-avoiding robot using an Arduino Uno, L293D Motor Control Board, and HC-SR04 Ultrasonic Sensor. This project is a great way to get started with robots and can be expanded to include even more features. By funding projects like this, we can develop an intelligent self-propelled vacuum cleaner, a robot with a camera that can go into places where people can't go, a robot for the military that can detect mines, and a robot for the medical field that can detect people. body temperature in crowded places.

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List of used literatu

1. O‘zbekiston Respublikasi Prezidentimizning 2019-yil 8-oktyabrdagi PF-5847-son “O‘zbekiston Respublikasi oliy ta’lim tizimini 2030-yilgacha rivojlantirish” konsepsiyasi
2. O‘zbekiston Respublikasi Prezidentimizning 2020-yil 29-oktyabrdagi PF- 6097-son “Ilm-fanni 2030-yilgacha rivojlantrish” konsepsiyasi
3. N.SH.Turdiyev Radioyelektronika asoslari. – Toshkent: “O‘qituvchi”, 1992
4. Edward Hughes, John Hiley, Keith Brown, Ian McKenzie Smith «Electrical and Electronic Technology» Pearson Education Limited, Harlow, United Kingdom 2012.
5. *Подураев Ю.В.* Мехатроника: основы, методы, применение. – М.: «Машиностроение», 2006.-256 с.
6. Texnologiya [Matn] : 7-sinf uchun darslik / – Toshkent : Respublika ta’lim markazi, 2023. – 240 b.
7. Texnologiya [Matn] : 6-sinf uchun darslik / – Toshkent : Respublika ta’lim markazi, 2021. – 240 b.
8. Texnologiya [Matn] : 5-sinf uchun darslik / – Toshkent : Respublika ta’lim markazi, 2023.

Information sources

1. www.pedagog.uz
2. www.apkpro.ru/content/view
3. www.prometeus.nsc.ru/contents/books/slasten
4. www.relarn.ru/conf/conf2007