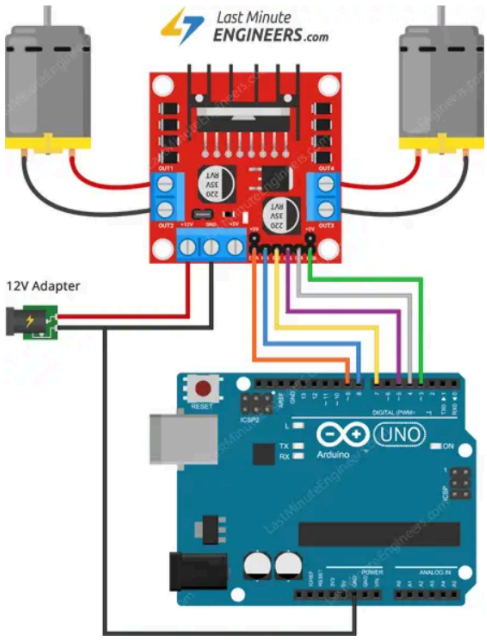
PRACTICE 10: MODERN IoT

1. L298N Motor Driver



We are using DC gearbox motors, also called “TT” motors, which are often found in two-wheel-drive robots. They are rated for 3 to 12V. We will therefore connect an external 12V power source to the VS terminal. Because L298N has a voltage drop of about 2V, the motors will receive 10V and spin at a slightly lower RPM. But that’s okay.

we need to supply 5V to the logic circuitry of the L298N. We’ll use the on-board 5V regulator to draw 5V from the motor power supply, so keep the 5V-EN jumper in place.

Now connect the L298N module’s Input and Enable pins (ENA, IN1, IN2, IN3, IN4 and ENB) to the six Arduino digital output pins (9, 8, 7, 5, 4 and 3). Note that both Arduino output pins 9 and 3 are PWM-enabled

Finally, wire one motor to terminal A (OUT1 and OUT2) and the other to terminal B (OUT3 and OUT4).

- Declaring the Arduino pins that are connected to the L298N's control pins

```
// Motor A connections
    int enA = 9;
    int in1 = 8;
    int in2 = 7;
// Motor B connections
    int enB = 3;
    int in3 = 5;
    int in4 = 4;
```

- In the setup section

```
void setup() {
    // Set all the motor control pins to outputs
    Code
    // Turn off motors - Initial state
    Code
}
```

- In the Loop section

```
void loop() {
    directionControl();
    delay(1000);
    speedControl();
    delay(1000);
}
```

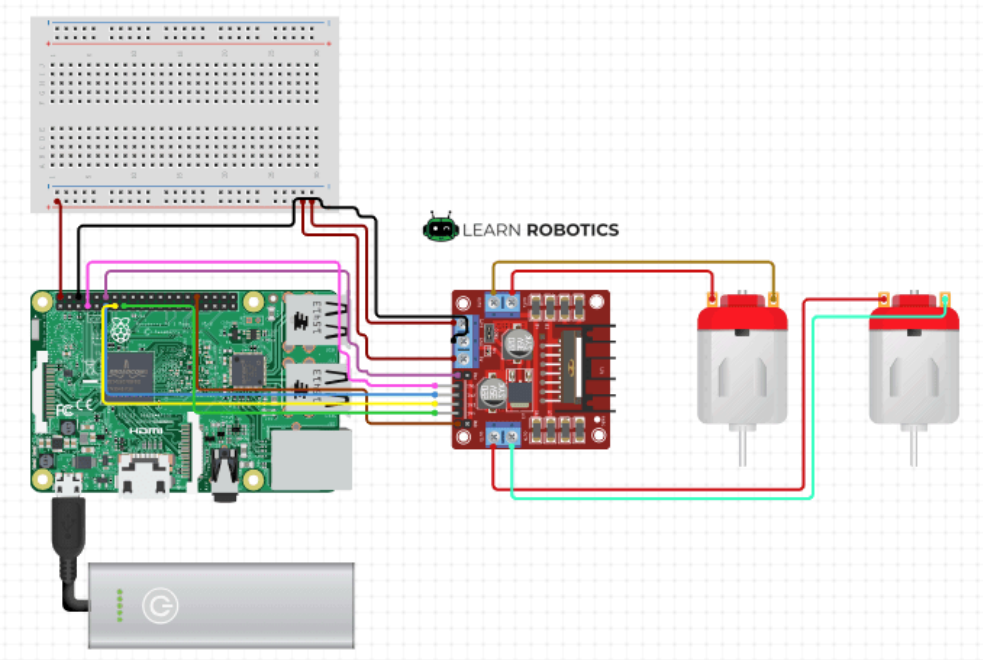
- `Implement directionControl()` – This function causes both motors to spin at full speed for two seconds. It then reverses the spinning direction of the motors and spins for two seconds. Finally, it stops the motors
- `Implement speedControl()` – This function uses the analogWrite() function to generate a PWM signal that accelerates both motors from zero to maximum speed before decelerating them back to zero. Finally, it stops the motors
- Let's create a few methods to control the motors. These methods include: `forward(int speed)`, `backward(int speed)`, `left(int speed)`, `right(int speed)`, and `stop()`

2. L298N Raspberry Pi Wiring Diagram

For this application, you'll connect the L298N signal pins as follows:

L298N ENA to GPIO18
L298N IN1 to GPIO4
L298N IN2 to GPIO17
L298N IN3 to GPIO27
L298N IN4 to GPIO22
L298N ENB to GPIO12

You'll power your Raspberry Pi using a 5V 2A battery pack



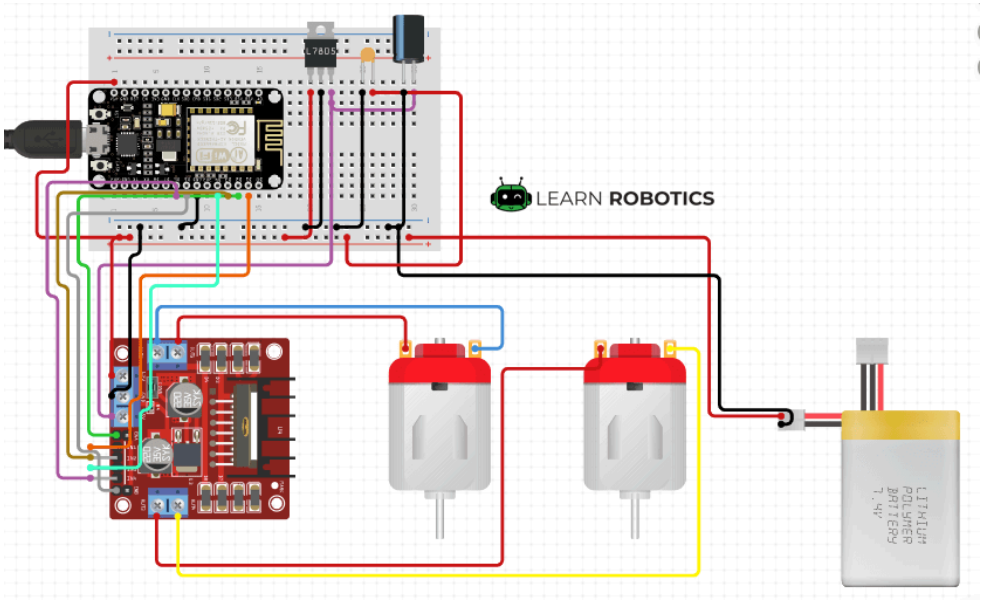
Implement this application with functions as the above.

3. NodeMCU ESP32 L298N Wiring Diagram

The NodeMCU requires an additional Voltage Regulator (L7805 – 5V 1.5A), an Electrolytic Capacitor (1uF/50V), and a Ceramic Capacitor (100nF – 0603). The signal pins between the NodeMCU and L298N are given as follows:

L298N ENA to D2
L298N IN1 to D1
L298N IN2 to D3
L298N IN3 to D4

L298N IN4 to D6
L298N ENB to D5



Implement this application with functions as the above.

Document Your Experimentations:

Your lab report **must include:**

- ❖ High-level description of your experiment.
- ❖ Step-by-step description so a classmate could repeat it.
- ❖ Data from your experiment.
- ❖ Answers to the lab questions.
- ❖ Interpretation of your results.