Motor Driver L298N

L298N Dual H-Bridge Motor Driver: The Power Bridge

The L298N module serves as an essential protective and intermediary power stage between the robot's battery and its drive motor.

The Necessity of a Driver:

The Raspberry Pi (our main controller) operates using low-power signals and cannot safely source or sink the high current required by the DC propulsion motor. Attempting to connect the high-power battery circuit directly to the Pi's low-voltage GPIO pins would result in immediate and irreversible damage to the controller. Therefore, the primary role of the L298N is to act as a current amplifier and insulator, safely handling the large electrical load demanded by the motor.

How the System Works (The Dam Analogy):

The L298N can be visualized as a large, reinforced concrete dam built to manage the powerful current flowing from the 9V battery (the reservoir) to the motor (the turbine). The Raspberry Pi acts as the control mechanism that precisely regulates the dam's sluice gates (via PWM signals). The Pi merely sends low-voltage commands to the L298N, instructing when and how much of the high-power battery current should be directed to the motor, without ever having to handle the power itself.

Component Description:

This module is based on the widely used L298 Dual H-Bridge Integrated Circuit. While the board is capable of controlling two DC motors independently (up to 2A peak current each), our application utilizes only one motor port to drive our single-motor RWD system. The unit is optimized for microcontroller interfacing, requiring only a few digital lines for full control. The board also features essential integrated components, including LED power indicators, internal protection diodes, and an onboard +5V voltage regulator which can supply power to the low-voltage controller (like the Raspberry Pi) for convenience.

Key Technical Data:

- Driver: L298N Dual H-Bridge DC Motor Driver

- Operating Voltage Range: DC 5 V - 35 V (Motor Power)

- Peak Current: 2 Amp per motor

- Input Logic Voltage (Control Signal):

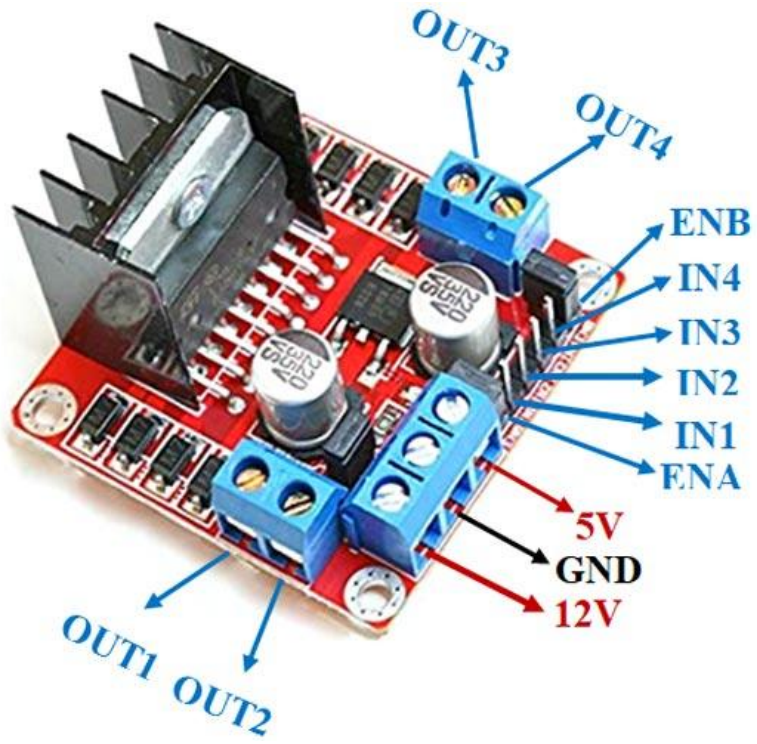
- Low: -0.3 ≤ Vin ≤ 1.5V (control signal is invalid).

- High: 2.3V ≤ Vin ≤ Vss (control signal active).

- Maximum Power Dissipation: \text{20W} (at T = 75^\circ C)

- On-board Feature: Integrated +5V regulated output supply.

- Approximate Dimensions: 4.3cm × 4.3cm × 2.7cm


OUT3
OUT4
ENB
IN4
IN3
IN2
IN1
ENA
5V
GND
12V
OUT1
OUT2