

ENGR 4421: Robotics II

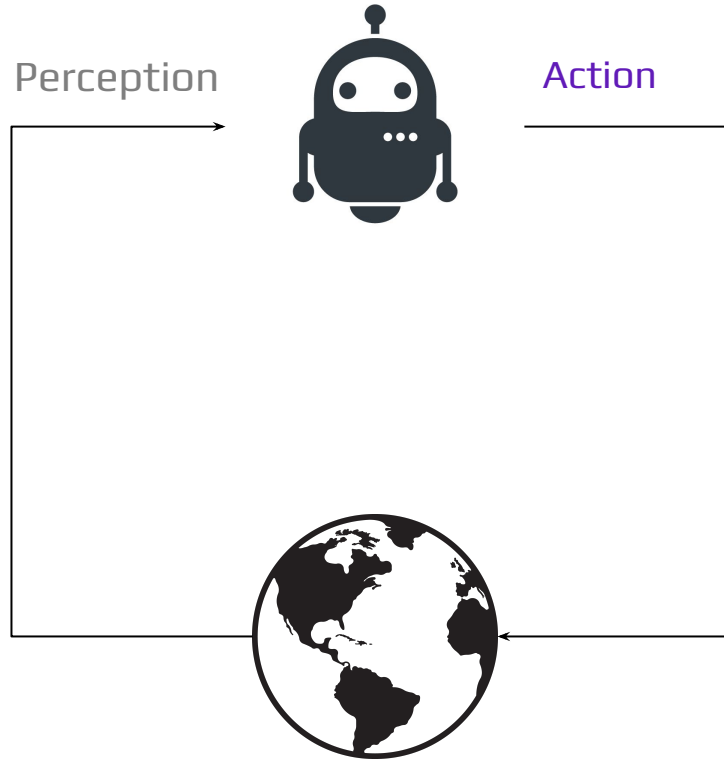
Motors Spin-Up

09/08/2022

Outline

- Types of Motors
- How does a DC Motor Work
- Drive a DC Motor
 - H-Bridge
 - PWM Signal
- Motor Driver Board

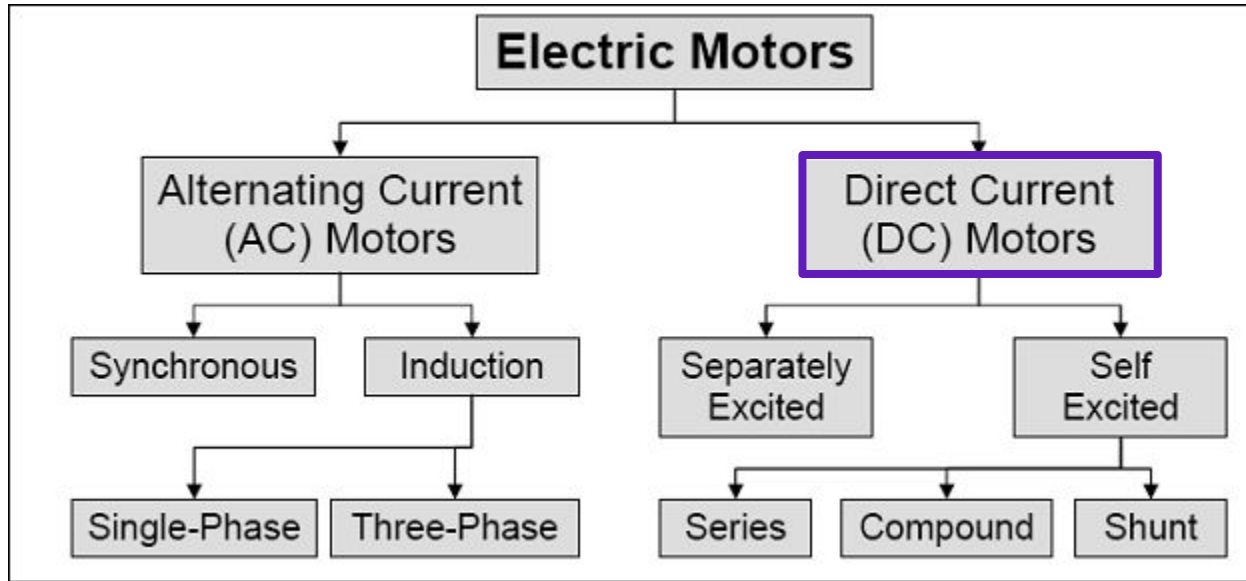
What does A Robot Do



Actuators

- Motors
- Hydraulic Actuators
- Pneumatic Actuators
- Solenoids
- Artificial Muscles
- ...

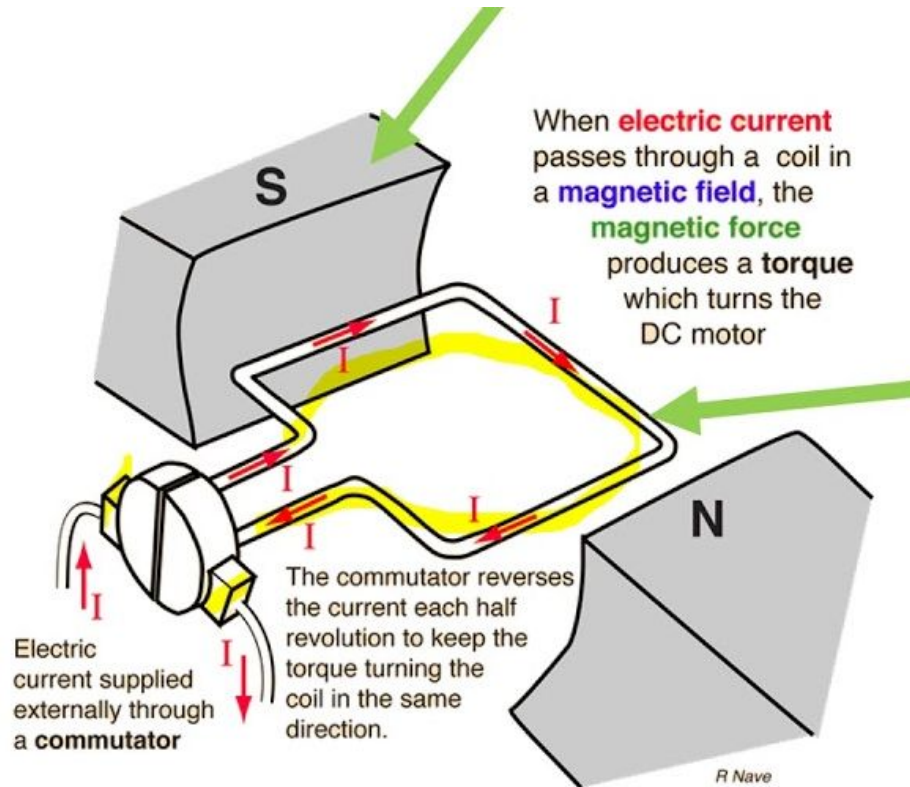
Types of Motors



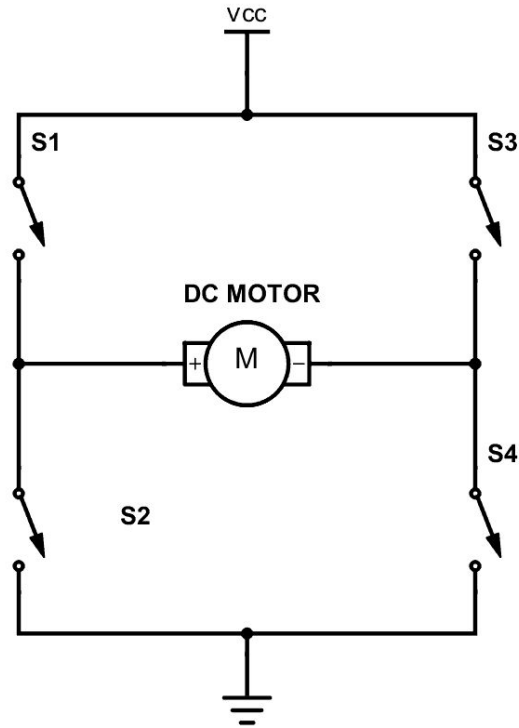
DC Motors



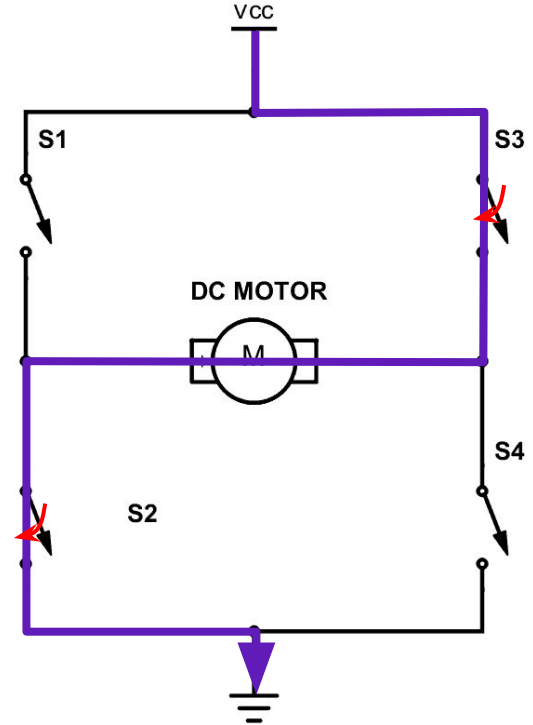
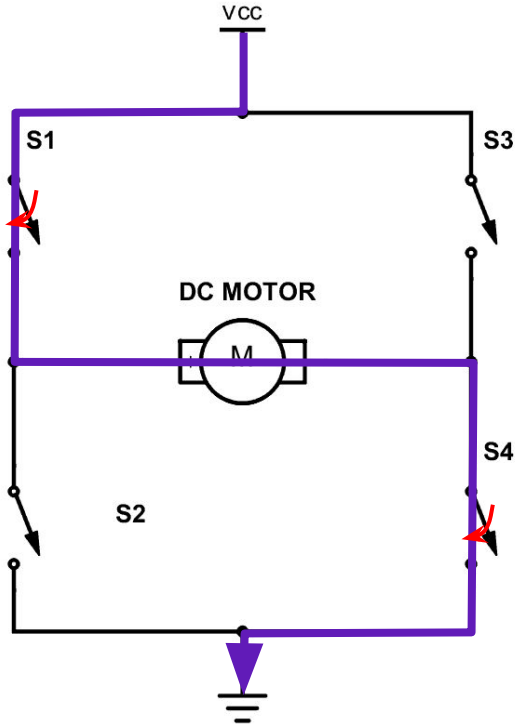
How does a DC Motor Work



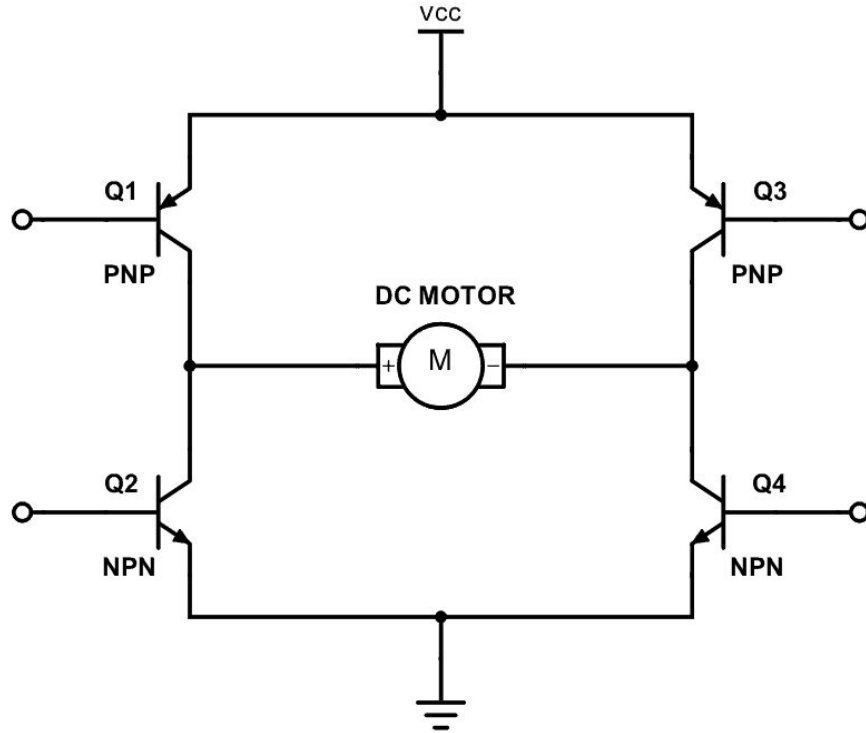
H-bridge Driving Circuit



H-bridge Driving Circuit



Transistor H-bridge



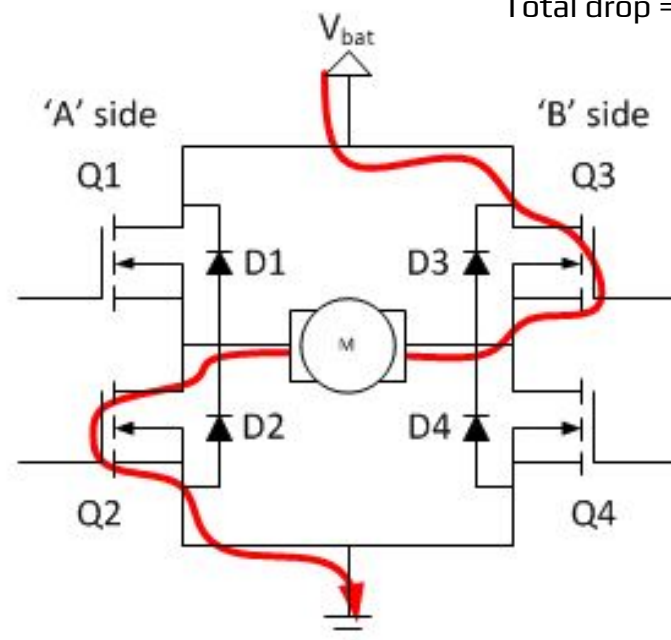
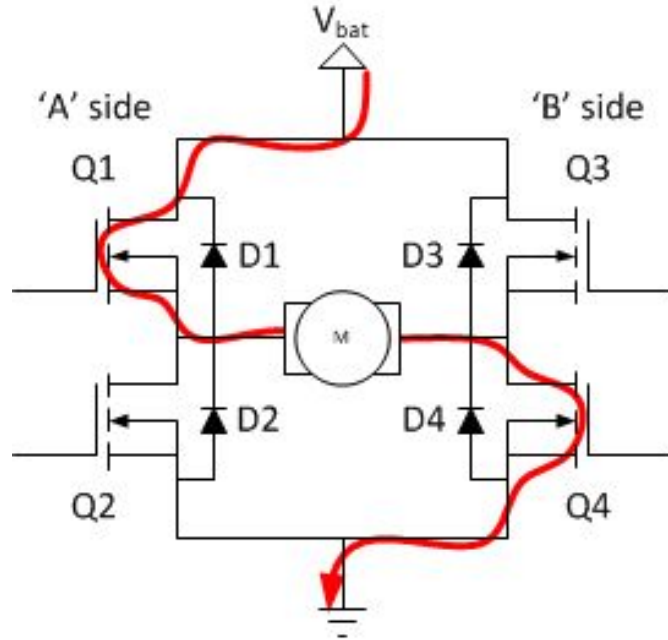
Transistors drop = 0.7 V

Total drop = 1.4 V

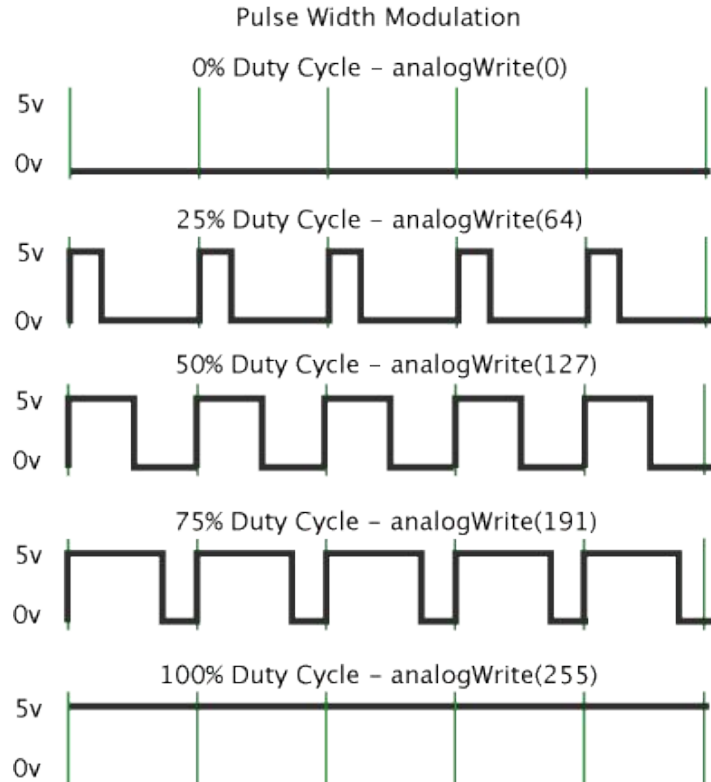
MOSFET H-bridge

MOSFET drop = 0.1 V

Total drop = 0.2 V

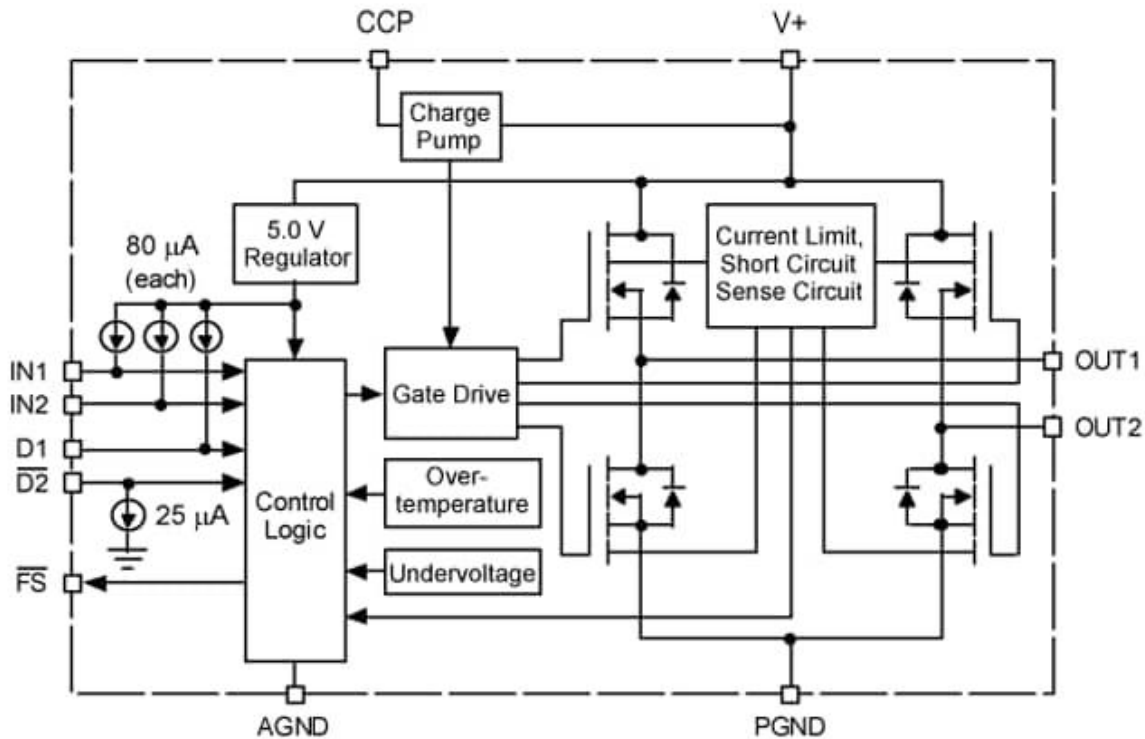
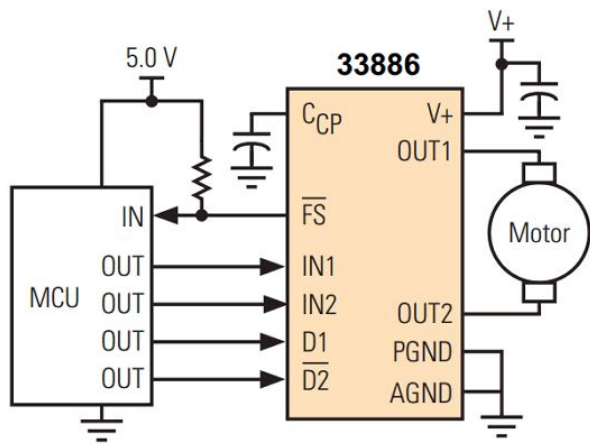


Pulse Width Modulation (PWM)

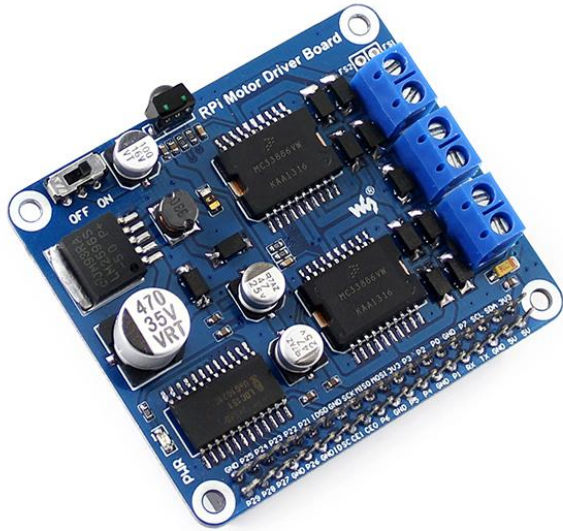


MC33886

33886 Simplified Application Diagram



Motor Driver Board



- Raspberry Pi 40PIN GPIO extension header
- Freescale H-bridge driver MC33886
- Onboard 5V regulator, provides power to Raspberry Pi
- Onboard IR receiver, used for remote control robot
- Multi protection circuit, excellent stability
 - 2A self-recovery fuse, keep your Pi safe
 - Driver chip features Short-Circuit Shutdown for Large Output Current, Undervoltage Disable Function
 - Reversed polarity protection for motor output
 - Anti-reverse diode for power supply
- Power input range: 7V~40V
- Single motor output current: up to 5A
- Power supply current for Raspberry Pi: up to 2A