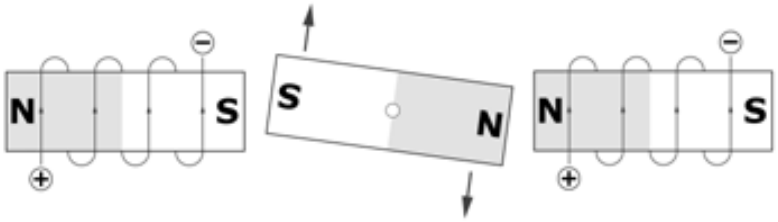
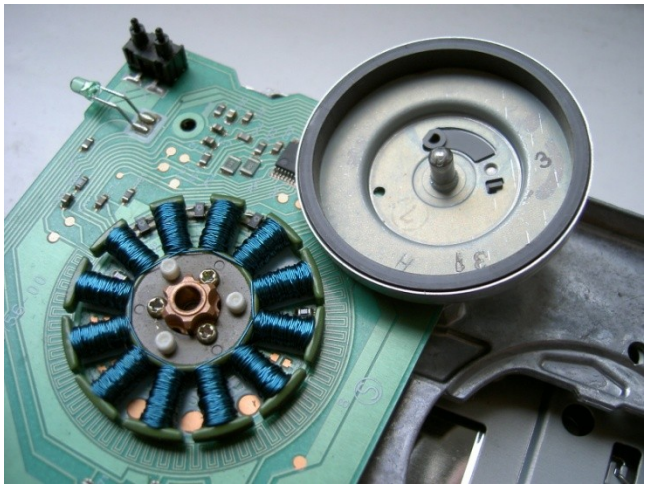
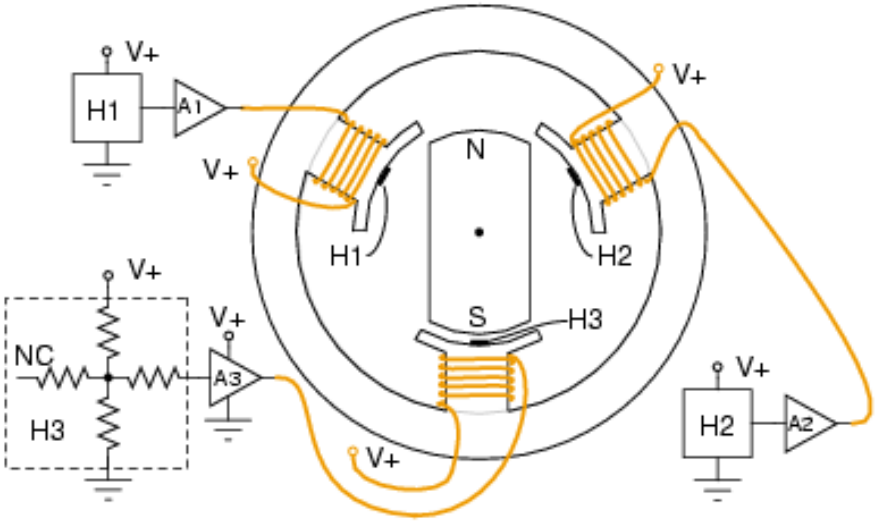
Special Electrical Machines

Brushless DC Motors

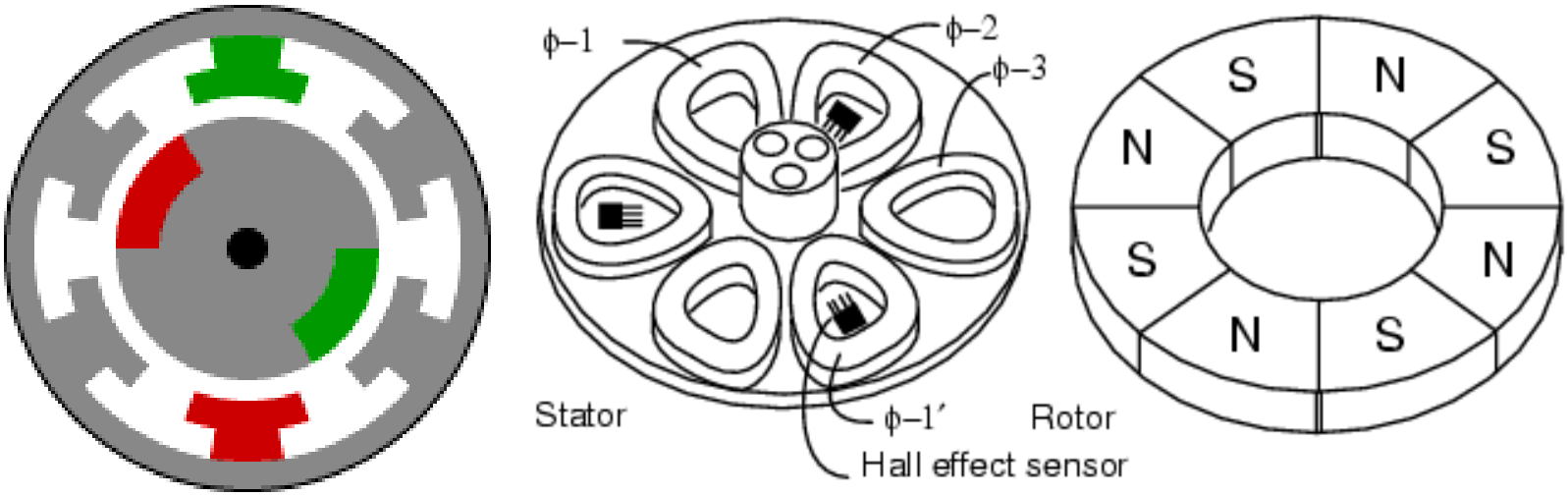
- Essential difference - commutation is performed electronically with controller rather than mechanically with brushes







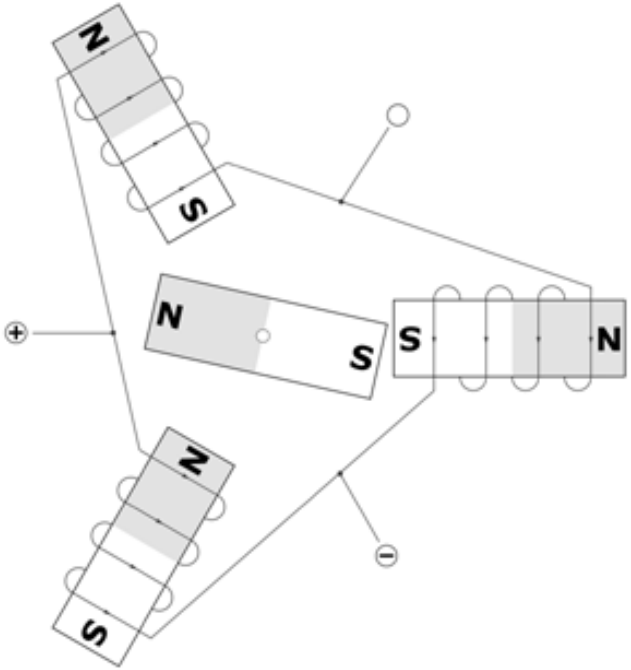
Brushless DC Motor Commutation

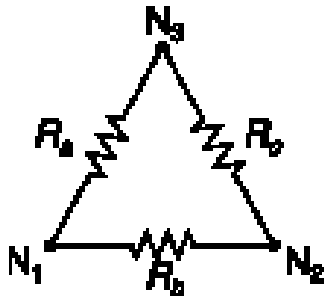


- Commutation is performed electronically using a controller (e.g. HCS12 or logic circuit)
  - Similarity with stepper motor, but with less # poles
  - Needs rotor positional closed loop feedback: hall effect sensors, back EMF, photo transistors

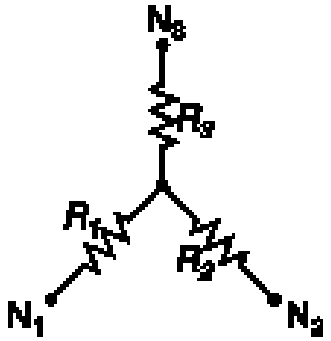
BLDC (3-Pole) Motor Connections

- Has 3 leads instead of 2 like brushed DC
- Delta (greater speed) and Wye (greater torque) stator windings





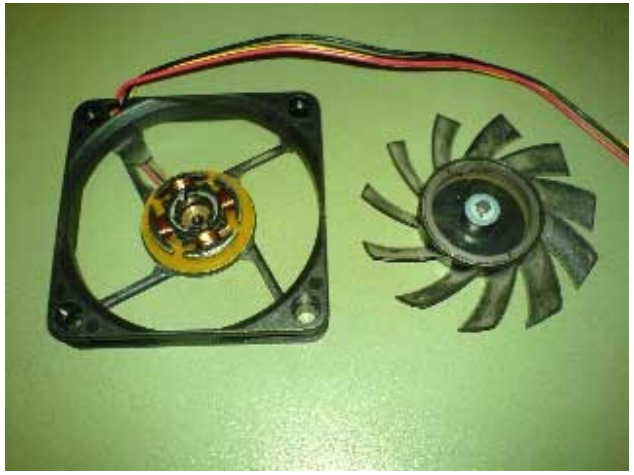
Delta



Wye

Brushless DC Motors

- Applications
  - CPU cooling fans
  - CD/DVD Players
  - Electric automobiles
- Pros (compared to brushed DC)
  - Higher efficiency
  - Longer lifespan, low maintenance
  - Clean, fast, no sparking/issues with brushed contacts
- Cons
  - Higher cost
  - More complex circuitry and requires a controller



Synchronous Motor

- Single phase synchronous motor; construction, operating principle and characteristics of reluctance and hysteresis motors; introduction to permanent magnet generators.

THANKS….

Queries Please…