
Practical Aspects of DC Motors and Drives

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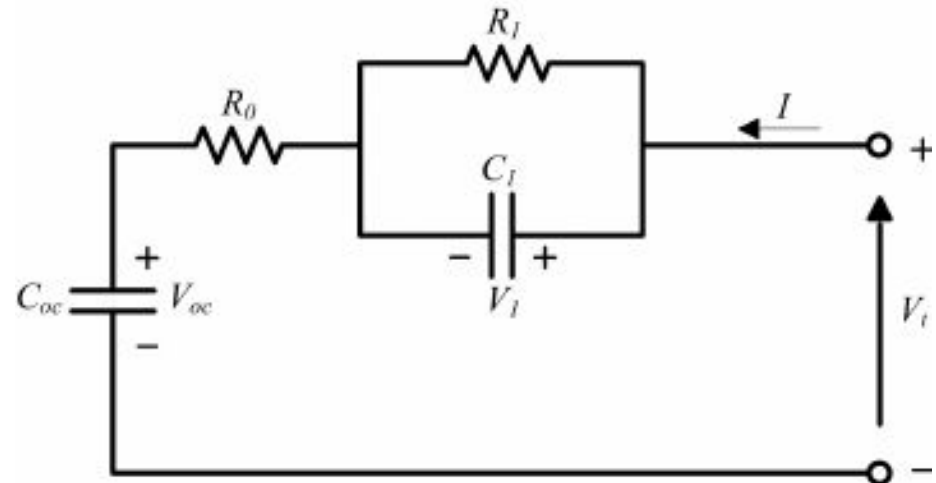
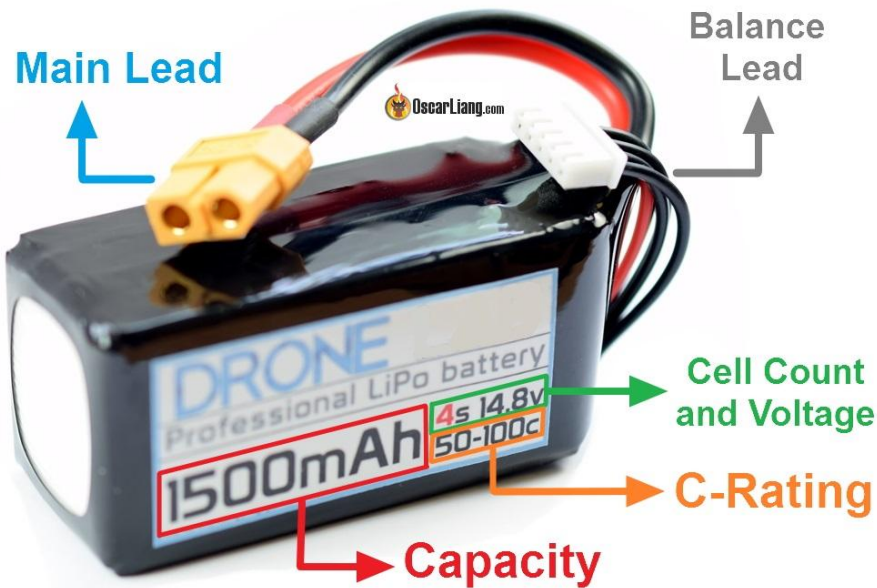
Typical Requirements



Things to REMEMBER

- There are no:
 - Lossless Systems
 - Ideal Voltage Sources
 - Ideal Conductors
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Non Ideal Voltage Source



Non-Ideal Conductor

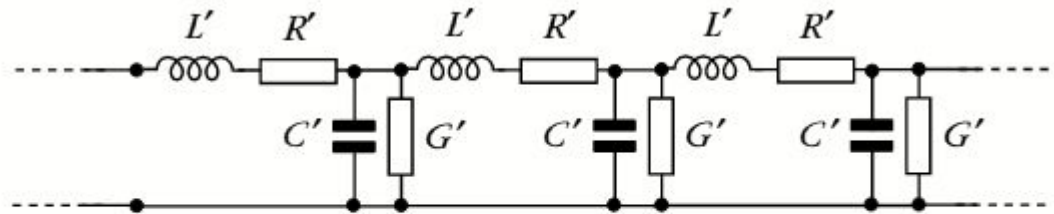
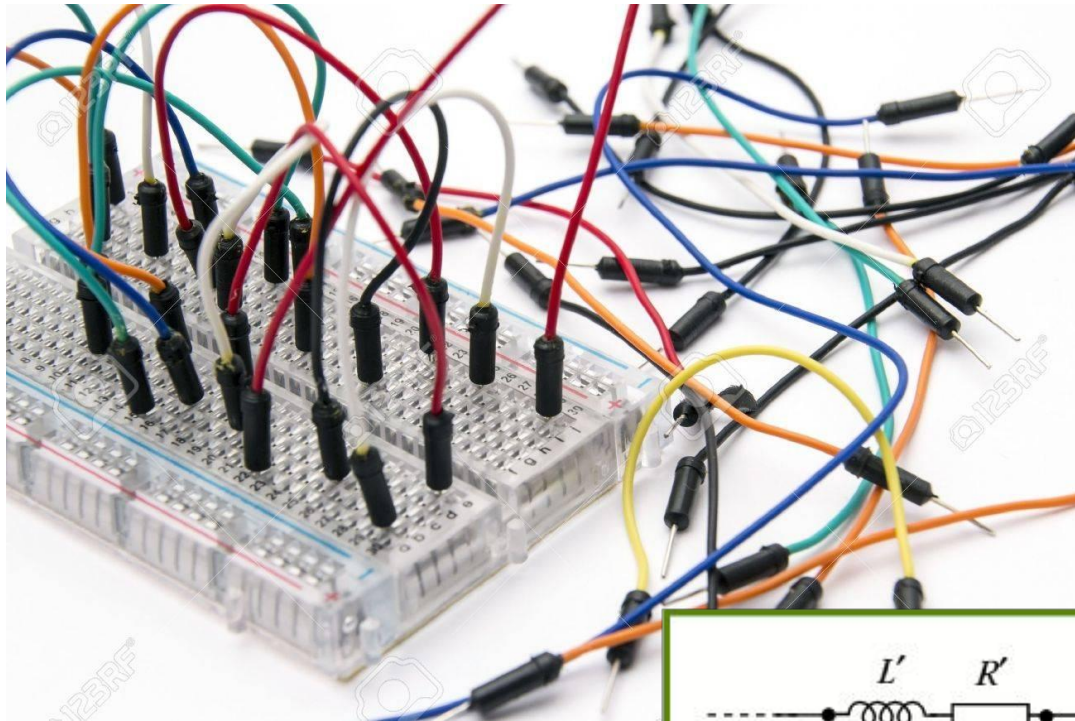
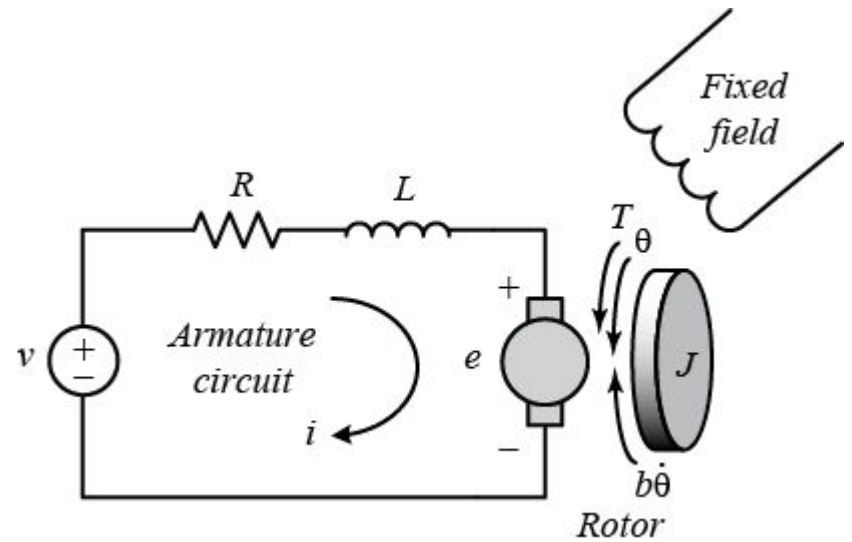


Figure 7-3 – More realistic cable model.

DC Motor Types

- Brushed DC Motor
 - Step Motor
 - Servo Motor
 - Brushless DC Motor
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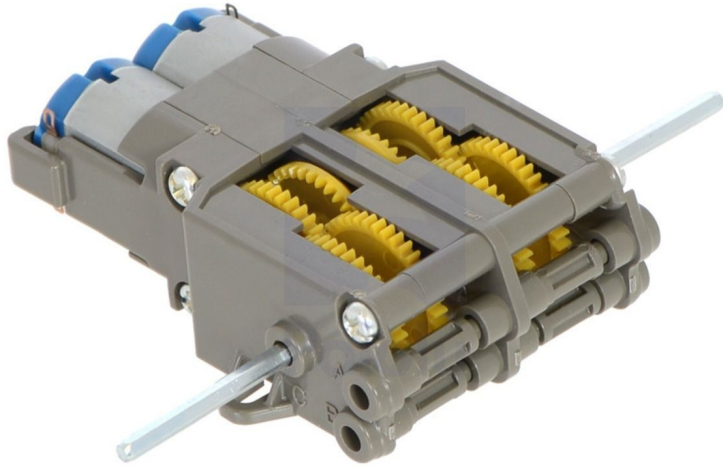
Brushed DC Motor



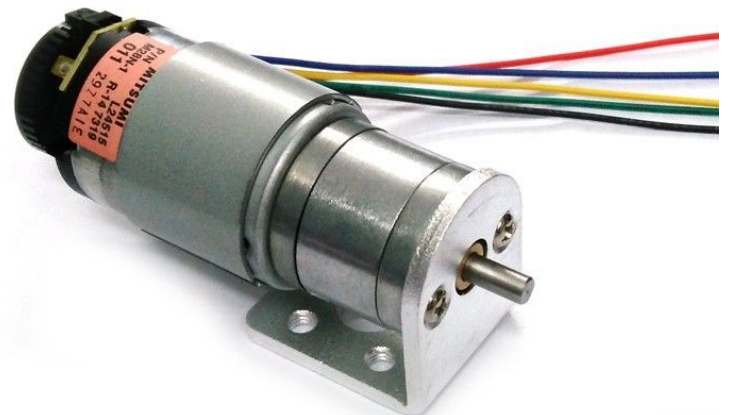
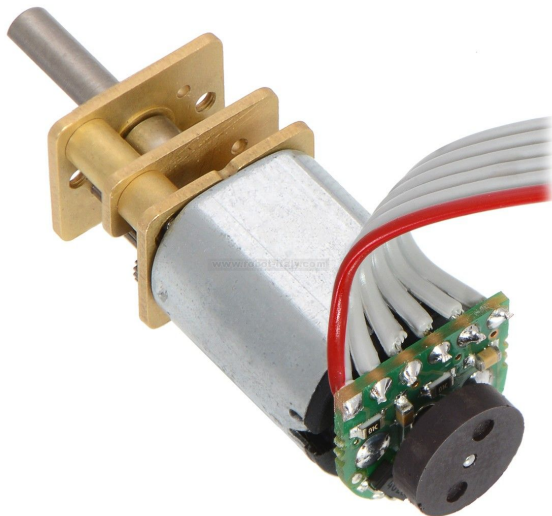
Case Study-1

Case Study-2

Brushed DC Motor



www.pololu.com

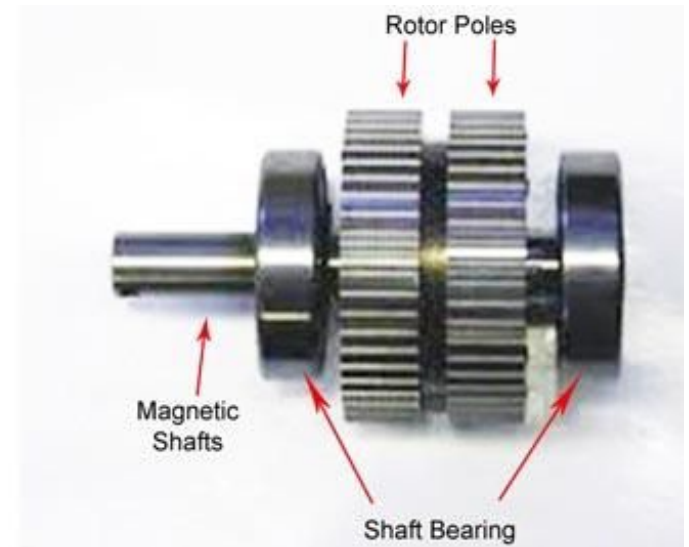
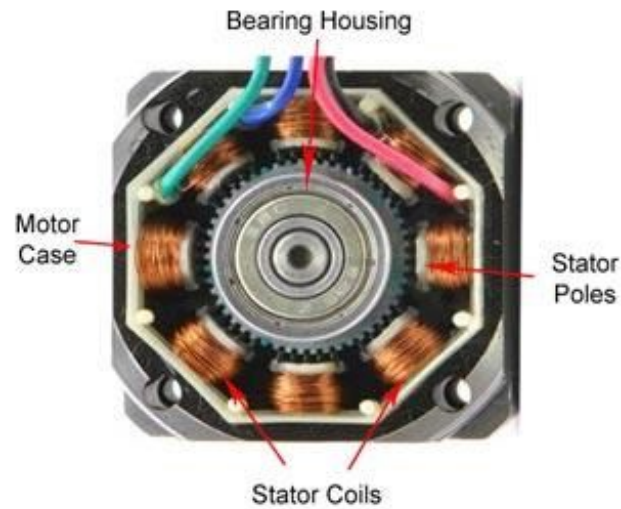
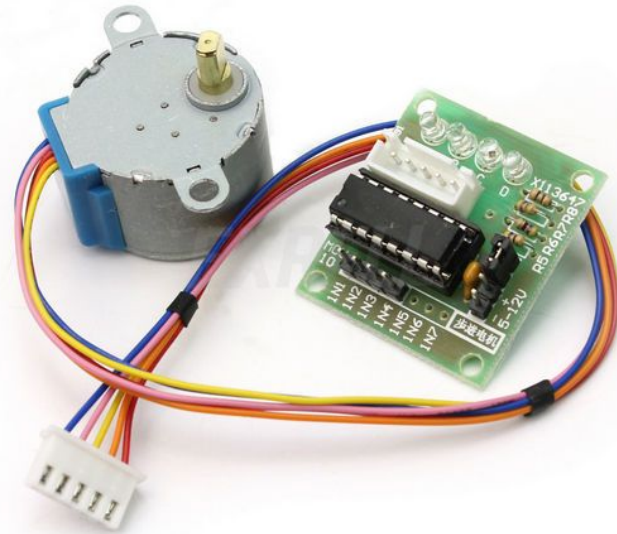
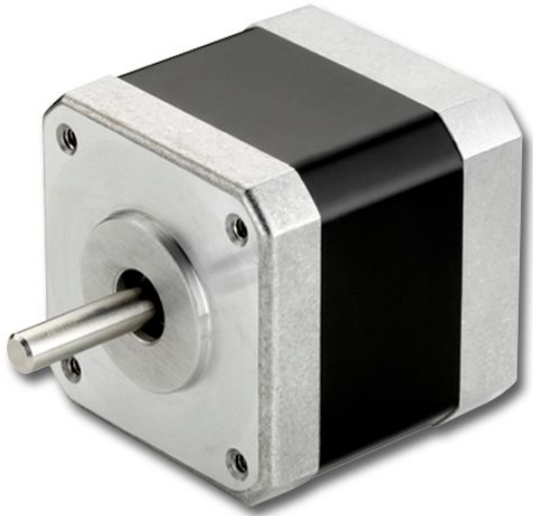


Brushed DC Motor

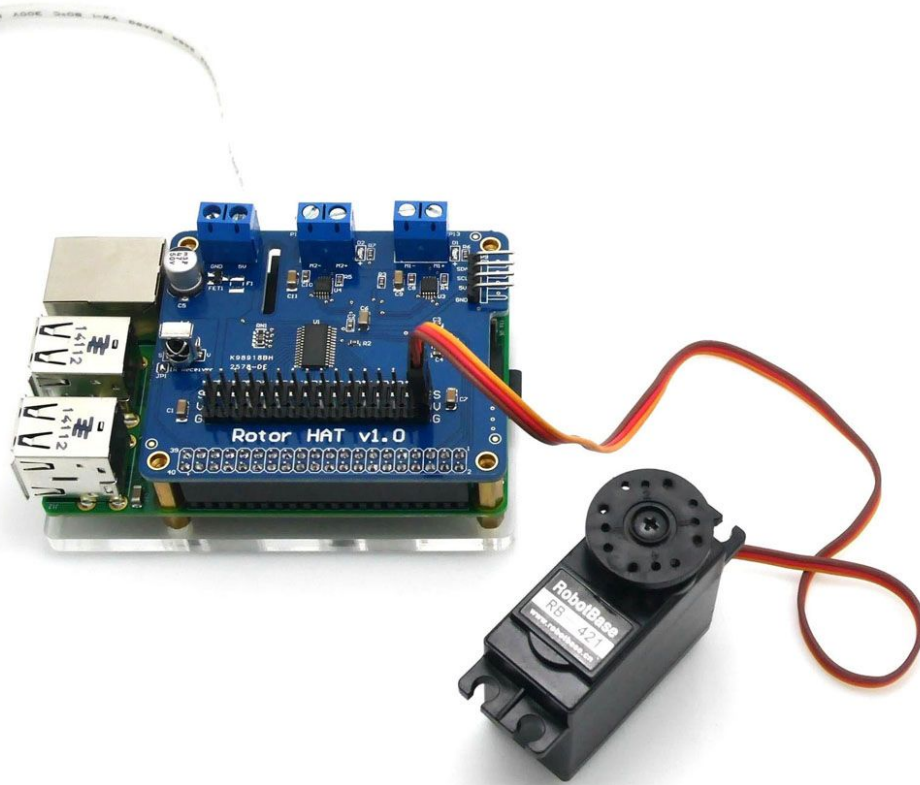


For Wheel Drive: Always use with a gearbox and proper mechanical coupling

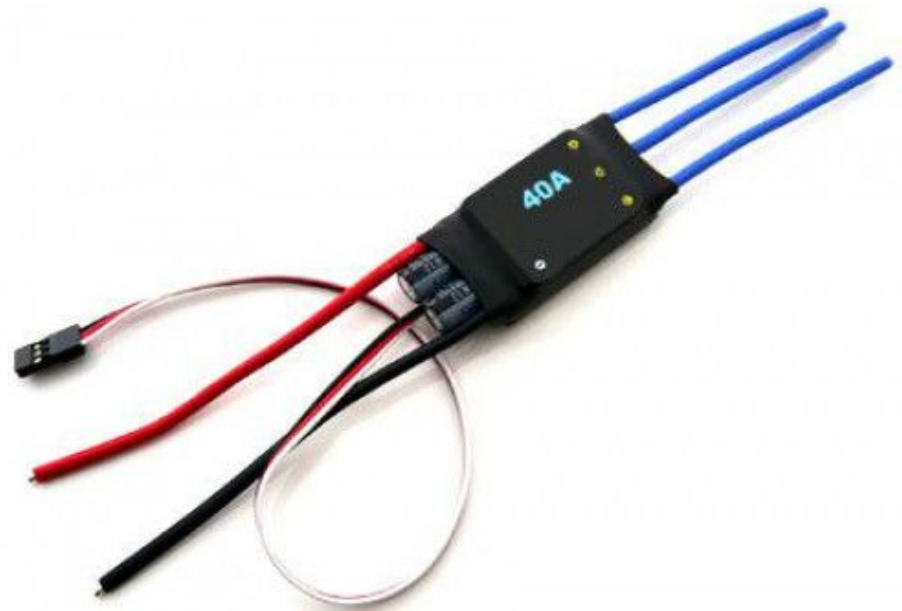
Step Motor



Servo Motors

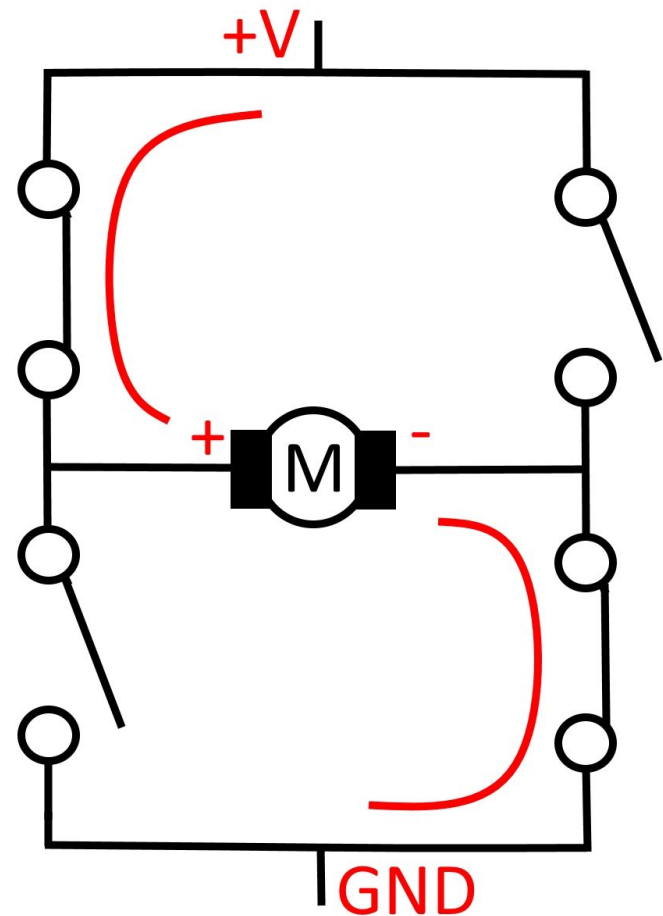
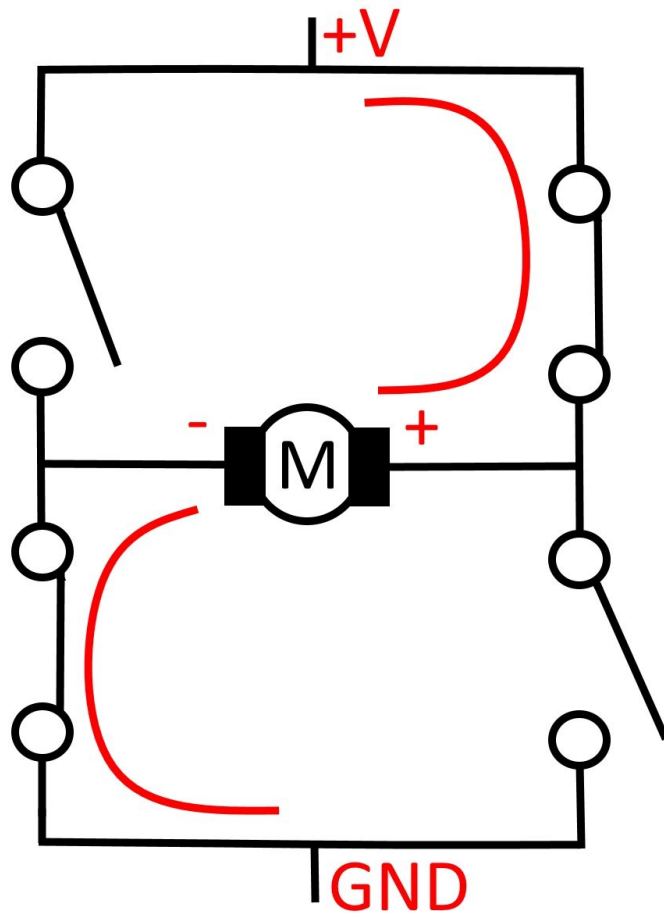


Brushless DC Motors

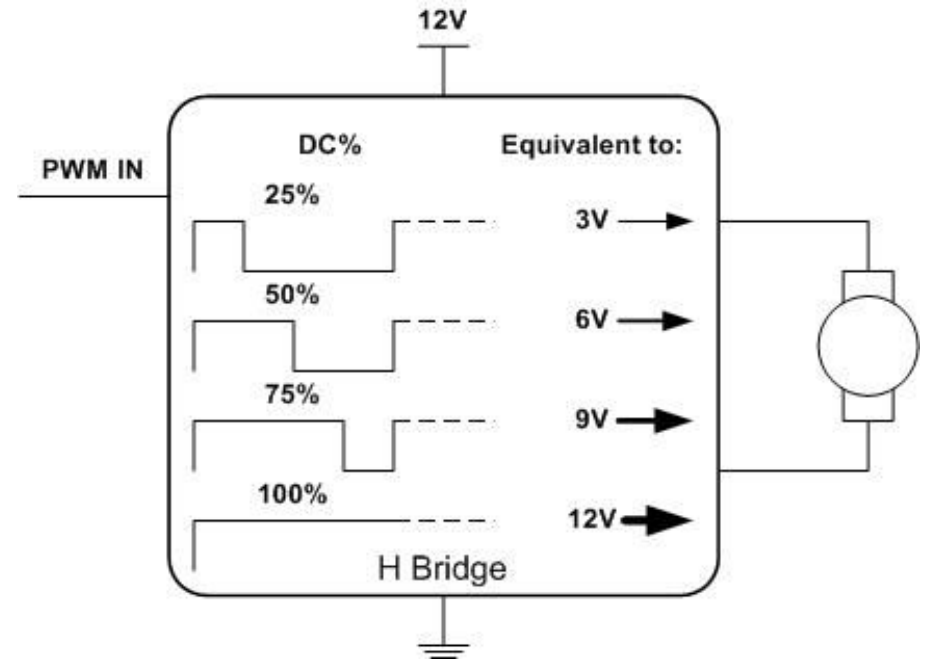
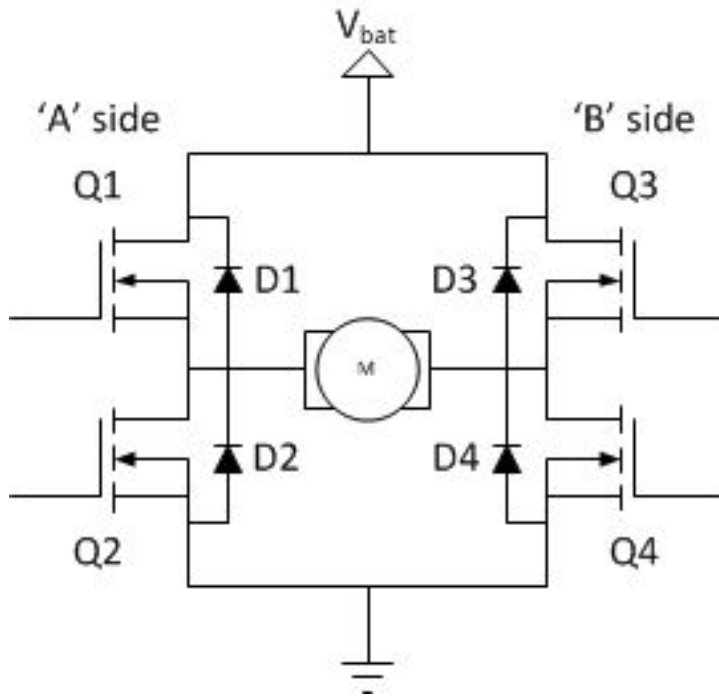


DC Motor Drives: H-Bridge

How an H-bridge can change direction

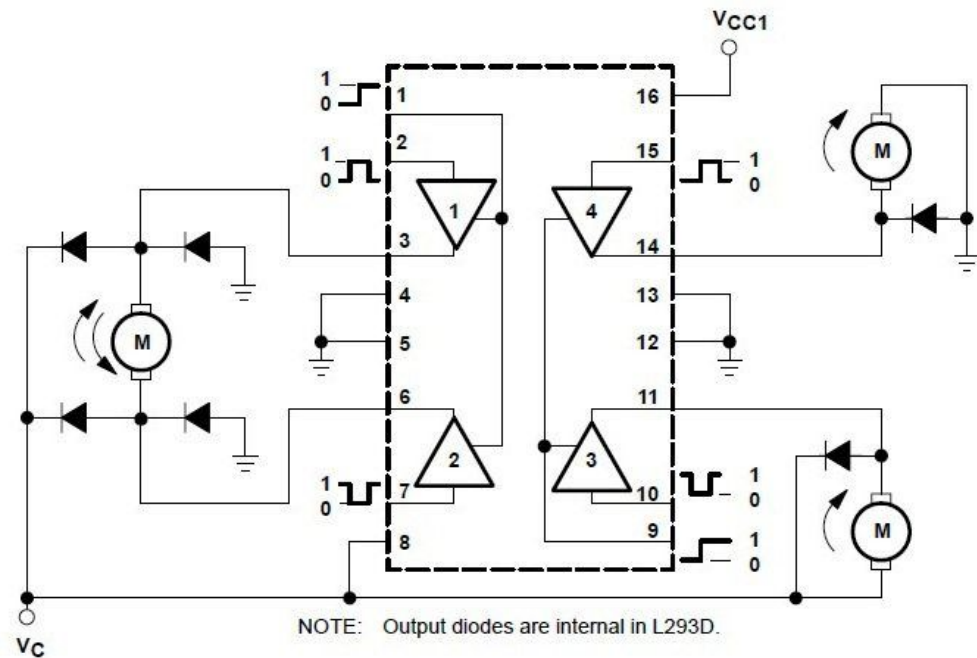
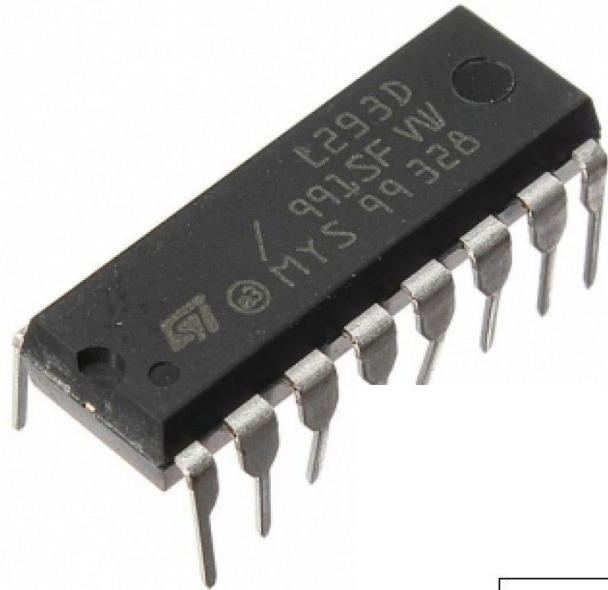


DC Motor Drives: H-Bridge

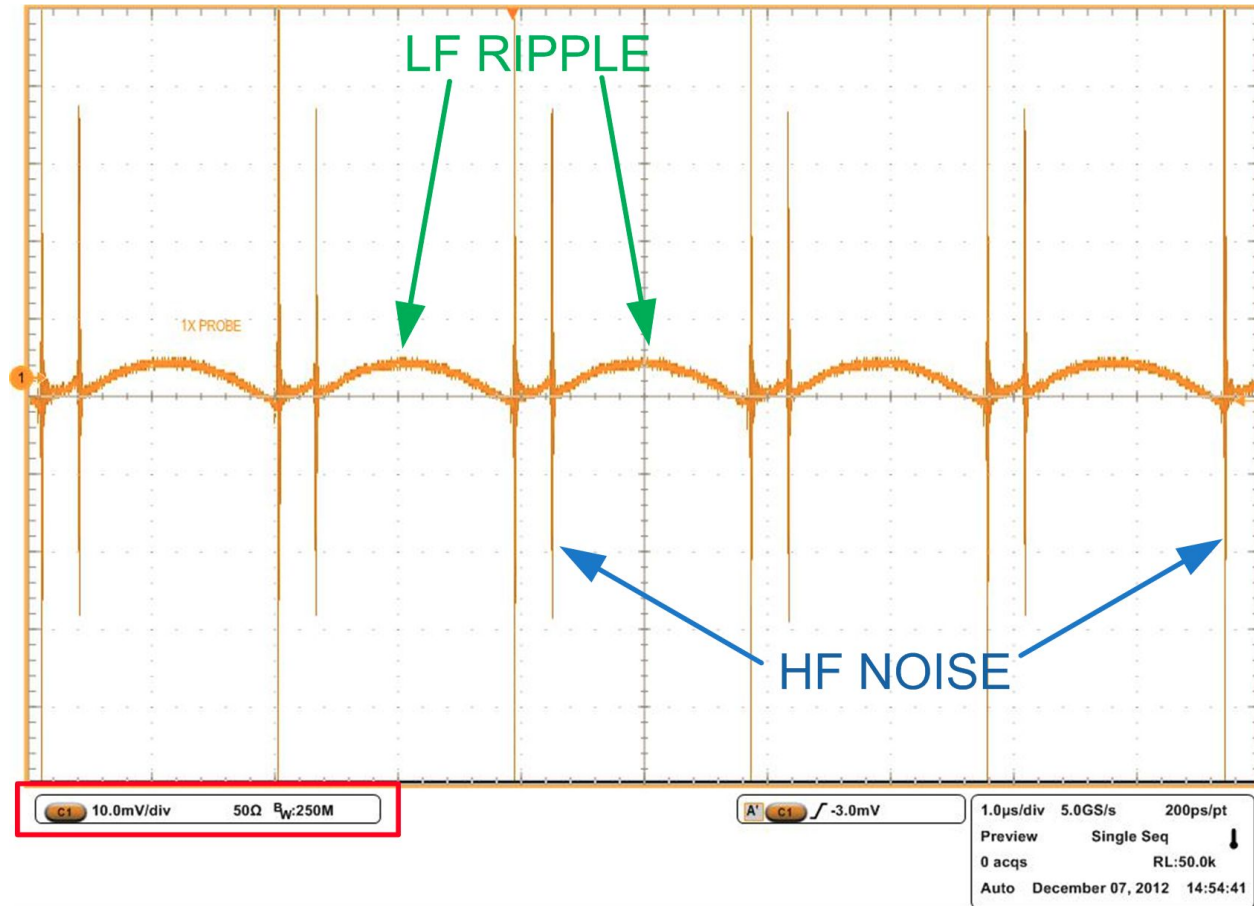


DC Motor Drives

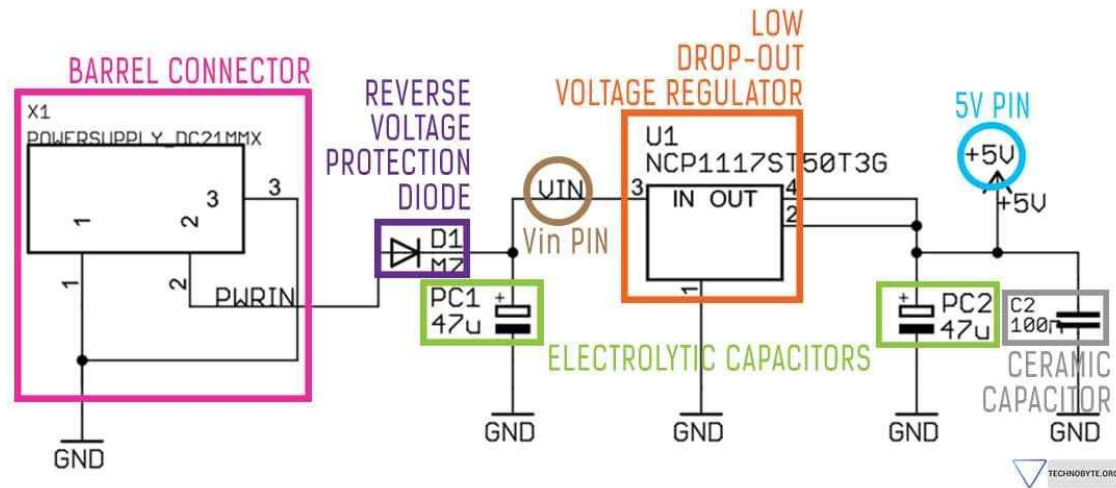
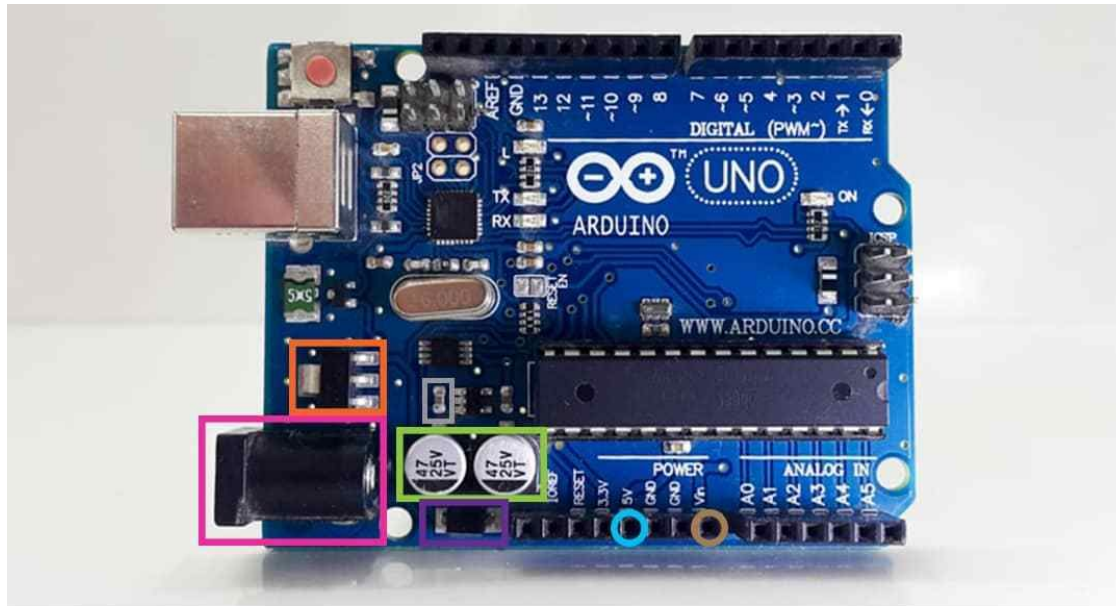
- L293D
- L293B
- L298
- L6205
- ...



Filtering/Isolating



Filtering/Isolating

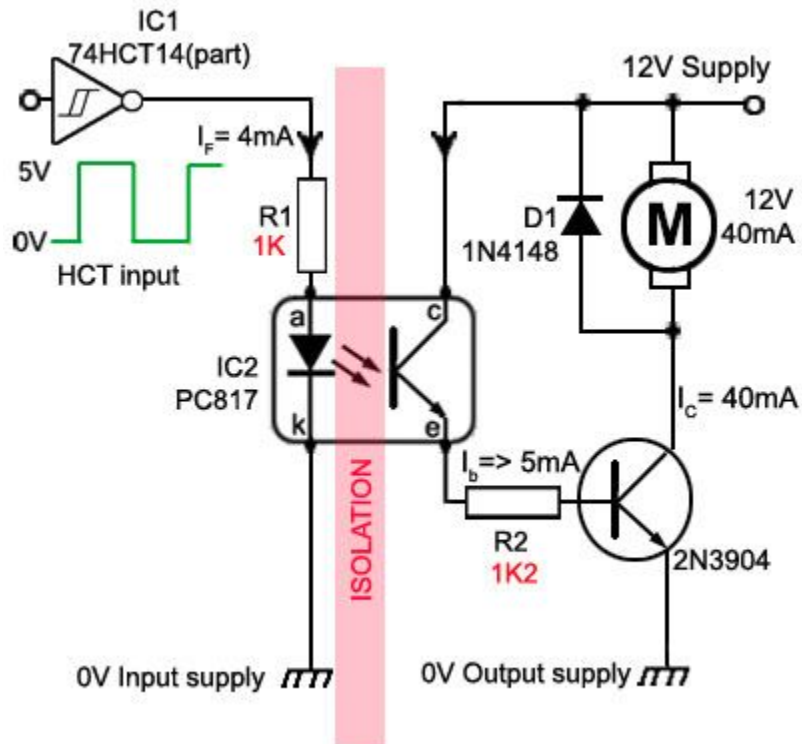


Filtering/Isolating

Mitigation Methods:

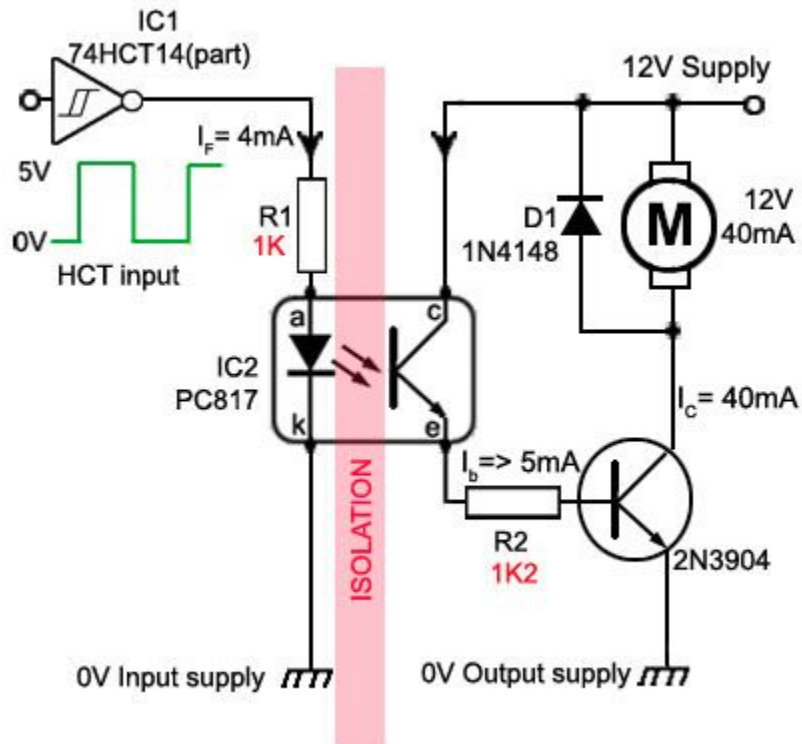
- Connect Small Capacitors to motor terminals
 - Connect Capacitors to Vcc of critical components
 - Keep short-twisted motor cables
 - Consider to use choke ferrite
 - Use separate supplies + Optocouplers
 - Use soft motor-start techniques
-

Optocoupler + Separate Supply



A few common optocouplers: HCP3120, L1319, PC817...

Optocoupler + Separate Supply



A few common optocouplers: HCP3120, L1319, PC817...

Soft Start

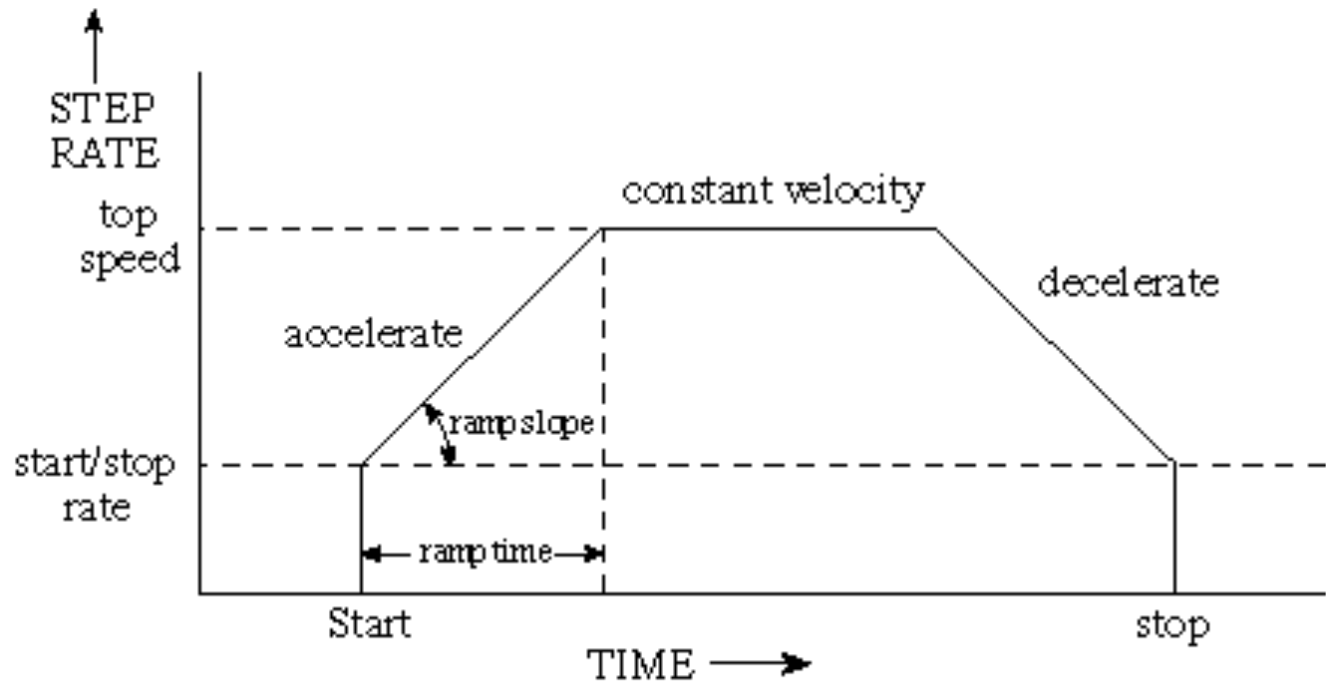


Fig. 29a

Drag Race

Jerk Control

Do Your Homework!

- [Practical Aspects of Motors for Mobile Robots](#)
 - [Drivetrain Design](#)
 - [Motor Selection Guide](#)
 - [How to Choose a Motor](#)
 - [Robot Drive System Fundamentals](#)
 - [Dealing with Motor Noise](#)
 - [PCB Design for Reduced EMI](#)
 - [Reducing Motor Noise](#)
 - [Electrical Noise in Motion Control Circuits](#)
 - [Reduction of DC motor noise](#)
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Teşekkürler

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Bu sunumu,
keysan.me/presentations
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