Motor Driver

A motor driver IC is an integrated circuit chip that controls motors in autonomous robots and embedded circuits. L293D and ULN2003 are the most commonly used motor Driver IC that is used in simple robots and RC cars. A motor driver is unquestionably something that causes the motor to move in accordance with the given instructions or inputs (high and low). It listens to the low voltage from the controller/processor and controls an actual motor that needs high input voltage A motor driver IC, in simple terms, controls the direction of the motor based on the commands or instructions received from the controller.

HOW IT WORKS: -

First, the microcontroller sends signals to the motor driver. Then, the signals received by the motor driver are interpreted and stepped up with the reference voltage i.e provided for driving the motor. The motor has two voltage input pins. Pin 1 turns ON the motor by giving the voltage equal to the reference voltage, whereas pin 2 turns OFF the motor by giving OV at the output pin. This entire process is controlled by the motor driver. We use motor drivers to give high power to the motor by using a small voltage signal from a microcontroller or a control system.

If the microprocessor transmits a HIGH input to the motor driver, The driver will rotate the motor in one direction keeping the one pin as HIGH and one pin as LOW. And when the microcontroller transmits a LOW input to the motor driver, the motor driver makes the motor to rot other direction by making 2 motor pins as LOW and HIGH alternatively.

H-Bridge circuit: -

is a simple circuit that allows you to control the direction of a DC motor. It is typically used in conjunction with a microcontroller, such as an Arduino, to control motors. You can build a robot if you can control two motors to move forward or backward.
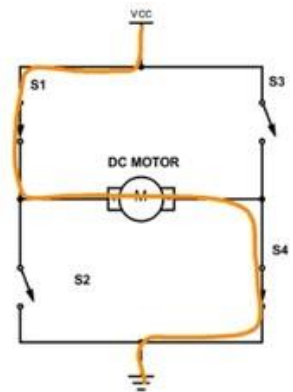
To select the best motor driver for your project you must look for: -

1- Compatible Motors: -

Most motor drivers are compatible with brushless DC motors, geared motors, and stepper motors but some motor drivers are compatible for angle-based motors like servo motors. So, it is necessary to choose the driver according to your motor.

2- *Interface*

You should choose the motor driver and its interface according to your application. Most motor drivers are compatible with Arduino and other TTL inputs. However, if you want to control the motor wirelessly, such as with Bluetooth control boards, then consider remote controllers.

3- *Voltage and Current*

Next, look at voltage and current handling capacity. Find a motor driver with a suitable voltage range according to your application.

Finding the right voltage range isn't difficult. Motor drivers come in wide voltage ranges (like 4.5V – 36V). Also, finding a driver with enough current handling capacity is relatively simple, as there are drivers available in the market with high current handling capacity.

4- *On-state Resistance*

The current in the motor driver IC flows through on-state resistance of the bridge transistor. Therefore, the high current will lead to power dissipation.

Power dissipation can be expressed as $P=(I^2)R$, where R is the on-state resistance. Power dissipation happens in the form of heat. Driver IC operating at its peak current capacity very quickly increases the internal temperature and can cause a thermal shutdown.

Knowing this, you need to select an IC with plenty of current handling capacity and if there's any chance the IC will overheat, a mechanical heat sink must be incorporated.

However, many times, there's no space for such a thing on a PCB, so try to select an IC with lower on-state resistance for minimum power dissipation.