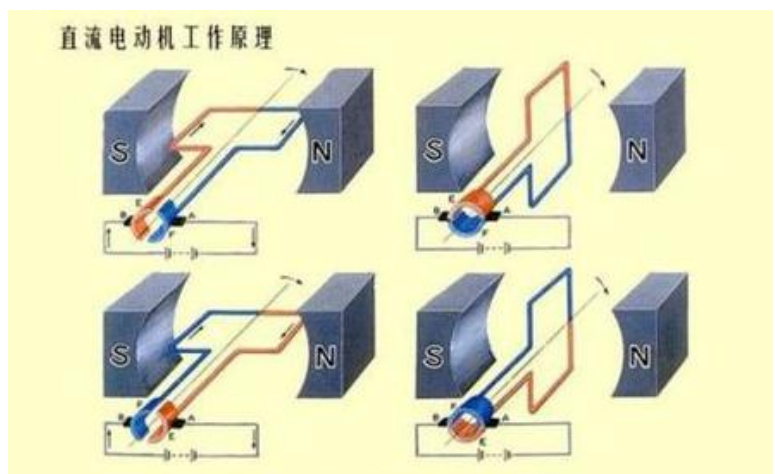
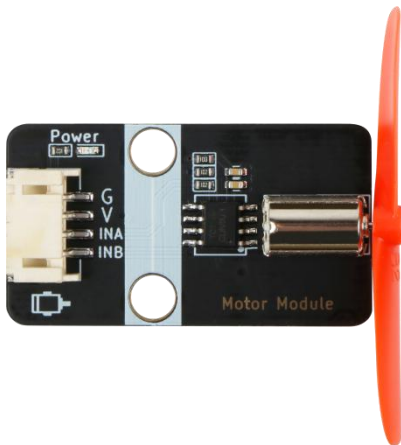


## DC Motor Experiment

### Module Introduction

DC motor is a kind of motor which converts DC electric energy into mechanical energy. Because of its good speed regulation performance, it is widely used in electric drive. DC motors are divided into permanent magnet, separate excitation and self excitation according to the excitation mode. Self excitation is divided into three types: parallel excitation, series excitation and compound excitation. When the DC power supply supplies the armature winding through the brush, the N-pole lower conductor on the armature surface can flow the current in the same direction. According to the left-hand rule, the conductor will be subject to the anti clockwise torque. The current in the same direction also flows through the conductor under the S pole of the armature surface. In this way, the whole armature winding, i.e. the rotor, will rotate anticlockwise, and the input DC electric energy will be converted into the mechanical energy output on the rotor shaft. It is composed of stator and rotor, stator: base, main magnetic pole, reversing pole, brush device, etc.; rotor (armature): armature core, armature winding, commutator, shaft and fan, etc..

Similarly, according to the left-handed rule, the conductor will also be subjected to a counter clockwise moment.



### Purpose of the Experiment

Learn how to use Arduino development board to control DC motor and realize forward and reverse rotation of DC motor.

### Device List

- BLE-UNO Main Board: 1
- Expansion Board :1
- USB Data Wire: 1
- DC Motor Module: 1

- 4PIN Wire Jumper: 1

## Experimental Principle

The electrified conductor is under the action of force in the magnetic field, which makes the coil rotate. Meanwhile, the steering gear changes the current direction to keep the coil rotating. Through Arduino development board, different voltage signals are output at both ends of the motor to control the forward and reverse rotation of the motor. Meanwhile, we can also control the size of the current to control the force on the conductor in the magnetic field. When the current is larger, the force is greater and the speed is faster.

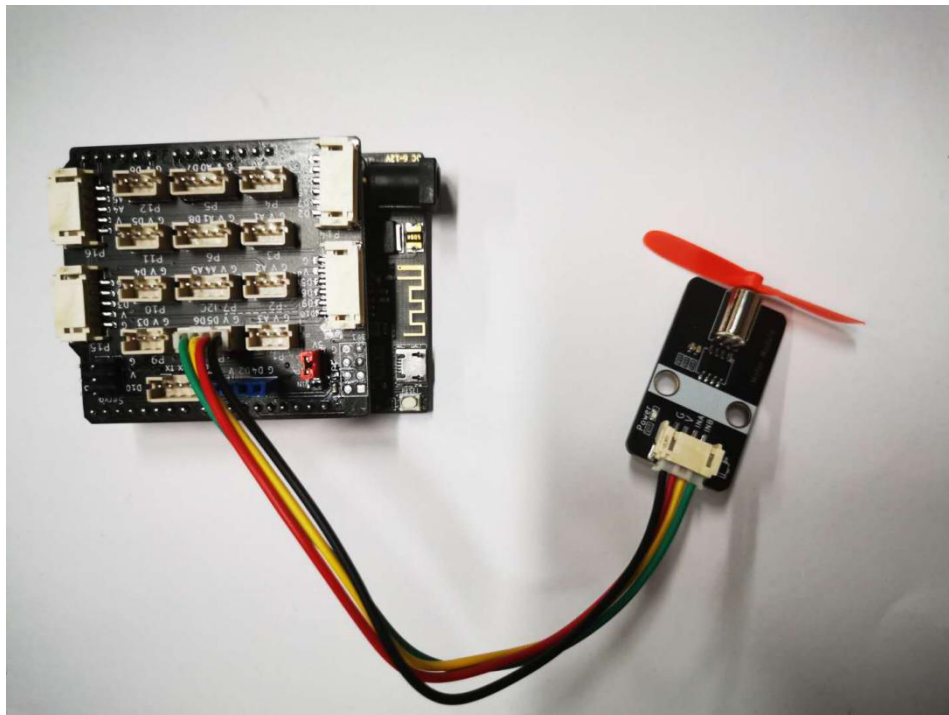
## DC Motor Value Table

INA	INB	Motor Status
0	0	Release
1	0	Forward Rotation
0	1	Reverse Rotation
1	1	Stop (Brake)

Release: The motor has no speed until the motor stops.

Stop: The motor stops immediately.

## Physical Wiring Diagram



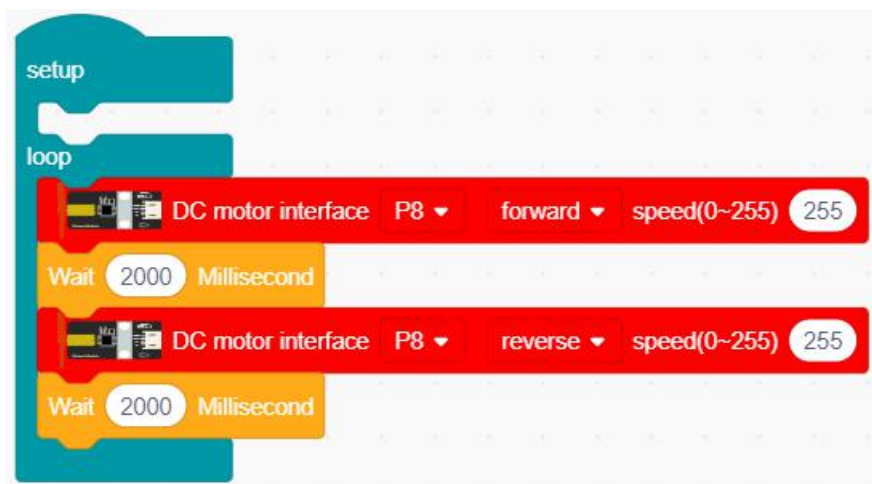
## DC Motor Program Code

```
#define INB 6 //Define motor B port
#define INA 5 //Define motor A port

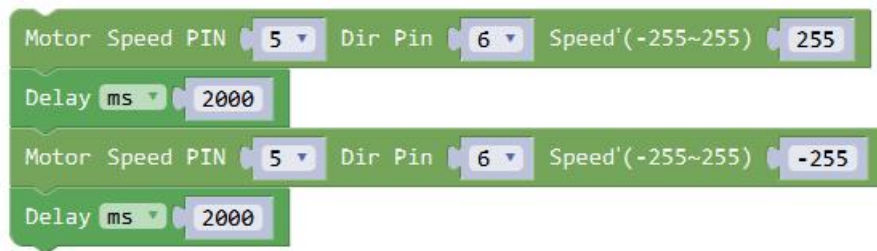
void setup()
{
    pinMode(INB, OUTPUT); //Set the motor B port to output mode
    pinMode(INA, OUTPUT); //Set the motor A port to output mode
}

void loop()
{
    analogWrite(INA, 255); //Set motor A port to high level
    analogWrite(INB, 0); //Set the motor B port to low level
    delay(2000); //Motor reverses after 2s
    analogWrite(INA, 0); //Set motor A port to low level
    analogWrite(INB, 255); //Set the motor B port to high level
    delay(2000); //Motor reverses for 2s and then forwards
}
```

## MagicBlock Program



## Mixly Program



## Experimental Principle

After the device is connected to the wire, burn the above program to the UNO board and power on the UNO board. It will be found that the motor will rotate forward and backward according to the program setting.