

Mohammad Zaki Patel

EGR 550 – Grader Report

Motor Control Project – Part I

Purpose: Hardware setup for motor speed and position control using Arduino.

Electronic components list:

1. Arduino Uno - (Separate Arduino Leonardo from the temperature control board)
2. L298N Motor driver
3. DC Motor: GA12-N20 (with encoder)
4. Power supply: 9V Battery
5. Battery terminal connector

Additional Resources to learn more details on the working of components:

[Control Tutorials for MATLAB and Simulink - Time-response Analysis of a DC motor \(umich.edu\)](#)

[Controlling DC Motors with the L298N H Bridge and Arduino - YouTube](#)

[Arduino Motor Control and PWM Signal with L298N H-bridge Motor Driver - YouTube](#)

Motor Speed Control with PWM Arduino IDE code - [Arduino Editor](#)

How to read input values from encoder using Arduino IDE: [Motor With Encoder, How to Read Input Value From Encoder : 3 Steps \(with Pictures\) - Instructables](#)

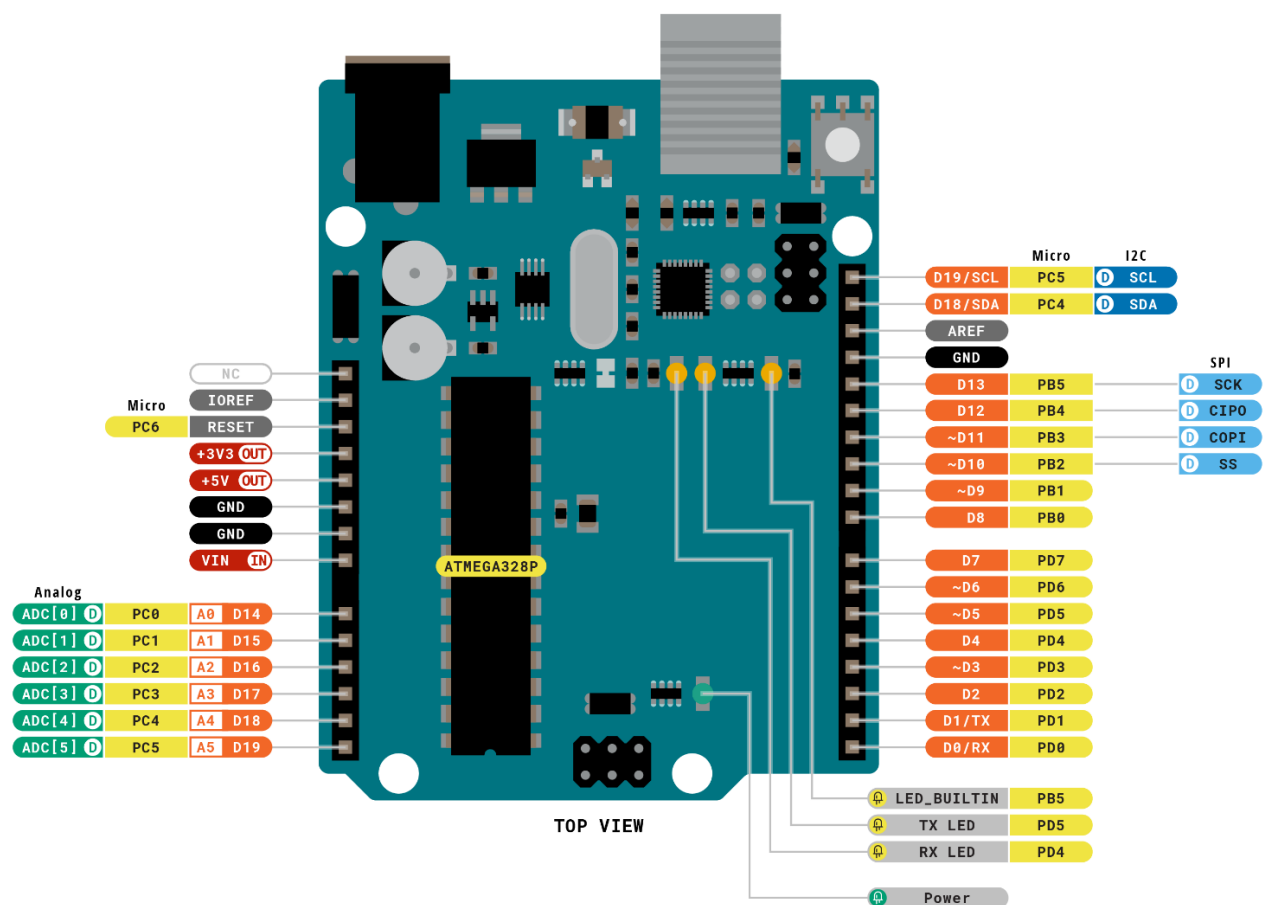
Information regarding the components:

Arduino Uno:

Link to Datasheet: [A000066-datasheet.pdf \(arduino.cc\)](https://www.arduino.cc/en/uploads/media/A000066-datasheet.pdf)

Additional information: [UNO R3 | Arduino Documentation](https://www.arduino.cc/en/Reference/UNO) | [Arduino Documentation](https://www.arduino.cc/en/Reference/Arduino)

Pin Diagram



Legend:	Digital	I2C
Power	Analog	SPI
Ground	Main Part	Analog



ARDUINO UNO REV3
SKU code: A000066
Pinout
Last update: 6 Oct, 2022

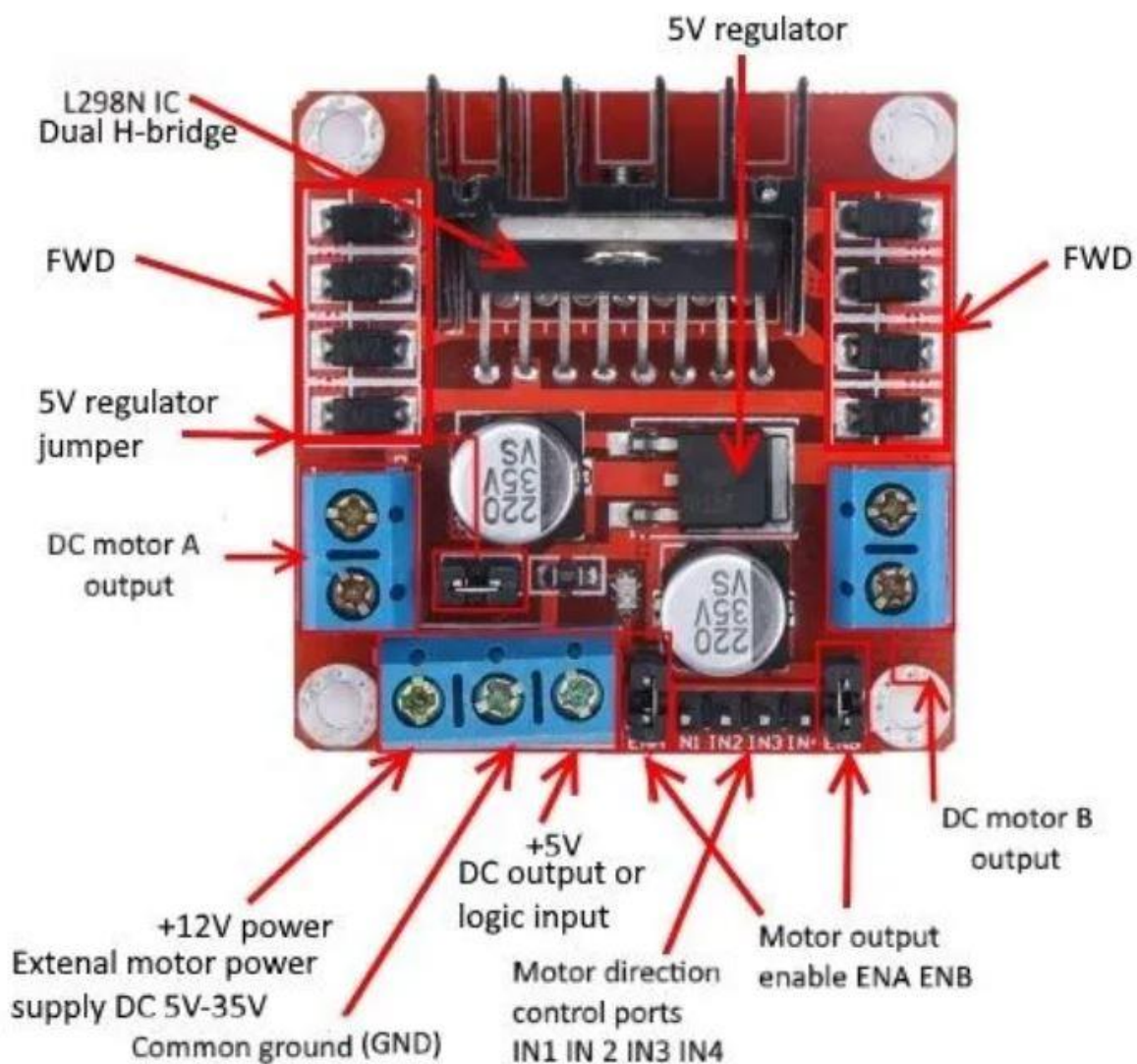
L298N MOTOR DRIVER:

Link to the Datasheet: [L298N Datasheet\(PDF\) - STMicroelectronics \(alldatasheet.com\)](https://www.st.com/en/microelectronics/l298n-datasheet.pdf)

Additional Information: [L298N Motor Driver Pin Diagram, Working, Datasheet & Arduino Connection \(etechnophiles.com\)](https://www.etechnophiles.com/l298n-motor-driver-pin-diagram-working-datasheet-arduino-connection/)

[How to Use L298N Motor Driver | Microcontroller Tutorials \(teachmemicro.com\)](https://teachmemicro.com/l298n-motor-driver/)

Pin Diagram and Description:



Pinouts of L298N Motor driver Module

VCC pin supplies power to the motor. Voltage anywhere between 5 to 35V can be applied. Remember, if the 5V-EN jumper is in place, you need to supply 2 extra volts than the motor's actual voltage requirement, in order to run the motor at its maximum speed.

GND is the common ground pin.

5V pin supplies power to the switching logic circuitry inside the L298N IC. If the 5V-EN jumper is in place, this pin acts as output and can be used to power up the Arduino. If the 5V-EN jumper is removed, you need to connect it to the 5V pin on Arduino.

ENA pins are utilized to control the speed of Motor A. Supplying this pin with HIGH logic makes the Motor A rotate, supplying it with LOW logic causes the motor to stop. Removing the jumper and connecting this pin to the PWM input let us control the speed of the Motor A.

IN1 & IN2 pins are used to control the direction of Motor A. If IN1 is HIGH and IN2 is LOW, Motor A spins in a certain direction. To change the direction, make IN1 LOW and IN2 HIGH. If both the inputs are either HIGH or LOW, the Motor A stops.

IN3 & IN4 pins are used to control the direction of the Motor B. If IN3 is HIGH and IN4 is LOW, Motor B spins in a certain direction. To change the direction, make IN3 LOW and IN4 HIGH. If both the inputs are either HIGH or LOW, the Motor B stops.

ENB pin can be used to control the speed of Motor B. Supplying this pin with the HIGH signal makes the Motor B turn, supplying it LOW cause the motor to stop. Eliminating the jumper and interfacing this pin to PWM information let us control the speed of Motor B.

OUT1 & OUT2 pins are connected to Motor A.

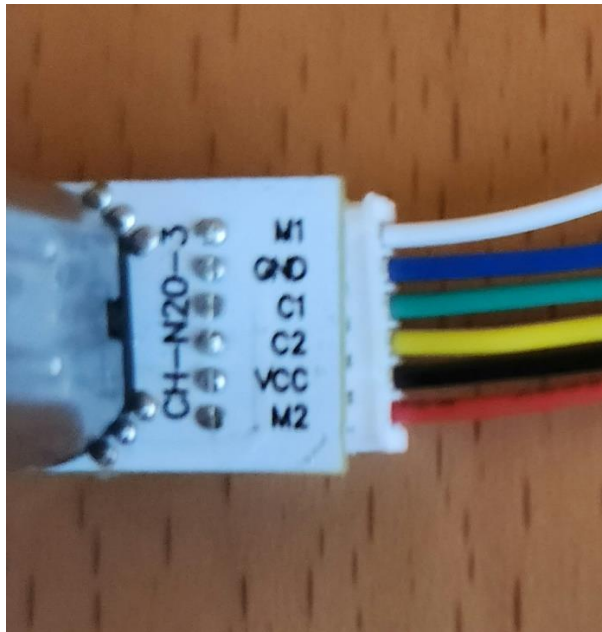
OUT3 & OUT4 pins are connected to Motor B.

DC Motor: GA12-N20







Link to Datasheet: [GA12-N20.pdf \(handsontec.com\)](http://GA12-N20.pdf(handsontec.com))

Additional Information: [Amazon.com: Fielect DC 6V 60RPM Gear Motor with Hall Encoder Micro Speed Reduction Gearbox for Mini Car Balance Motor Encoder DIY GA12-N20 : Toys & Games](https://www.amazon.com/dp/B078888888)

Pin / Wire Diagram for DC Motor and Encoder:



Encoder wiring method

-  Red: Motor power supply+ (The exchange can control the forward and reverse rotation of the motor)
-  Black: Coded Power+ (Positive and negative poles must not be connected wrongly 3.3-3.5V)
-  Yellow: signal feedback (2 signals when the motor rotates one revolution)
-  Green: signal feedback (2 signals when the motor rotates one revolution)
-  Blue: Coded Power- (Positive and negative poles must not be connected wrongly 3.3-3.5V)
-  White: Coded Power- (The exchange can control the forward and reverse rotation of the motor)

Building the Circuit:

Connect the Arduino to the computer for power supply.

Circuit Diagram

