ROV Motor Control

ALLEGHENY COLLEGE COMPUTER AND INFORMATION SCIENCE DEPT.

Today's Agenda

Tether

Lights

Thrusters

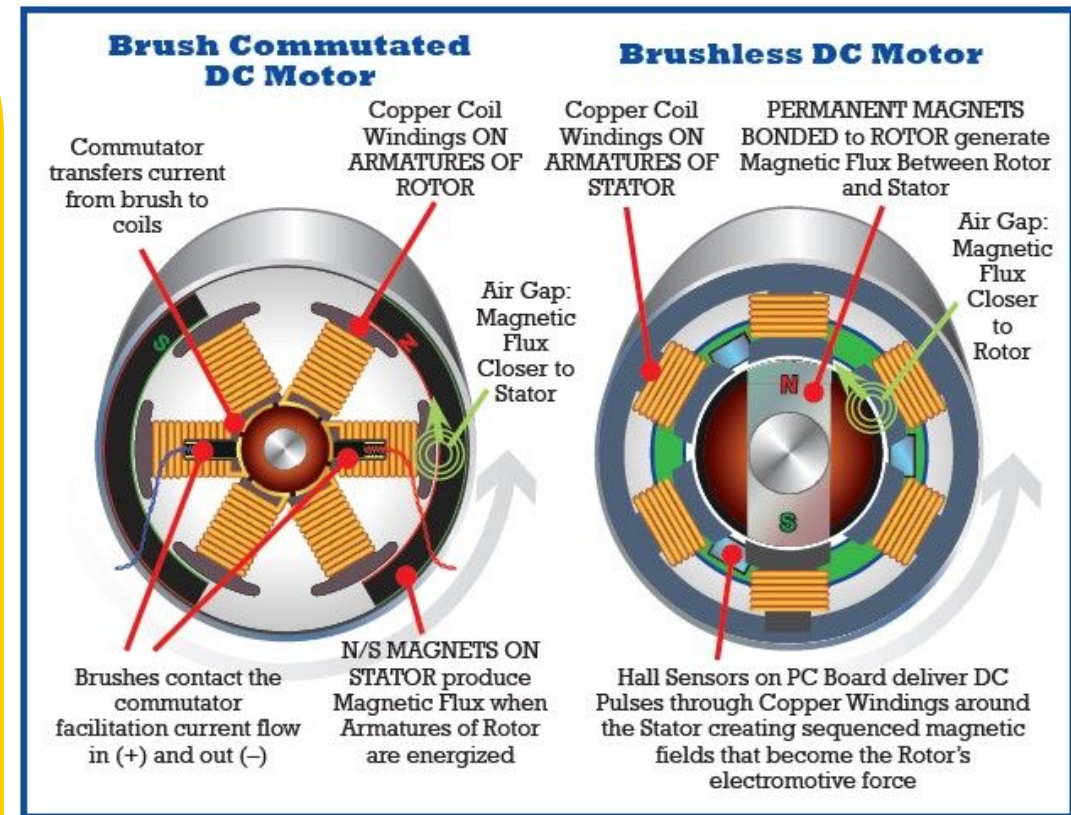Seaeye Leopard

Camera

Frame

What is
a Motor?

Introduction to Motors
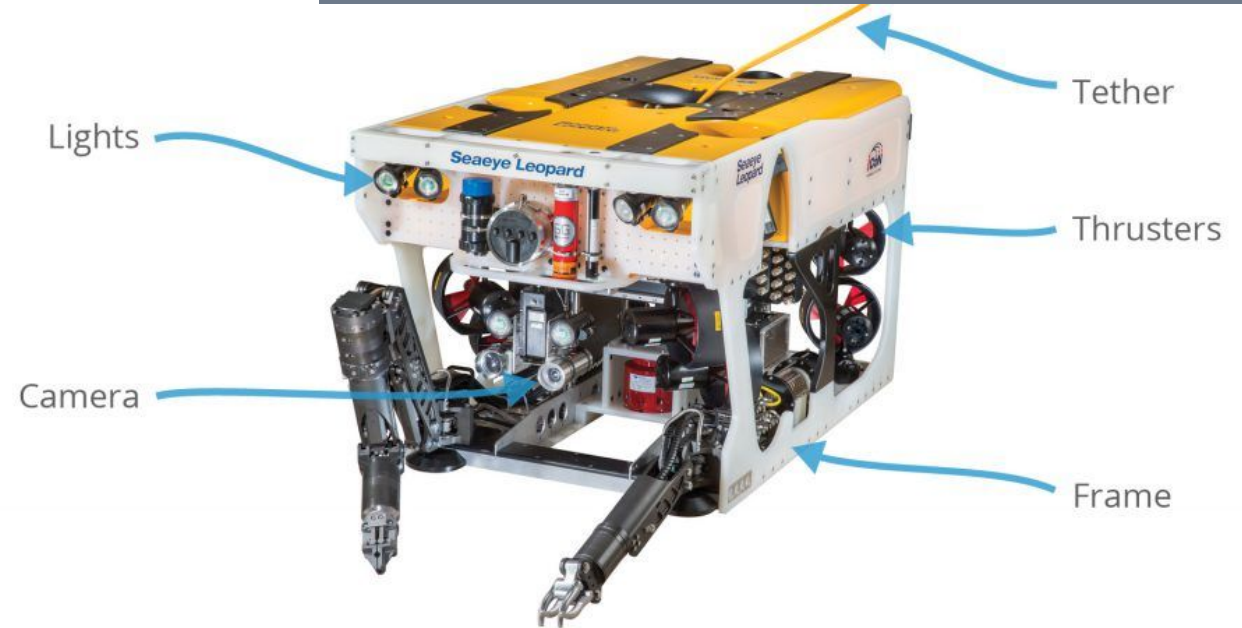
- Motors convert electrical energy into mechanical motion
- 2 types include:
  - Brushed DC Motors: Simple design using brushes to switch current direction, affordable but prone to wear
  - Brushless DC Motors: Efficient, higher lifespan, more complex controllers
- We will be using waterproof brushed motors
  - Need to be waterproofed to prevent electrical shorts or corrosion

Brush Commutated DC Motor

Commutator transfers current from brush to coils

Copper Coil Windings ON ARMATURES OF ROTOR

Air Gap: Magnetic Flux Closer to Stator

Brushes contact the commutator facilitation current flow in (+) and out (–)

N/S MAGNETS ON STATOR produce Magnetic Flux when Armatures of Rotor are energized

Brushless DC Motor

Copper Coil Windings ON ARMATURES OF STATOR

PERMANENT MAGNETS BONDED to ROTOR generate Magnetic Flux Between Rotor and Stator

Air Gap: Magnetic Flux Closer to Rotor

Hall Sensors on PC Board deliver DC Pulses through Copper Windings around the Stator creating sequenced magnetic fields that become the Rotor's electromotive force
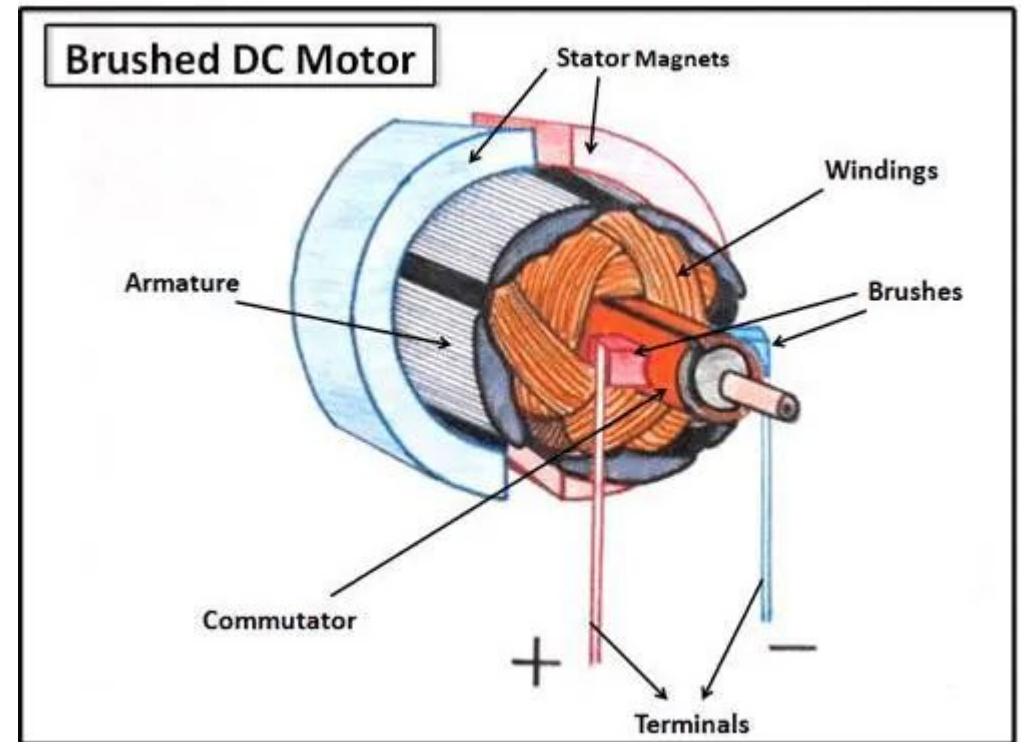
- Brushed Submarine Thruster
- Features
  - Waterproof housing
  - Corrosion-resistant materials
  - High Torque Output for Propelling through water
- Advantages
  - Easy to control
  - Affordable
  - Can go clockwise and counterclockwise
- Disadvantages
  - Brushes wear out overtime
  - May need future maintenance

Brushed DC Motors for ROVs

Considerations for Motors

- Voltage and Current
  - Our motor runs on about 9-12 Volts
  - Varying Current
  - We need to match our power supply
- RPM (Revolutions per Minute)
  - Speed of the motor
  - Increases with Voltage and current
- Torque
  - High torque means better performance underwater
- Waterproof Rating (IP rating)
  - Higher rating the better

Brushed DC Motor — Stator Magnets, Windings, Armature, Brushes, Commutator, Terminals, + −

Motor Control

Our Control System

- We will be using 2 motors
  - 1 up and down
  - 1 forward and backward
- Each motor will be connected to 6 pin on-off-on switch
- 1 direction will be clockwise the other will be counterclockwise
  - Polarity of the voltage switches the motor direction
- The power will be supplied by a 9 V battery. This will allow for portability.

Blue wire : connection Pin-5
Blue wire : connection Pin-6
Black wire : power-
Red wire : power+
Blue wire : connection Pin-3
Blue wire : connection Pin-4

positive power mark

Make your Motor Control System

Congratulations for making your motor system! Next time we will finish the