Lesson 5 Servo

About this lesson:

In this lesson, you will learn how to control a servo motor using LAFVIN UNO R3.

The servo motor has three leads. The color of the leads varies between servo motors, but the red lead is always 5V and GND will either be brown.The red one is the power wire and should be connected to the 5v port and this is usually orange. This control lead is connected to digital pin 9.

Introduction

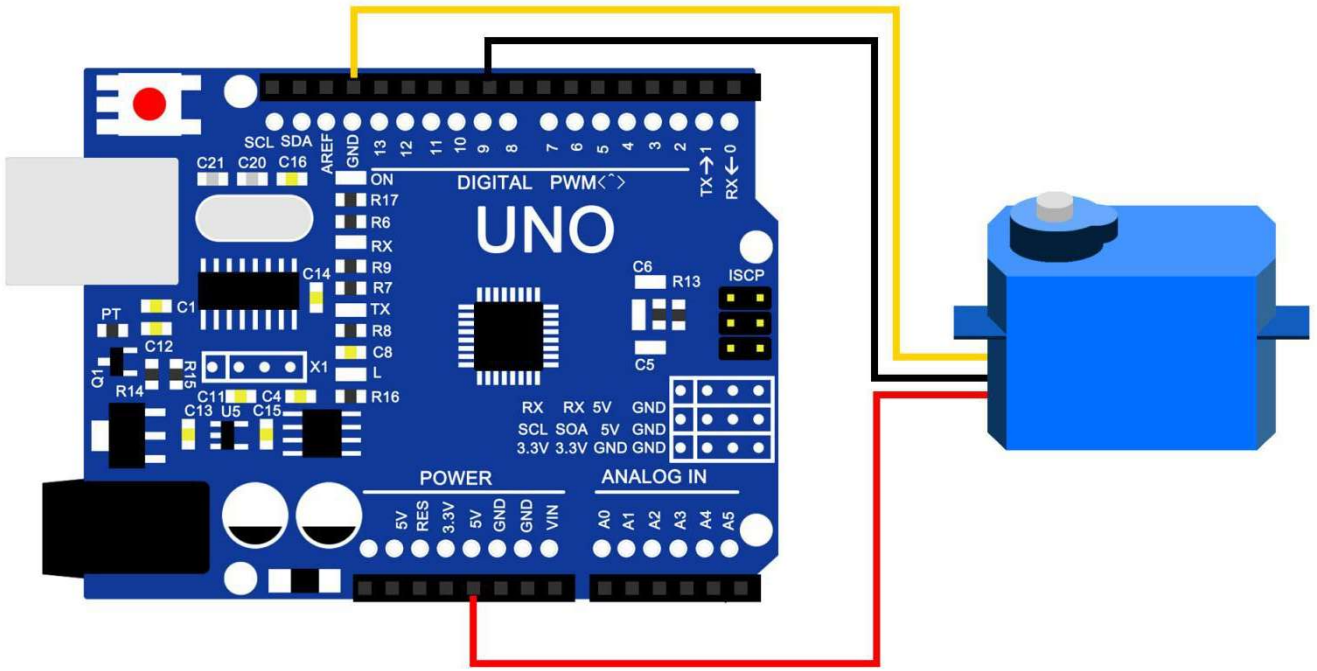
Servo motors are great devices that can turn to a specified position.

Usually, they have a servo arm that can turn 180 degrees. Using the Arduino, we can tell a servo to go to a specified position and it will go there. As simple as that!

Servo motors were first used in the Remote Control (RC) world, usually to control the steering of RC cars or the flaps on a RC plane. With time, they found their uses in robotics, automation, and of course, the Arduino world.

There are two ways to control a servomotor with Arduino. One is to use a common digital sensor port of Arduino to produce square wave with different duty cycle to simulate PWM signal and use that signal to control the positioning of the motor. Another way is to directly use the Servo function of the Arduino to control the motor. In this way, the program will be easier but it can only control two-contact motor because for the servo function, only digital pin 9 ang 10 can be used. The Arduino drive capacity is limited. So if you need to control more than one motor, you will need external power.

Connection diagram



Code

After connecting,please open the the program and load up the code - Lesson 5 Servo onto your Arduino board. See Lesson 3 for details about program uploading if there are any errors.

Before you can run this, make sure that you have installed the < Servo> library or re-install it, if necessary. Otherwise, your code won't work.

For details about loading the library file, see Lesson 2.

Lesson 6 Ultrasonic Sensor Module

About this lesson:

Ultrasonic sensor is great for all kind of projects that need distance measurements, avoiding obstacles as examples.

The HC-SR04 is inexpensive and easy to use since we will be using a Library specifically designed for these sensor.

Introduction:

Ultrasonic sensor module HC-SR04 provides 2cm-400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

(1) Using IO trigger for at least 10us high level signal,

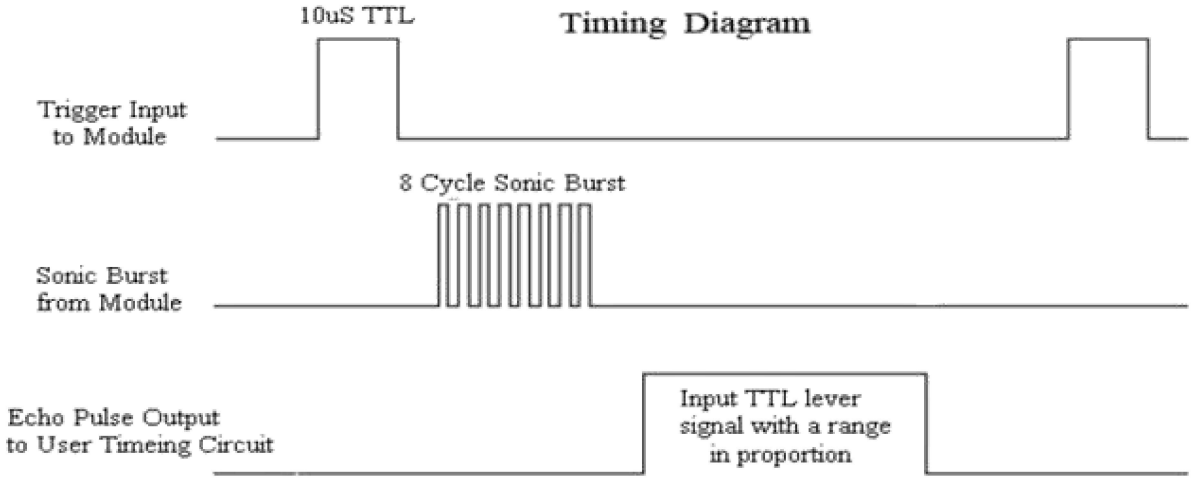
(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic tore turning.

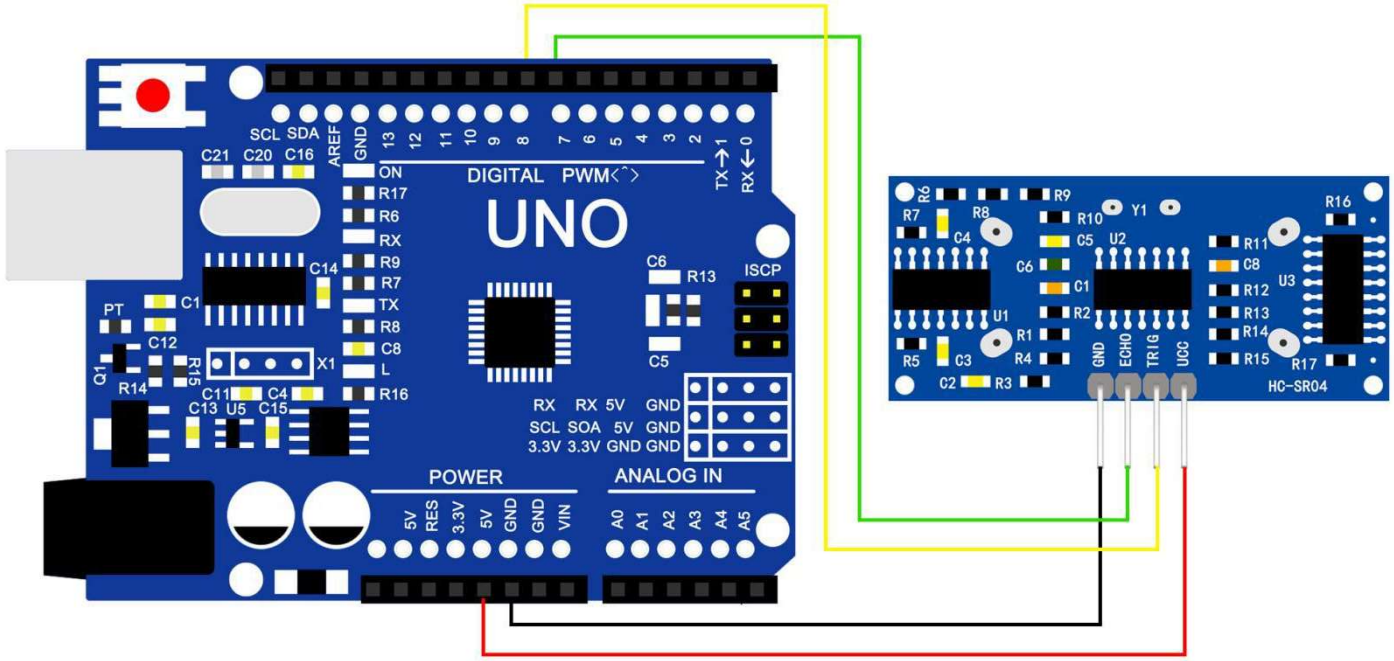
Test distance = (high level time × velocity of sound (340m/s) /2

The Timing diagram is shown below. You only need to supply a short 10us pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the

range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: us / 58 = centimeters or us / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



Wiring diagram



Code

Using a Library designed for these sensors will make our code short and simple. We include the library at the beginning of our code, and then by using simple commands we can control the behavior of the sensor.

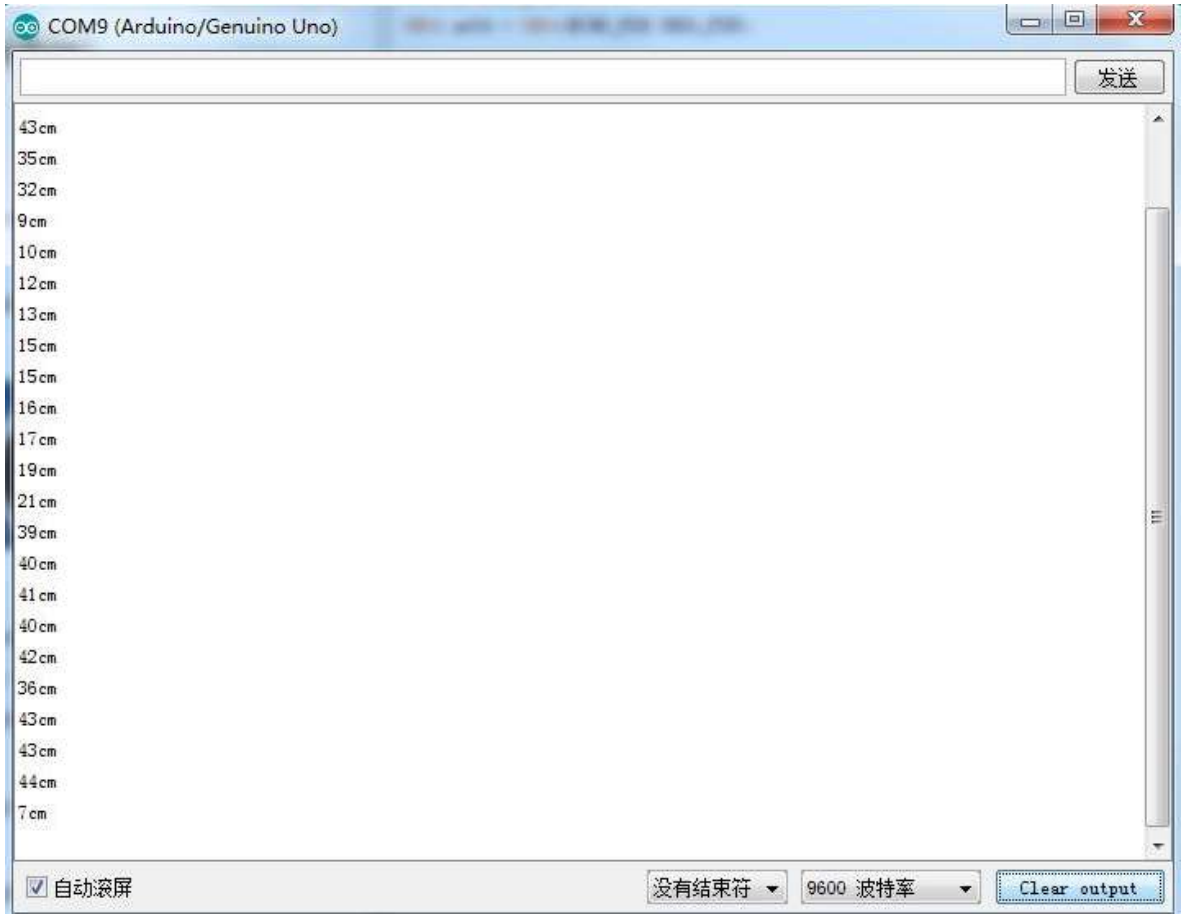
After wiring, please open the program in the code folder- Lesson 6 Ultrasonic Sensor Module and click UPLOAD to upload the program. See Lesson 3 for details about program uploading if there are any errors.

Before you can run this, make sure that you have installed the < HC-SR04> library or re-install it, if necessary. Otherwise, your code won't work.

For details about loading the library file, see Lesson 2.

Open the monitor then you can see the data as blow:

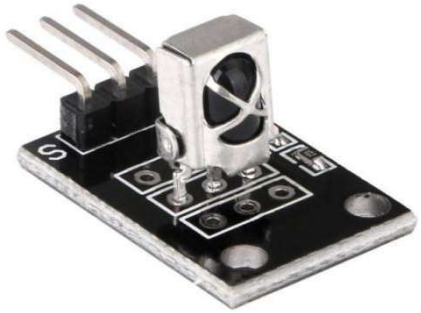
Click the Serial Monitor button to turn on the serial monitor. The basics about the serial monitor are introduced in details in Lesson 1.



Lesson 7 IR Receiver Module

About this lesson:

Using an IR Remote is a great way to have wireless control of your project. Infrared remotes are simple and easy to use. In this tutorial we will be connecting the IR receiver to the UNO, and then use a Library that was designed for this particular sensor.

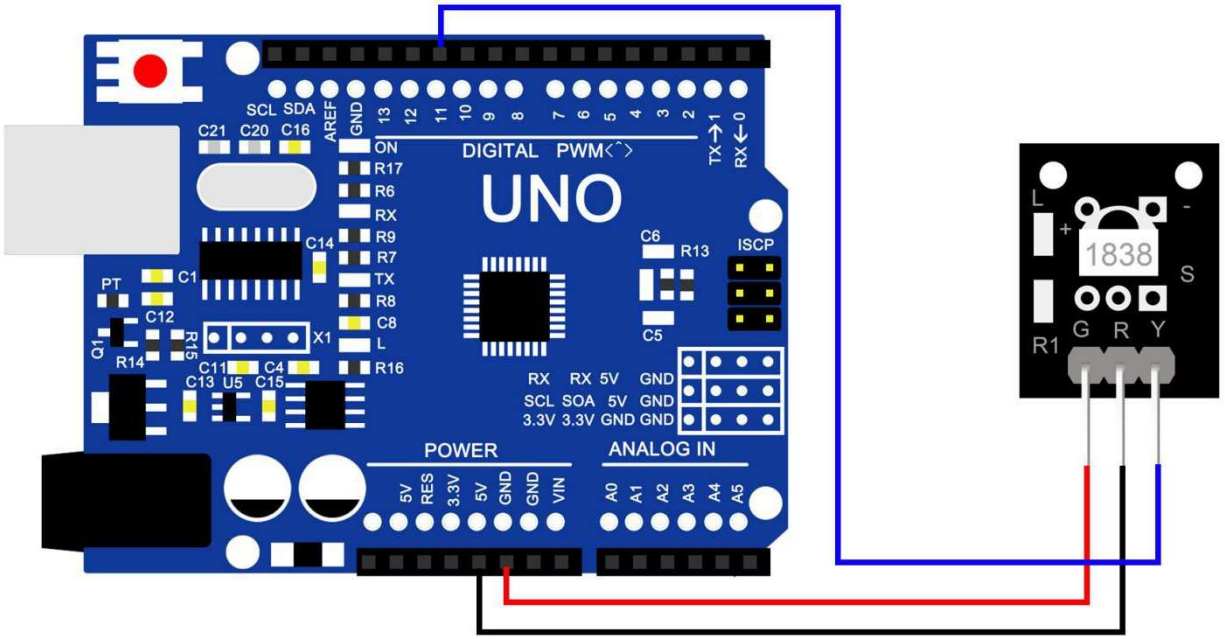


Introduction

IR is widely used in remote control. With this IR receiver, Arduino project is able to receive command from any IR remoter controller if you have the right decoder. Well, it will be also easy to make your own IR controller using IR transmitter.

There are 3 connections to the IR Receiver.
The connections are: Signal, Voltage and Ground.
The “-” is the Ground, “S” is signal, and middle pin is Voltage 5V.

Wiring diagram



Code

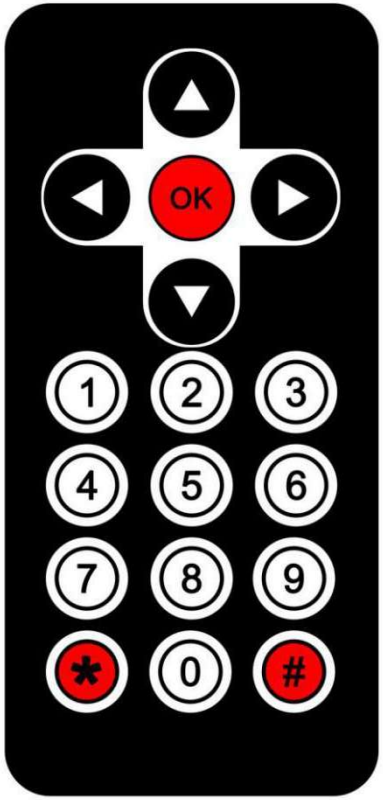
After wiring, please open the program in the code folder- Lesson 7 IR Receiver Module and click UPLOAD to upload the program. See Lesson3 for details about program uploading if there are any errors.

Before you can run this, make sure that you have installed the < IRremote > library or re-install it, if necessary. Otherwise, your code won't work.

For details about loading the library file, see Lesson 3.

In this lessson, we need to use a IR remote control which has 17 functional key and its launching distance is 8 meters at most, proper to control various devices indoors. This project is actually to decode remote control signal. After connection and uploading codes, aim at IR receiving module and press the key, finally you can see corresponding codes. If you press the key too long, it will show messy codes easily as shown in bellow figure.

Remote control code:



▲ FF629D	◀ FF22DD	▶ FFC23D
▼ FFA857	OK FF02FD	1 FF6897
2 FF9867	3 FFBD4F	4 FF30CF
5 FF18E7	6 FF7A85	7 FF10EF
8 FF38C7	9 FF5AA5	0 FF4AB5
* FF42BD	# FF52AD	

Lesson 8 L298N Motor Driver

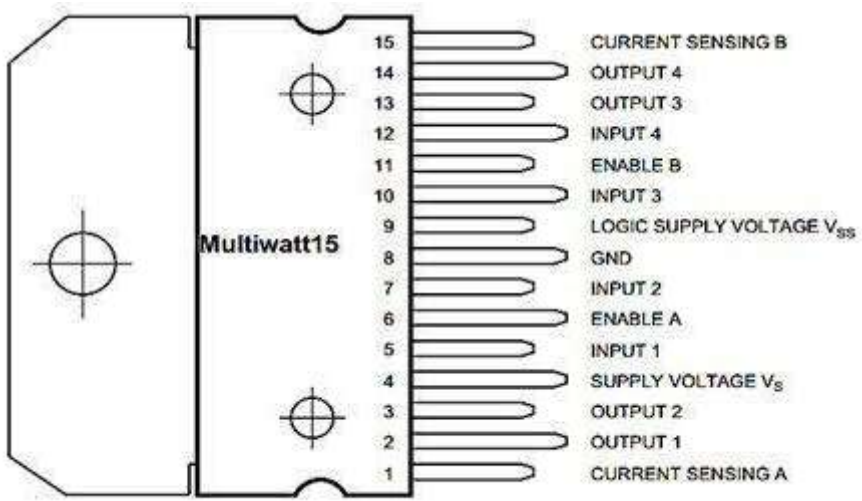
About this lesson:

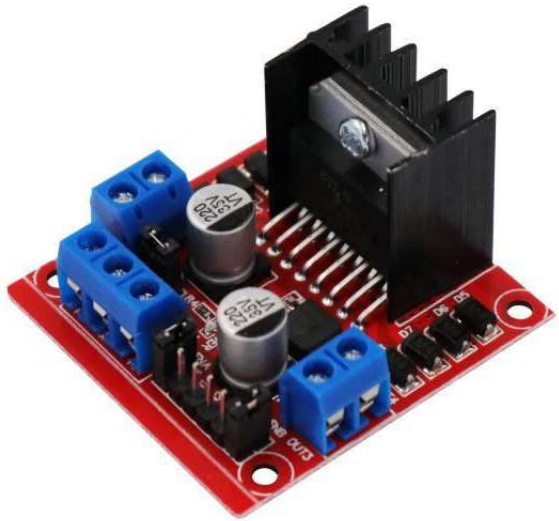
In this lesson, you will learn how to use a L298N Motor Driver module.

Component Introduction

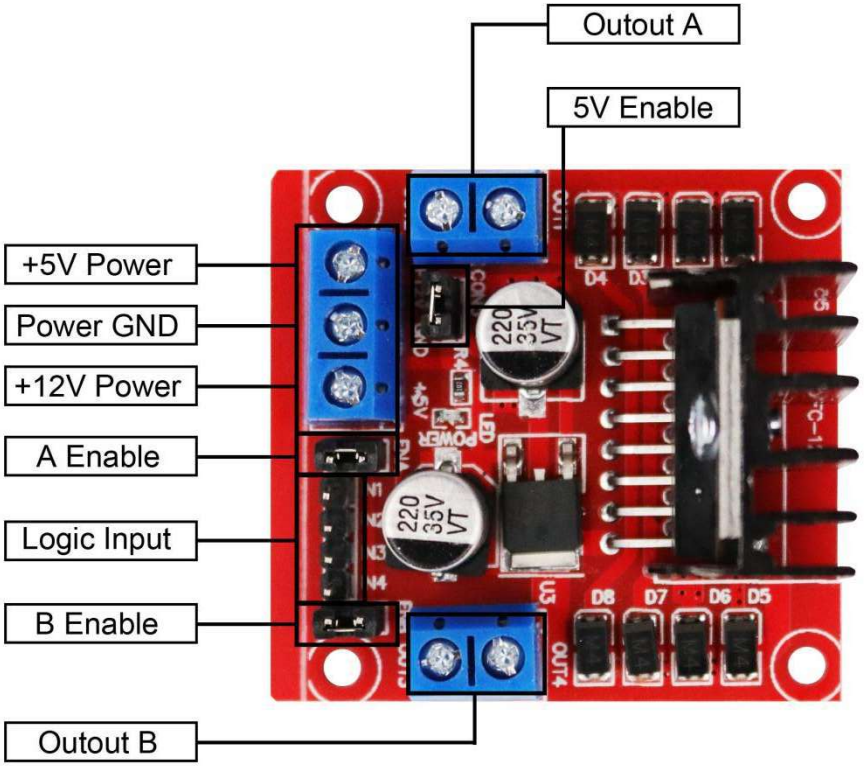
The L298N actually contains two complete H-Bridge circuits, so it is capable of driving a pair of DC motors. This makes it ideal for robotic projects, as most robots have either two or four powered wheels. The L298N can also be used to drive a single stepper motor, however we won't cover that configuration in this article.

Here is a diagram of the pinouts of an L298N integrated circuit:

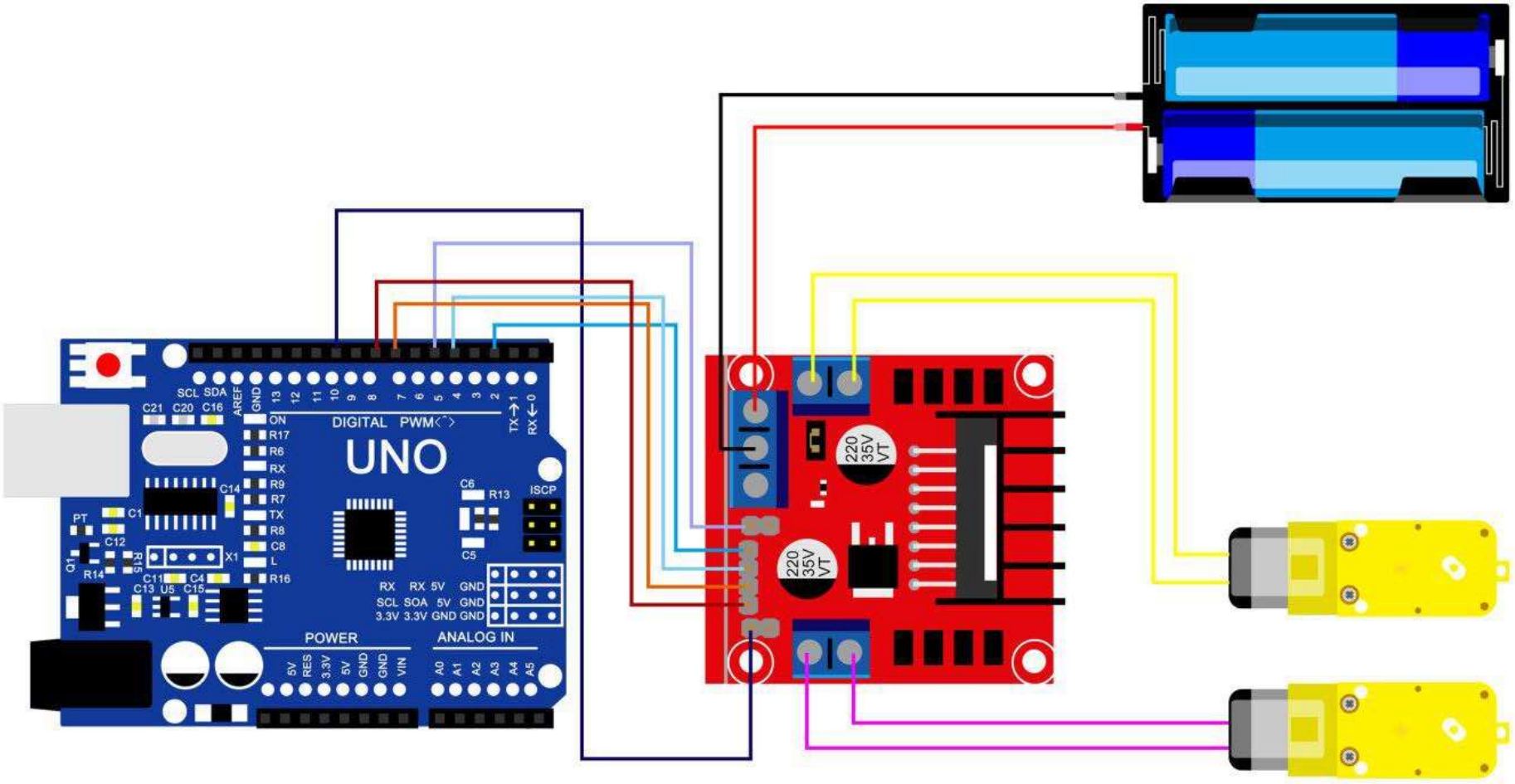




Using L298N made by ST Company as the control chip, the module has characteristics of strong driving ability, low calorific value and strong anti-interference ability.
This module can use built-in 78M05 for electric work via a driving power supply part. But to avoid the damage of the voltage stabilizing chip, please use an external 5V logic supply when using more than 12V driving voltage.
Using large capacity filter capacitor, this module can follow current to protect diodes, and improve reliability.



Wiring diagram



Code

After wiring, please open the program in the code folder- Lesson 8 L298N Motor Driver and click UPLOAD to upload the program. See Lesson 3 for details about program uploading if there are any errors.

After connection and power-on, two motors rotate clockwise for 2 second at a speed of 200 (PWM value is 200) and then stop for 2 second; two motors rotate anticlockwise for 2 second at a speed of 100 (PWM value is 100) and then stop for 2second; circulating like this.