TA0136
USER MANUAL
ARDUINO 2 WHEEL DRIVE ULTRASONIC ROBOT KIT
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1. Overview – TA0136

In this instruction, we will introduce you through the fun project of the Arduino 2 Wheel Drive Ultrasonic Robot Kit. Get your Arduino board kit. Let’s get started!

2. Getting started: Programming the arm robot using Arduino UNO

2.1. What is Arduino?
Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards can read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

2.2. What is IDUINO UNO?

The Iduino Uno is on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analogue inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

For more information:  https://store.arduino.cc/usa/arduino-uno-rev3

2.3. What are the differences between other Arduino development boards we are providing?

There are a bunch of Arduino boards, they come in different shapes and sizes, with different processing power, digital IO, and other capabilities. Rather than telling you guys what to buy, we have put together a handy guide to show you the capabilities of each board.
No need to worry anything for now as you will gain deep understanding after completing this fun project. Stay with me and get your hands dirty using Arduino UNO.

For more information: https://www.arduino.cc/en/Products/Compare

3. Software installation

In this section, we will introduce you the development platform where you translate creative mind into codes and let it fly.

3.1. Arduino Software/IDE

Download from [here](https://www.arduino.cc). Open Windows-based app by double clicking it and follow the instruction to complete(Remember to install everything driver for Arduino). Easy!

Connecting your UNO board with your computer

Connecting UNO and your PC by a blue USB cable, and if connected correctly you will see the green power LED light up and another orange LED is blinking.
Find your Serial COM number and note it down.

![Figure 2 Check Your special COM and note it down the number](image)

We need to figure out which channel COM is currently communicating between PC and UNO. Following the path: Control panel | Hardware and Sound | Devices and Printers | Device Manager | Ports (COM & LPT) | Arduino UNO (COMx)

Note down the COM number as we require this later. In this case, we are using the COM 4

3.2. Play with your first “Hello World” LED example

Firstly, let’s tell IDE where to find our Arduino port and which board you are currently using: The following instruction (Figure 3 and 4) shows the details:

![Configuration of Ports](image)
Configuration of the Board
It’s time to play with you first simple example. Following the path by File | Examples | 01. Basics | Blink. A new code window would pop up, press the arrow symbol to upload. You will notice the orange LED is blinking almost every second.

3.3. Run your Arduino 2 Wheel Drive code

```
#include <Servo.h>

int pinL6=6; // define pin6 as left back connect with IN1
int pinL9=9; // define pin9 as left forward connect with IN2
int pinR6=10; // define pin10 as right back connect with IN3
int pinR9=11; // define pin11 as right back connect with IN4
int inputPin = A0; // define ultrasonic receive pin (Echo)
int outputPin = A1; // define ultrasonic send pin (Trig)
int speedL = 0; // forward distance
int speedR = 0; // right distance
int direction = 0; // left distance

void setup()
{
  Servo myservo; // new myservo
  delay_time = 200; // set stable time
  myservo.attach(8);
  myservo.write(0);
  delay(200);
  myservo.write(120);
  delay(200);
  turn_right;
  turn_left;
}
```

Upload to UNO
4. Hardware installation

4.1. Unboxing and Component list

- Acrylic Chassis
- DC Motors
- SG90 Servo and Bracket
- Rubber Wheels
- Metal Pivot wheel
- Ultrasonic Sensor
- Arduino UNO
- Sensor shield
- 6 x AA Battery Box
- L298N Board
- Switch

- Fastener package
  Screw, nuts and spacer components
4.2. Chassis Frame Installation

Remove the protective cover and prepare the items:
- 4 x M3 * 6 Screw
- 4 x M3 x 10 Spacer
- Metal Pivot Wheel

Assemble the M3*10 spacers and M3*6 screws onto the Metal Pivot Wheel
Prepare the four M3*6 screws

Screw in the metal pivot wheel to the chassis
Gather four M3*10 screws and nuts to secure L289N board.

Screw the L289N board from the bottom chassis.
Gather four M3*8 screws and four M3*36 spacers

Secure Spacers onto the chassis as per the picture on the left.
Spacers/Stand-offs should look like this
Gather the following components:

- 2 x DC motors
- 2 x Acrylic Motor Brackets
- 4 x M3*30 screws and nuts

*Attaching wheel encoders are optional. These are not required for this particular project*
Place acrylic DC motor Brackets on both sides of the motors as shown on the left

Gather another two acrylic fasteners and two wheels and nuts
Insert the acrylic fasteners first in pre-cut slot.

Then tighten and secure the DC motor with one nut on the other side.
4.3. Arduino Installation
Let’s fix the Arduino UNO and Sensor shield in the following steps.

Fix the other motor as well

Pull the wire through as we need to connect them to the L289N board
Prepare the jumper cables

Separate the jumper cable set into four and eight configurations
Connect the 8 jumpers with L289N board as shown.

Prepare the following:
- Battery pack
- UNO board
- Top acrylic chassis
  - 6 x nuts
- 6 x M3*10 screws
Peel the protective cover

Place the battery pack and UNO board on the top acrylic chassis
Secure the screws from the bottom.

It should look like this.
Feed the jumper wire from the L298N board and pull through to the top acrylic chassis hole to connect with the UNO board later.

Mount the top acrylic chassis to the bottom chassis.
Use four M3*6 screws to secure top acrylic chassis.

It should look like this
4.4. Sensor installation

Ultrasonic sensor acts as the eye of this 2-wheel drive car. In the following steps, we are going to guide you through the installation of ultrasonic sensor and servo.

Place the sensor shield on the top of the UNO board and ensure the pins line up with the Uno Board.

Items required in this step
Assemble the FPV holder and servo

Use two self-tapping screws (in the FPV package) to tighten
Prepare the items

To fit the servo horn into the black holder we need to modify as pictured. Best tool to do this with is a side cutter
Place the modified servo horn inside the bracket and secure with 6 * M2.5 screws.

It should look like this.
To tighten the ultrasonic sensor, we can use several cable ties (Not included in the Kit). Alternatively, you can use other methods:
- Use rubber bands
- Hot Melt Glue Gun
- Thread or Plastic Strings

It should look like this
Prepare the Self-tapping screw in the Servo package and tighten the sensor part with servo rack.

It should look like this.
Gather four M2.5 screws and corresponding nuts in the FPV package to secure to the bottom chassis.

Finished!

4.5. Switch

The switch can save you a lot energy turning the car on and off. However, it’s just an option. It can be done by putting the switch in line with the battery box power wire.
Insert the switch in pre-cut slot

Solder the switch in line with the power cable

The following diagram shows the switch connection with battery pack and L289N.
4.6. Wire Connection

You are almost there. Final step is to wire the cables to power supply (i.e. Battery Box), UNO board, ultrasonic sensor and Servo. The following diagram shows the connection map. Don’t panic if this is your first project, you can also follow the connection table 2.
Figure 3 Connection map

Figure 4 Arduino Sensor shield v5.0 Diagram
### Table 2: Connection table

<table>
<thead>
<tr>
<th>UNO board Sensor Shield</th>
<th>L289N</th>
<th>Battery Box</th>
<th>Motor left</th>
<th>Motor Right</th>
<th>Servo</th>
<th>Ultrasonic sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GND</td>
<td>GND</td>
<td>VMS</td>
<td>VMS</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>+(Left)</td>
<td>+(red)</td>
<td>-(Left)</td>
<td>-(black)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+(Right)</td>
<td>+(red)</td>
<td>-(Right)</td>
<td>-(black)</td>
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<tr>
<td>V</td>
<td>ENA</td>
<td></td>
<td>G</td>
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<td></td>
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<tr>
<td>6</td>
<td>IN1</td>
<td></td>
<td>5V+</td>
<td></td>
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<td>9</td>
<td>IN2</td>
<td></td>
<td></td>
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<tr>
<td>10</td>
<td>IN3</td>
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<td>+</td>
<td>Trig</td>
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<tr>
<td>A0</td>
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<td></td>
<td></td>
<td></td>
<td>Echo</td>
<td></td>
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<tr>
<td>S</td>
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<td>-</td>
<td></td>
</tr>
</tbody>
</table>
5. Have fun

Now it’s time to have fun! Turn the power on, and see how your DIY Arduino Robot car goes! After final assembly and activation, the Robot car may require adjustments and debugging. The Robot will perform on how it is programmed. Figuring out what the code is doing is part of the learning process. Reopen your Arduino IDE and we assure you will learn a lot once you gain a deep understanding of the code.

This kit is just a starting point and can be expanded to incorporate other sensors and modules. You are limited by your imagination.

We are also offering other Arduino Robot Kit versions where you can learn WIFI, Bluetooth, infrared remote control and so many more.

- Arduino 4 Wheel Drive with Ultrasonic & Line Tracer Bluetooth Robot Kit
- Arduino 4 Wheel Drive with Ultrasonic & Line Tracer Robot Kit
- Arduino 2 Wheel Drive Wireless Bluetooth Robot Kit
- Arduino Robot Arm 4dof Mechanical Claw Kit

Check our website at Here.
Appendix

Code:

**********Code begin**********

#include <Servo.h>

int pinLB=6; // define pin6 as left back connect with IN1
int pinLF=9; // define pin9 as left forward connect with IN2
int pinRB=10; // define pin10 as right back connect with IN3
int pinRF=11; // define pin11 as right back connect with IN4
int inputPin = A0; // define ultrasonic receive pin (Echo)
int outputPin = A1; // define ultrasonic send pin(Trig)
int speed = 0; // forward distance
int Rspeed = 0; // right distance
int Lspeed = 0; // left distance
int direction = 0; //
Servo myservo; // new myservo
int delay_time = 250; // set stable time
int Fgo = 8;
int Rgo = 6;
int Lgo = 4;
int Bgo = 2;
// forward
// turn right
// turn left
// back
void setup()
{
  Serial.begin(9600);
  pinMode(pinLB, OUTPUT);
  pinMode(pinLF, OUTPUT);
  pinMode(pinRB, OUTPUT);
  pinMode(pinRF, OUTPUT);
  pinMode(inputPin, INPUT);
  pinMode(outputPin, OUTPUT);
  myservo.attach(5); // define the servo pin(PWM)
}
void advance(int a) // forward
{
  digitalWrite(pinRB, LOW);
  digitalWrite(pinRF, HIGH);
  digitalWrite(pinLB, LOW);
  digitalWrite(pinLF, HIGH);
  delay(a * 40);
}
void turnR(int d) // turn right
{
  digitalWrite(pinRB, LOW);
  digitalWrite(pinRF, HIGH);
  digitalWrite(pinLB, HIGH);
  digitalWrite(pinLF, LOW);
  delay(d * 50);
}
void turnL(int e) // turn left
{
  digitalWrite(pinRB, HIGH);
  digitalWrite(pinRF, LOW);
digitalWrite(pinLB,LOW);
digitalWrite(pinLF,HIGH);
delay(e * 50);
}
void stopp(int f) //stop
{
digitalWrite(pinRB,HIGH);
digitalWrite(pinRF,HIGH);
digitalWrite(pinLB,HIGH);
digitalWrite(pinLF,HIGH);
delay(f * 100);
}
void back(int g) //back
{
digitalWrite(pinRB,HIGH);
digitalWrite(pinRF,LOW);
digitalWrite(pinLB,HIGH);
digitalWrite(pinLF,LOW);
delay(g * 300);
}
void detection() //test the distance of different direction
{
  int delay_time = 250; //
  ask_pin_F(); // read forward distance
  if(Fspeedd < 10) // if distance less then 10
  {
    stopp(1);
    back(2);
  }
  if(Fspeedd < 25) // if distance less then 10
  {
    stopp(1);
    ask_pin_L();
    delay(delay_time);
    ask_pin_R();
    delay(delay_time);
    if(Lspeedd > Rspeedd) //if left distanc
  
    
    }  
  if(Lspeedd <= Rspeedd)//if left distance not more than right
    //distance
  { 
    directionn = Lgo;
  }  
  //if left if (Lspeedd < 10 && Rspeedd < 10) distance and right
  //distance both less than 10
  { 
    directionn = Bgo;
  }  
  else 
  { 
    directionn = Fgo; // forward go
  }  
}
void ask_pin_F() // test forward distance
{
  myservo.write(90);
  digitalWrite(outputPin, LOW);
  delayMicroseconds(2);
  digitalWrite(outputPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(outputPin, LOW);
  float Fdistance = pulseIn(inputPin, HIGH);
  Fdistance = Fdistance/5.8/10;
  Serial.print("F distance:");
  Serial.println(Fdistance);
  Fspeedd = Fdistance;
}
void ask_pin_L() // test left distance
{
  myservo.write(5);
  delay(delay_time);
  digitalWrite(outputPin, LOW);
  delayMicroseconds(2);
  digitalWrite(outputPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(outputPin, LOW);
  float Ldistance = pulseIn(inputPin, HIGH);
  Ldistance = Ldistance/5.8/10;
  Serial.print("L distance:");
  Serial.println(Ldistance);
  Lspeedd = Ldistance;
}
void ask_pin_R() // test right distance
{
  myservo.write(177);
  delay(delay_time);
  digitalWrite(outputPin, LOW);
  delayMicroseconds(2);
  digitalWrite(outputPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(outputPin, LOW);
  float Rdistance = pulseIn(inputPin, HIGH);
  Rdistance = Rdistance/5.8/10;
  Serial.print("R distance:");
  Serial.println(Rdistance);
  Rspeedd = Rdistance;
}
void loop()
{
  myservo.write(90);
  detection();
  if(directionn == 2)
  {
    back(8);
    turnL(2);
    Serial.print(" Reverse ");
  }
  if(directionn == 6)
back(1);
turnR(6);
Serial.print(" Right ");
}
if(directionn == 4)
{
back(1);
turnL(6);
Serial.print(" Left ");
}
if(directionn == 8)
{
advance(1);
Serial.print(" Advance ");
Serial.print(" ");
}

********Code End*******