

# Week 9

Motor 1 --- [Spooky movement]

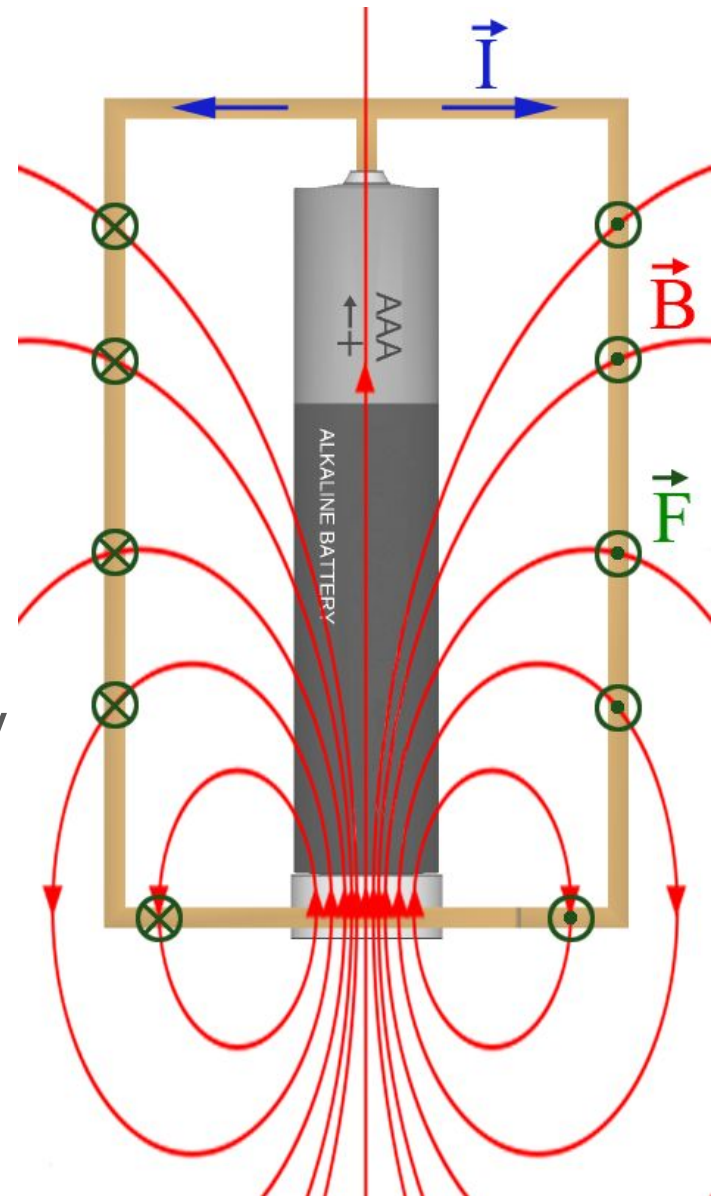
# What is a Electric Motor?

1. Motors convert electrical energy to mechanical energy
2. Most of motors are made up of
  - a. Magnets
  - b. Coil (electromagnets)
  - c. rotor (shaft)
3. Can also be used to convert mechanical energy to electrical energy

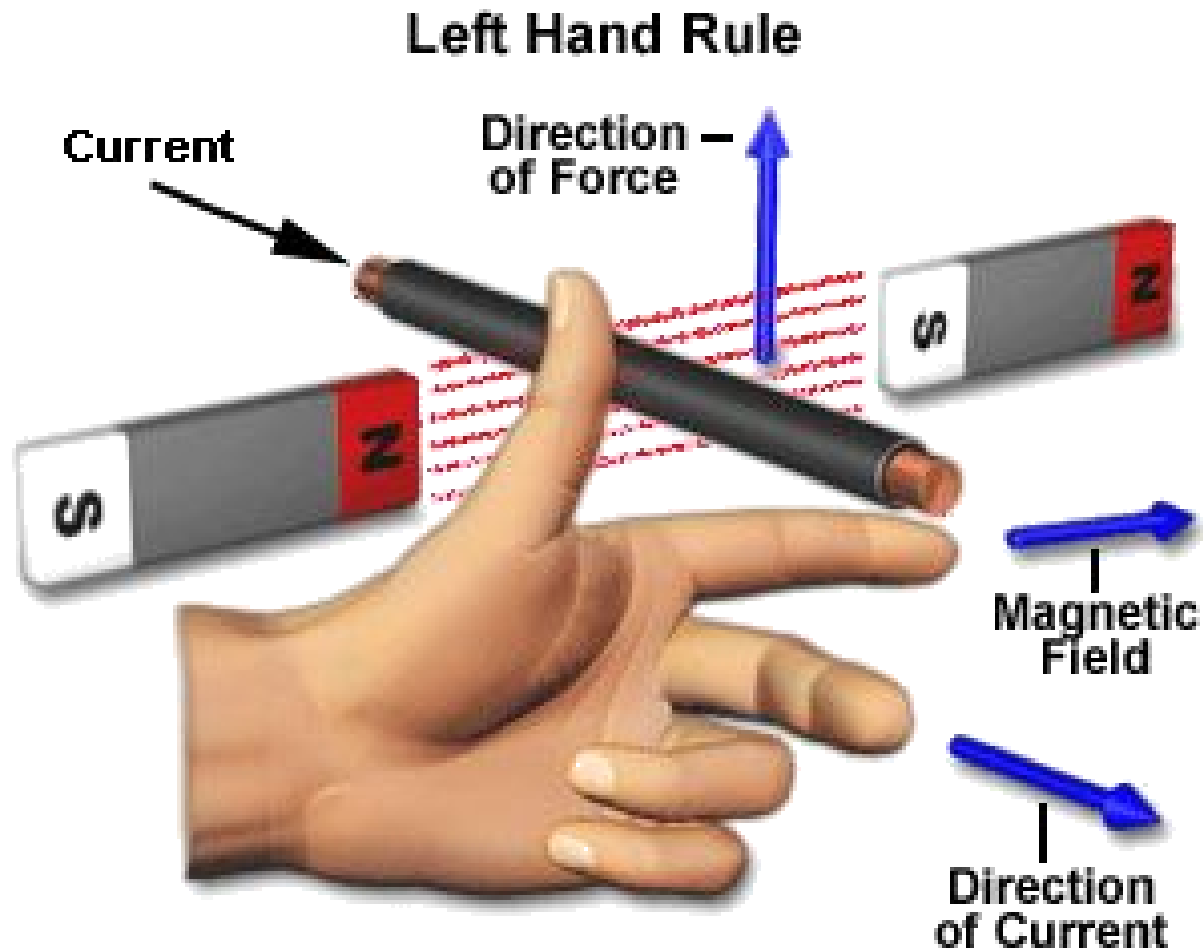


# Homopolar Motors

1. First form of motor to be built
2. Simplest form of motor
3. Consists of
  - a. Battery
  - b. Copper wire
  - c. Earth magnet
4. Electromagnetic field created by current in the copper wire interacts with static magnetic field and creates force



# Fleming's left-hand rule

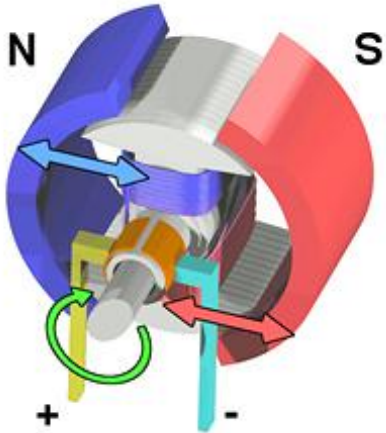


# Brushed DC motors

1. Most common type of motor used
2. Found in cell phones, cars, appliances, power tools etc..
3. Simple and Economical



# Brushed Motor



## 3 Carbon Brushes

Conduct electricity from the battery to the commutator.

## Commutator

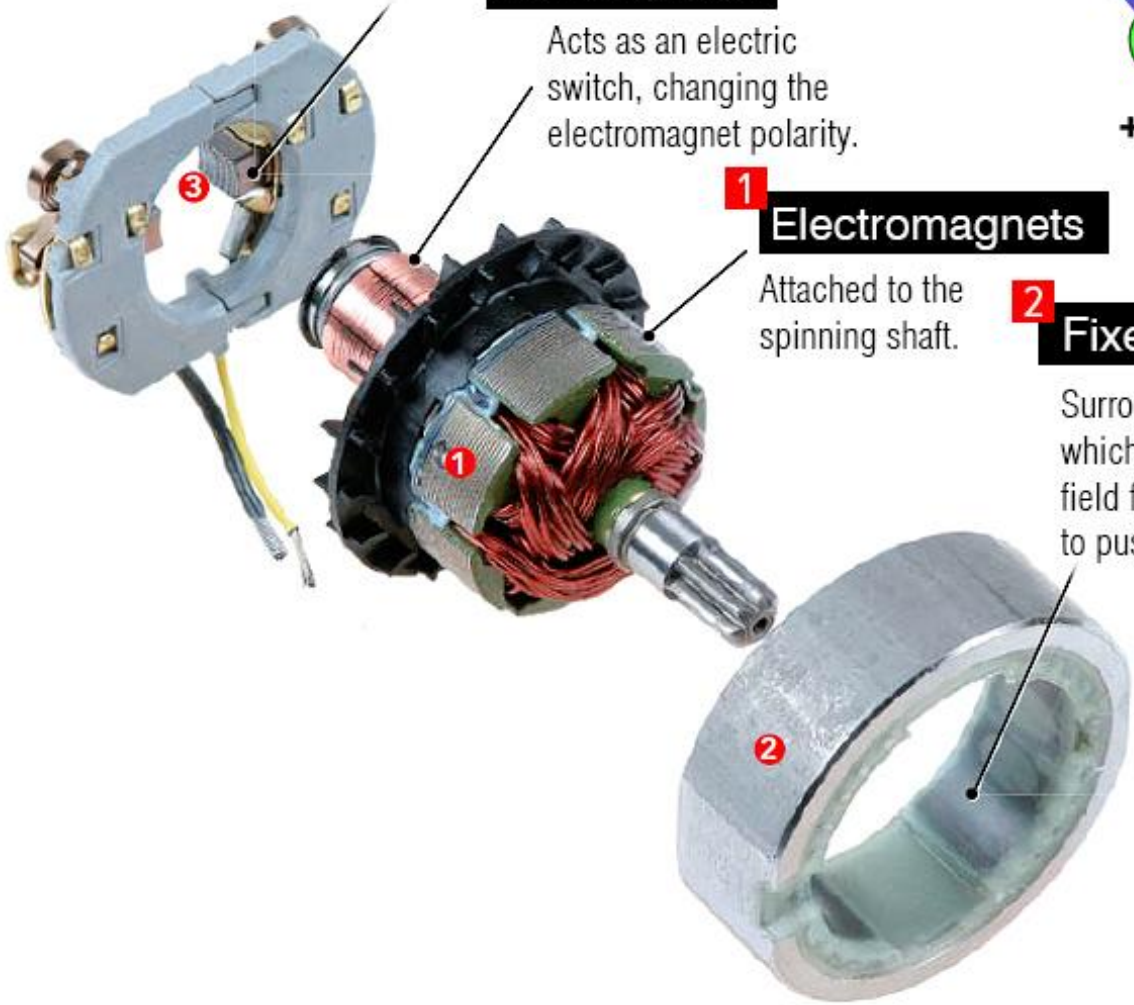
Acts as an electric switch, changing the electromagnet polarity.

## 1 Electromagnets

Attached to the spinning shaft.

## 2 Fixed Magnets

Surrounds the electromagnet, which creates the magnetic field for the electromagnet to push & pull against.



# Motor Characteristics

## 1. Voltage

All motors have voltage rating that they are made for. Giving more voltage than rated voltage to a motor might cause your motor to heat up and potentially damage. Giving less voltage will decrease speed and power.

## 2. Current

Motor will draw certain amount of current (like momentum) when voltage is applied. **Your power supply must be rated more than what your motor draws**

## 3. RPM (rotation per minute)

A measurement of how many times the motor shaft turns per minute  
(speed of motor)

[How to measure RPM without special tools](#)

# Find out about your motor

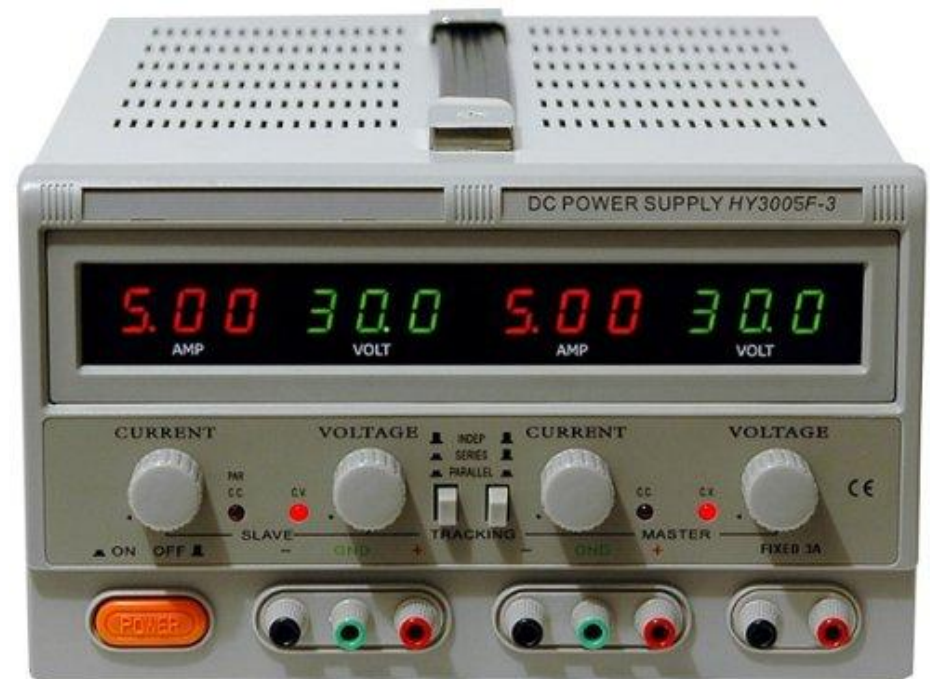
1. Look for a label for brand/model name if there is any
2. Look for voltage and current rating of your motor on label or online
3. Use benchtop power supply to find out appropriate voltage
  - a. Start low and slowly increase voltage.
  - b. Stop at anytime if motor is getting hot
  - c. Many common DC brushed motors are rated for 3V, 5V, 6V, 12V  
Evaluate how motor is running in each point. (Rated voltage usually correspond to motor size)
4. Find out current draw from benchtop power supply
5. Find out stall current draw by seeing a value when motor is physically stopped



# Use a Benchtop DC power supply

We will be using Benchtop DC power supply to test your motor!

1. It can provide up to 30V.  
Always start at 0!
2. Find an appropriate voltage for your motor
3. Find current draw of your motor



# Find an appropriate power supply

1. Find out if the adapter is **AC** or **DC**. Chose a kind that matches your kind of motor
2. Find **voltage rating**
3. Find **current rating**
4. Test it with Multimeter if it's giving rated voltage

**\*Current rating must be more than what your motor is drawing with load**

