



Sensors and Sensing

MCHE 470 – Fall 2013

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Rougeou 225

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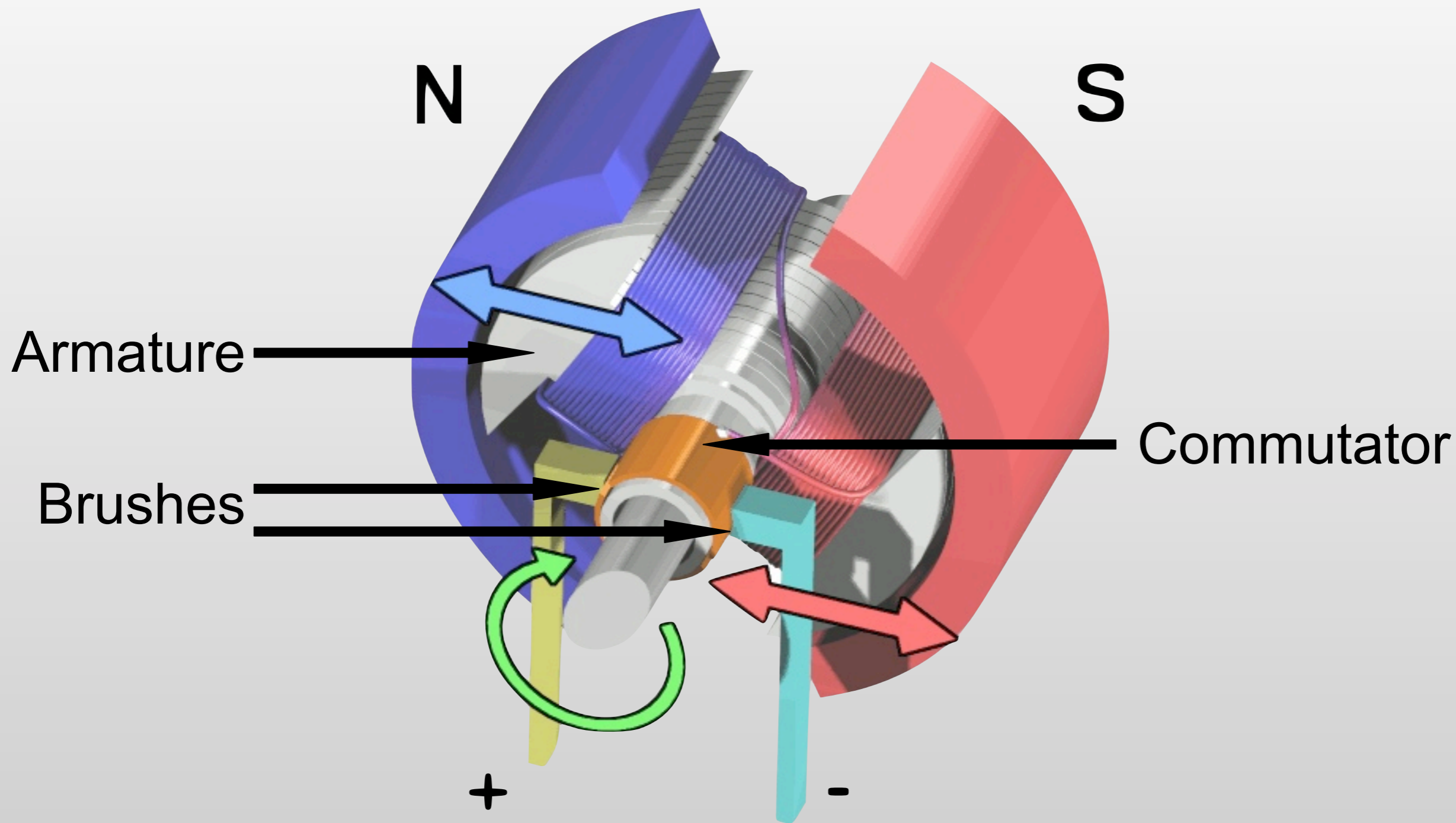
[@Doc_Vaughan](#)

A quick aside

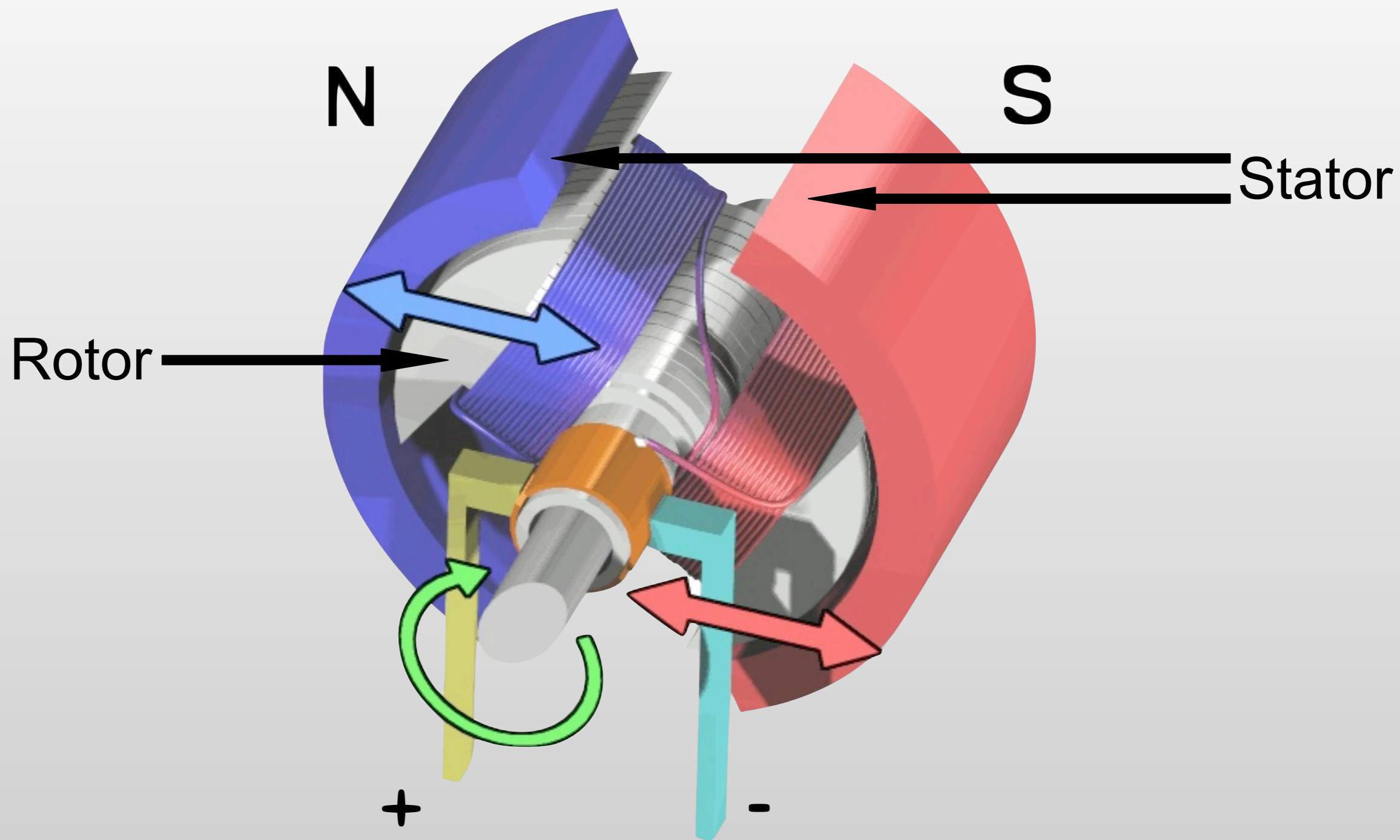


- How do DC motors work?

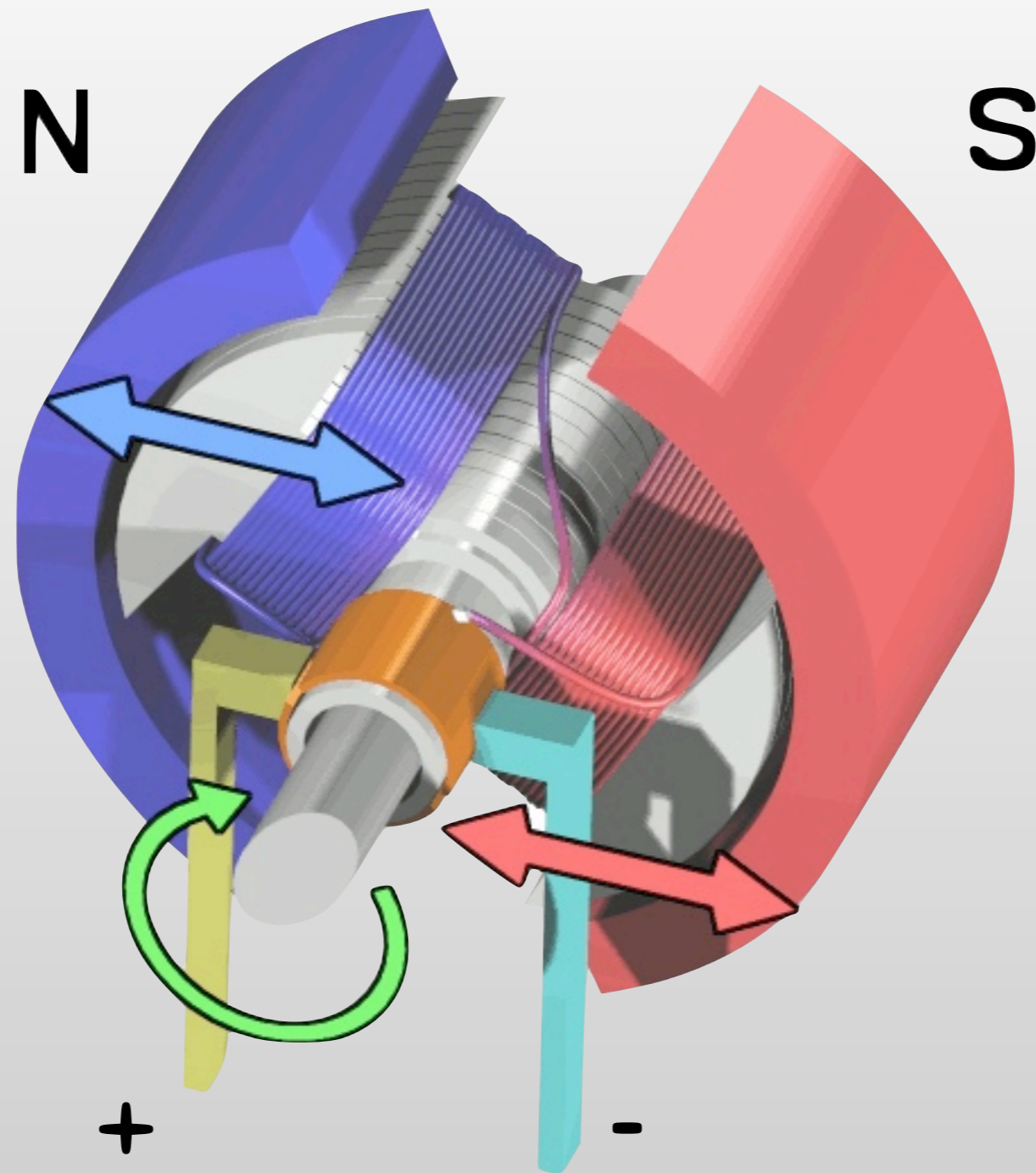
Brushed DC Motors



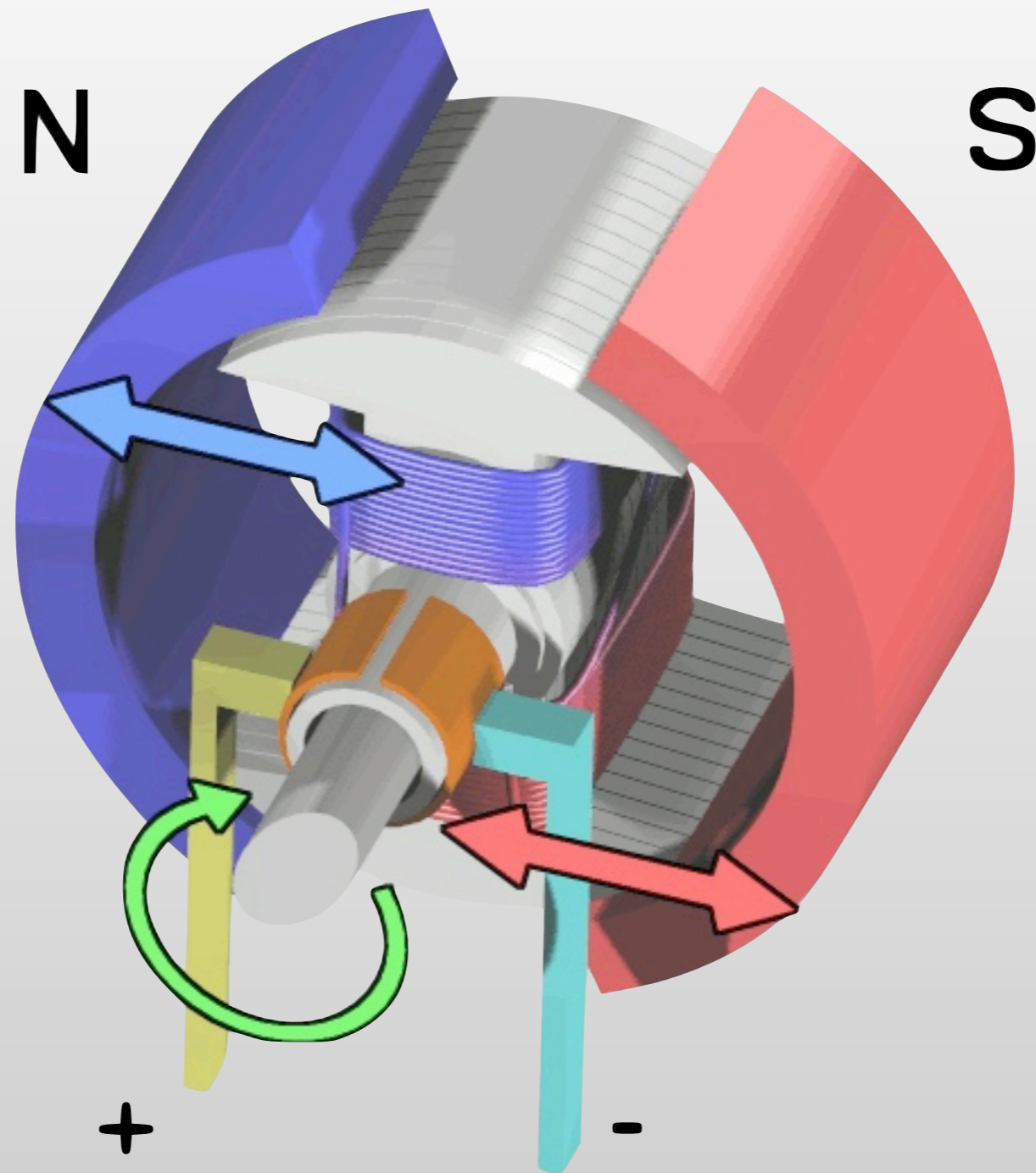
Brushed DC Motors



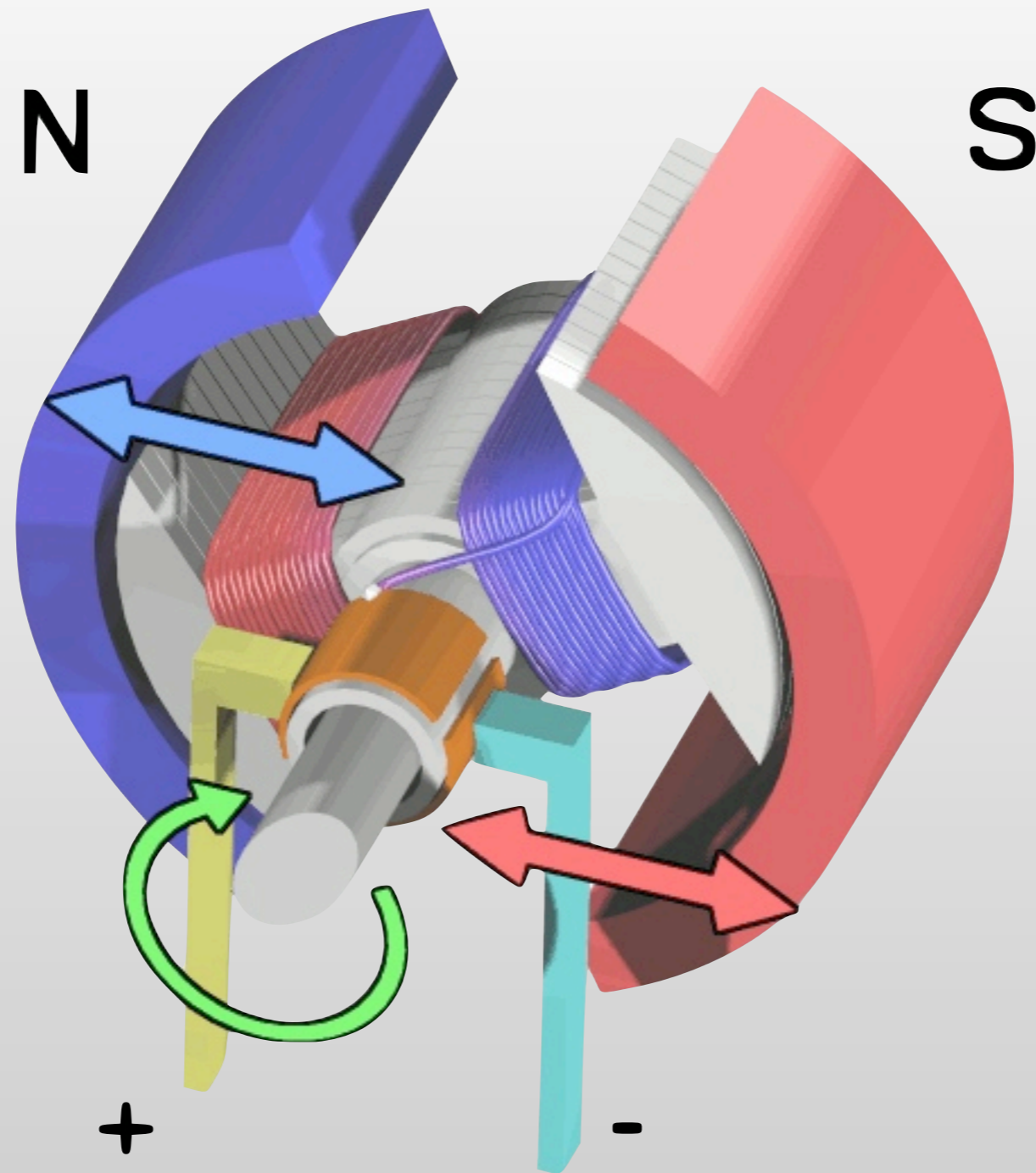
Brushed DC Motors



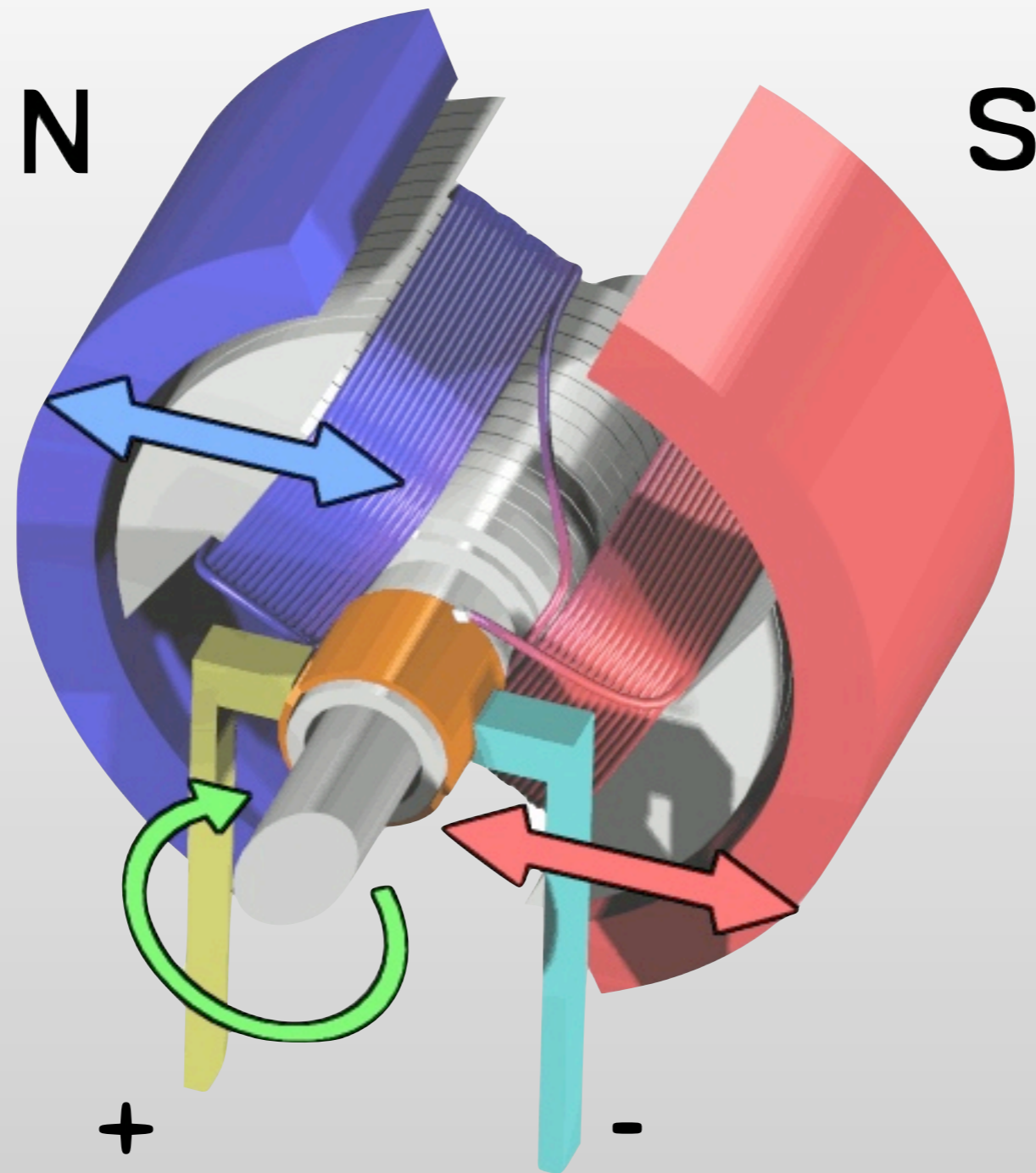
Brushed DC Motors



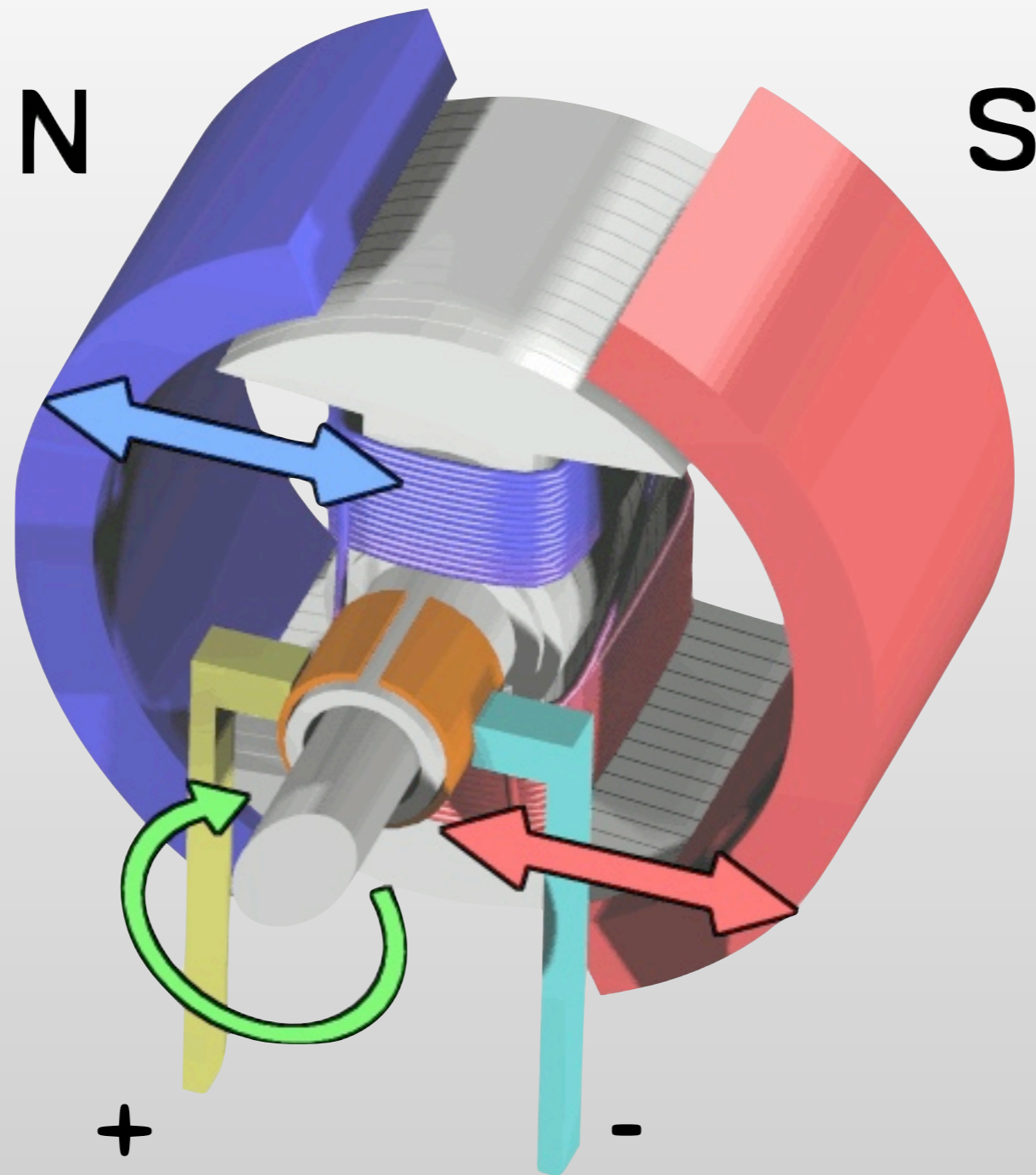
Brushed DC Motors



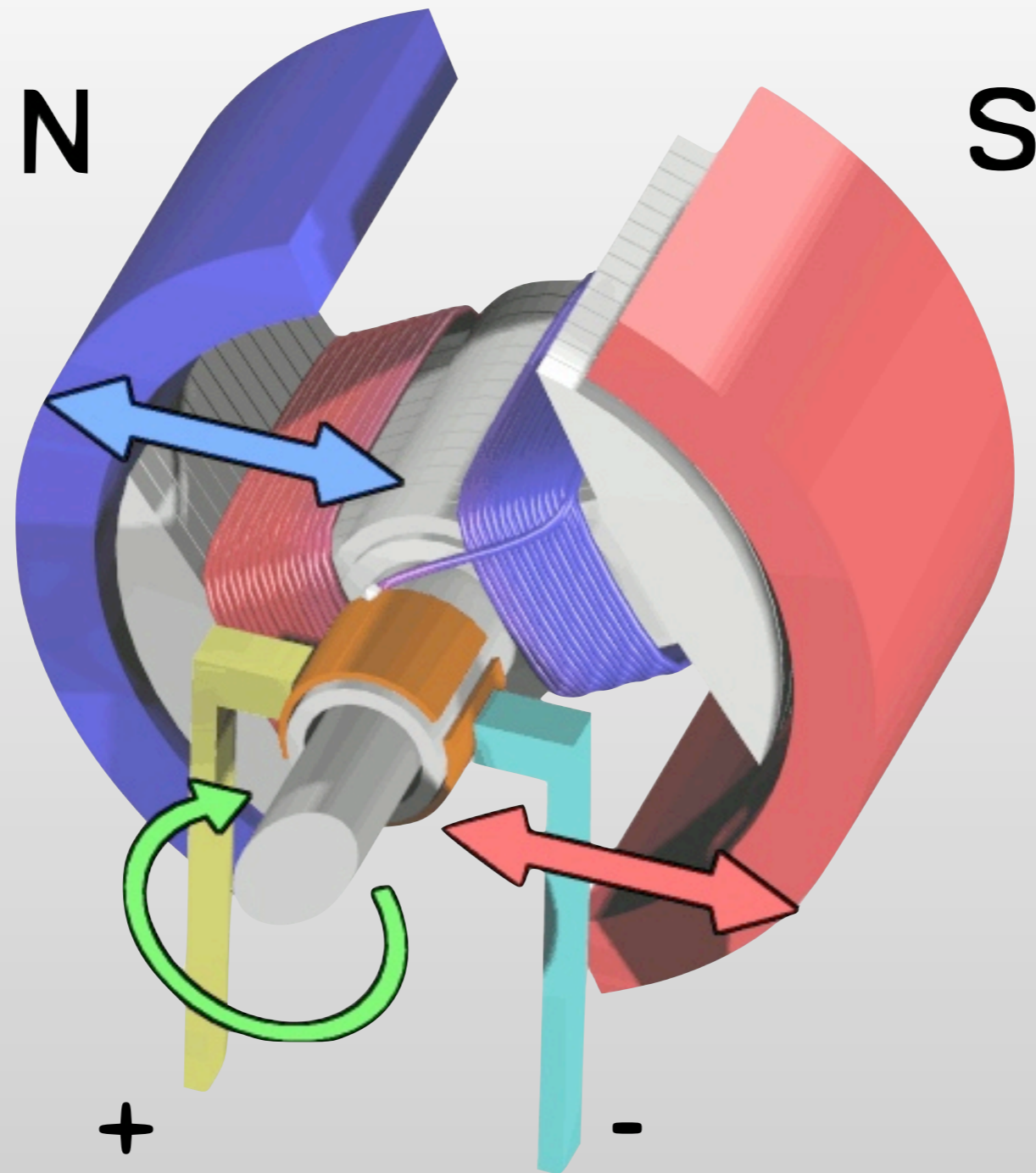
Brushed DC Motors



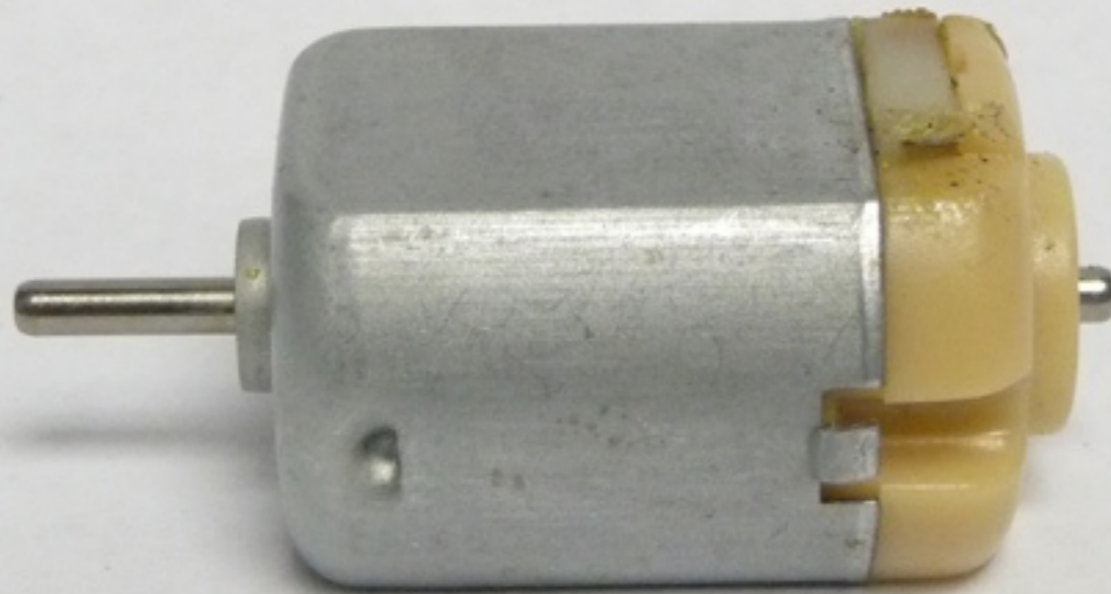
Brushed DC Motors



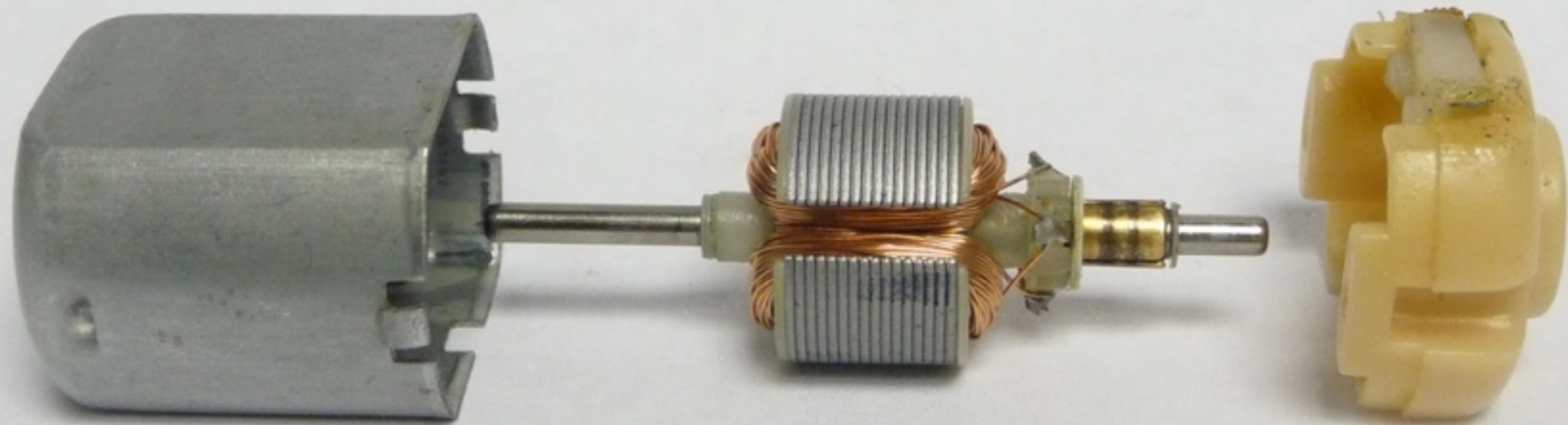
Brushed DC Motors



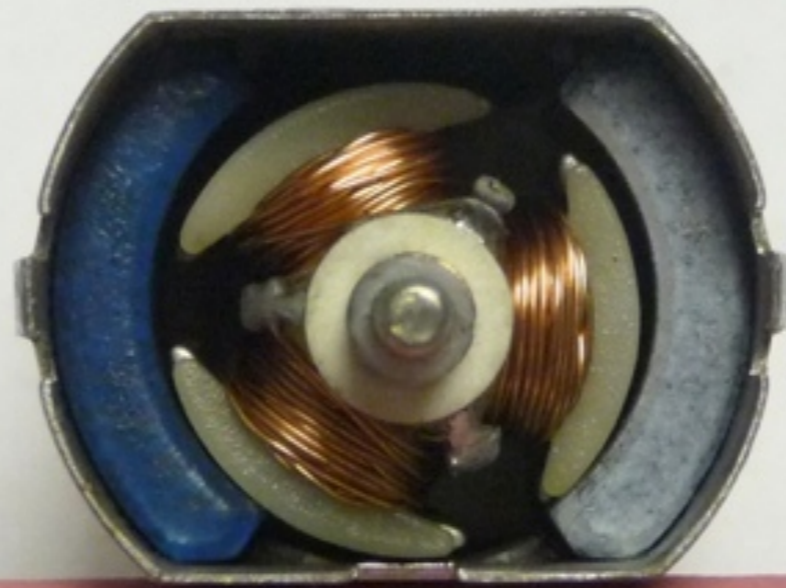
Example Brushed DC Motor



Example Brushed DC Motor



Example Brushed DC Motor



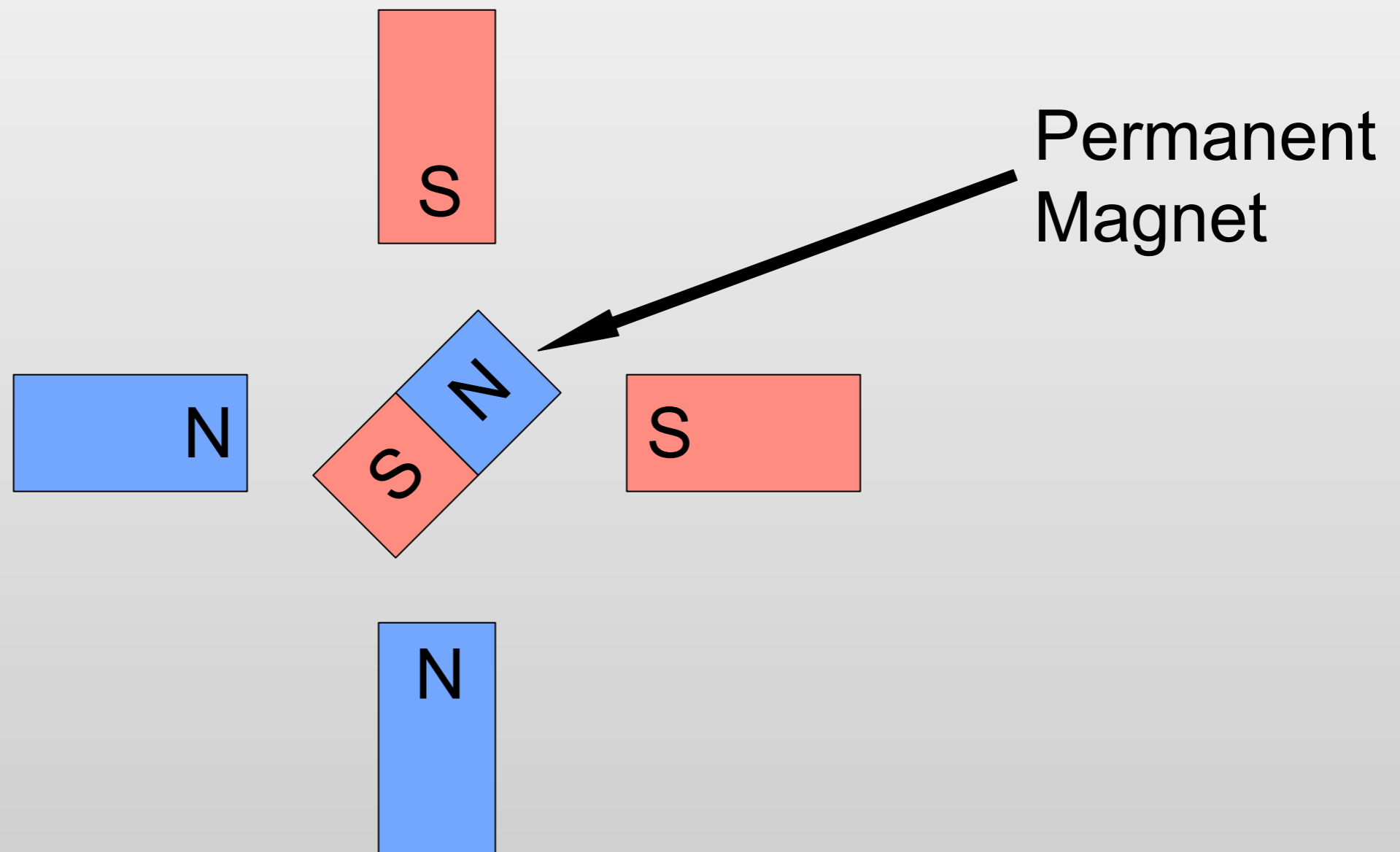
Example Brushed DC Motor



Brushless DC Motors



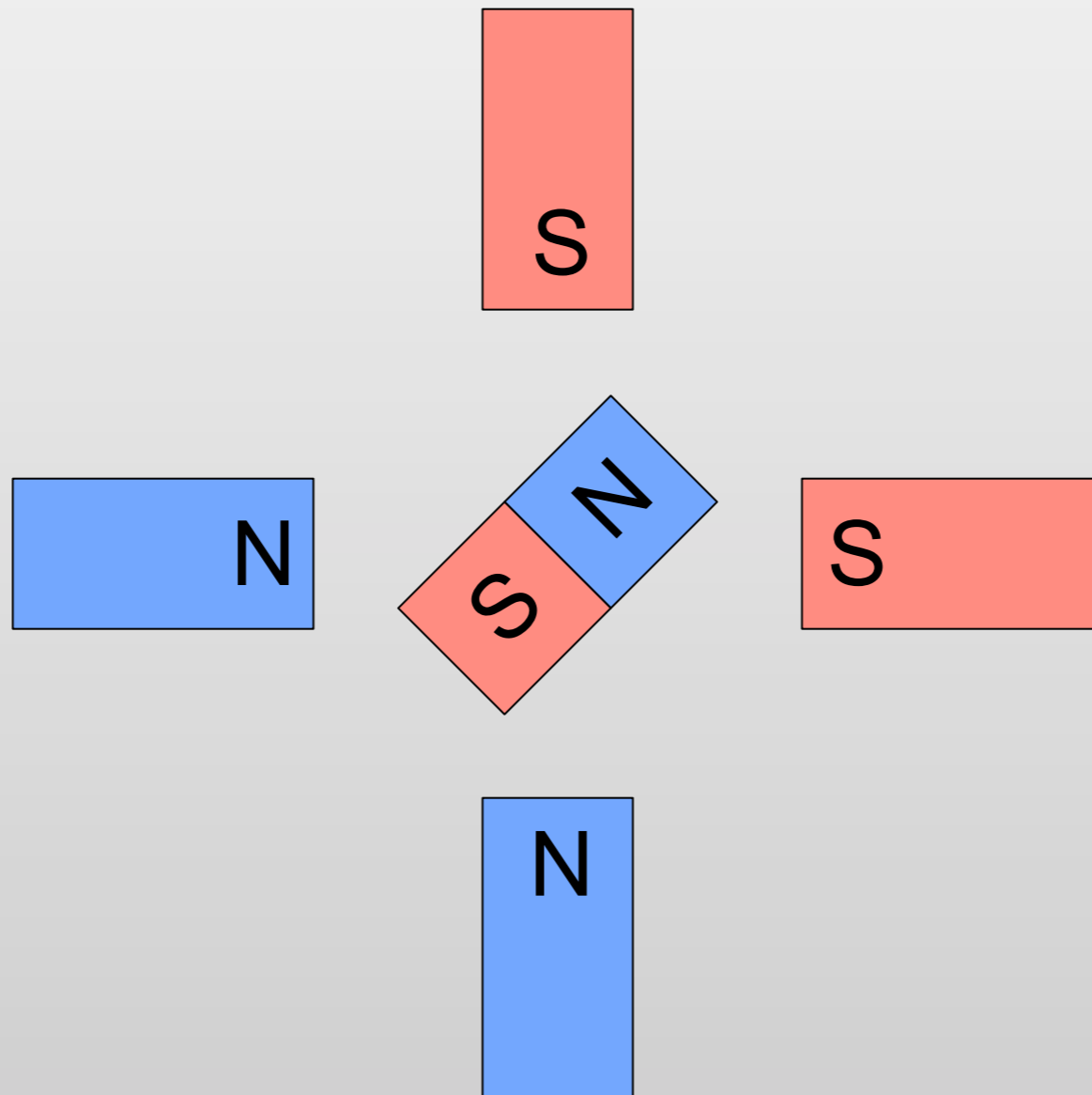
- Move commutation from rotor to stator
- Requires electric controller



Brushless DC Motors



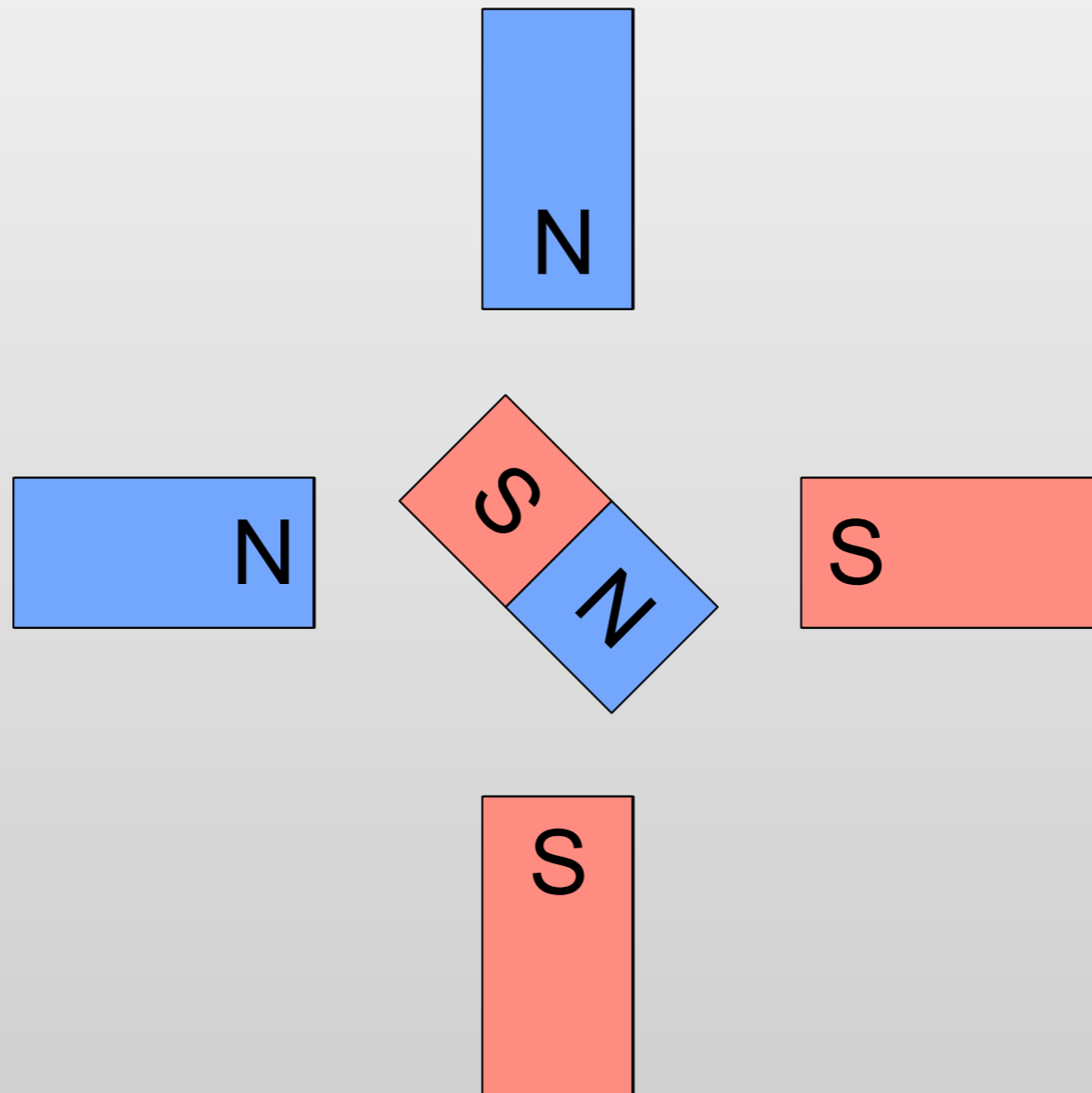
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Brushless DC Motors



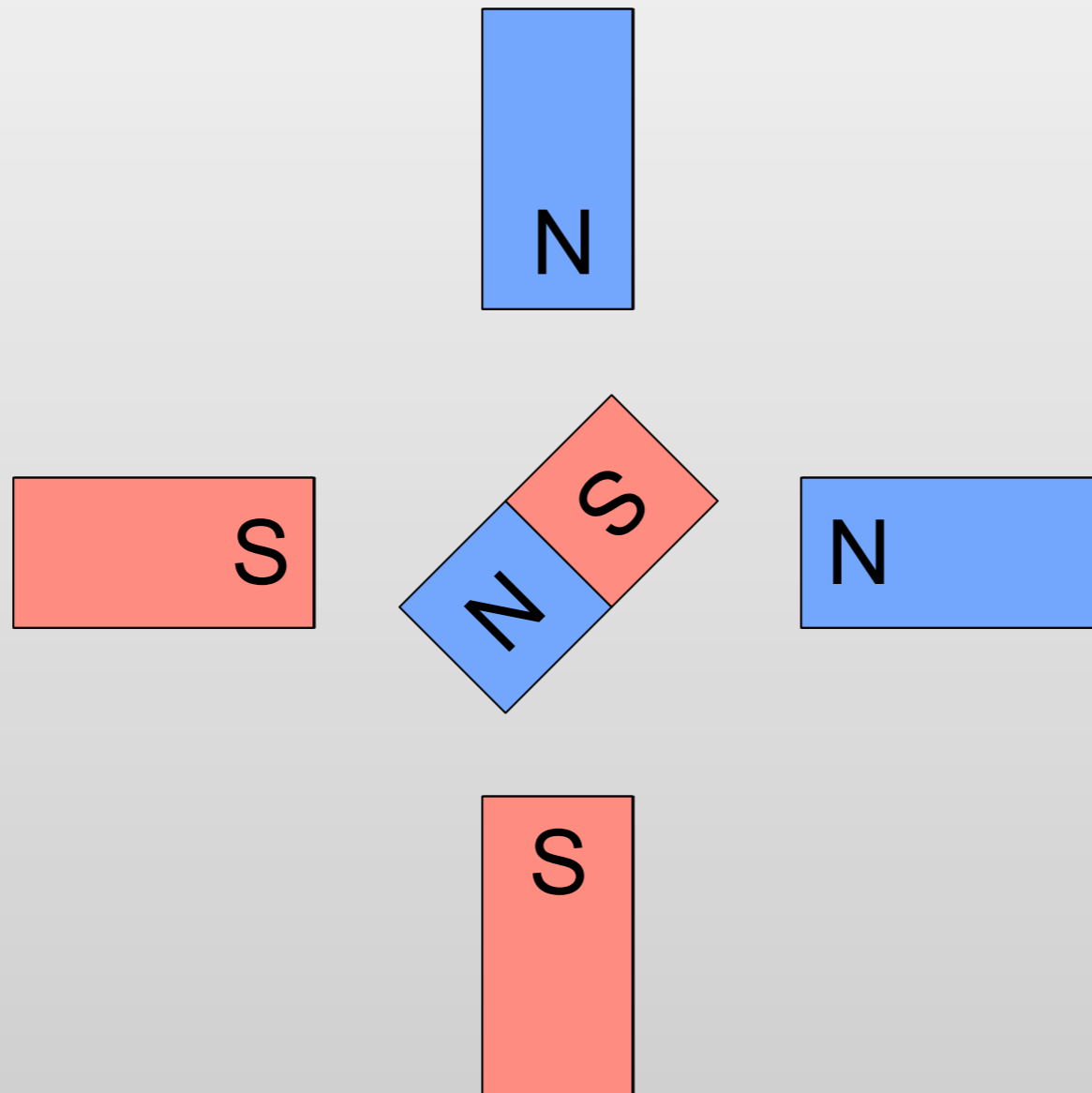
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Brushless DC Motors



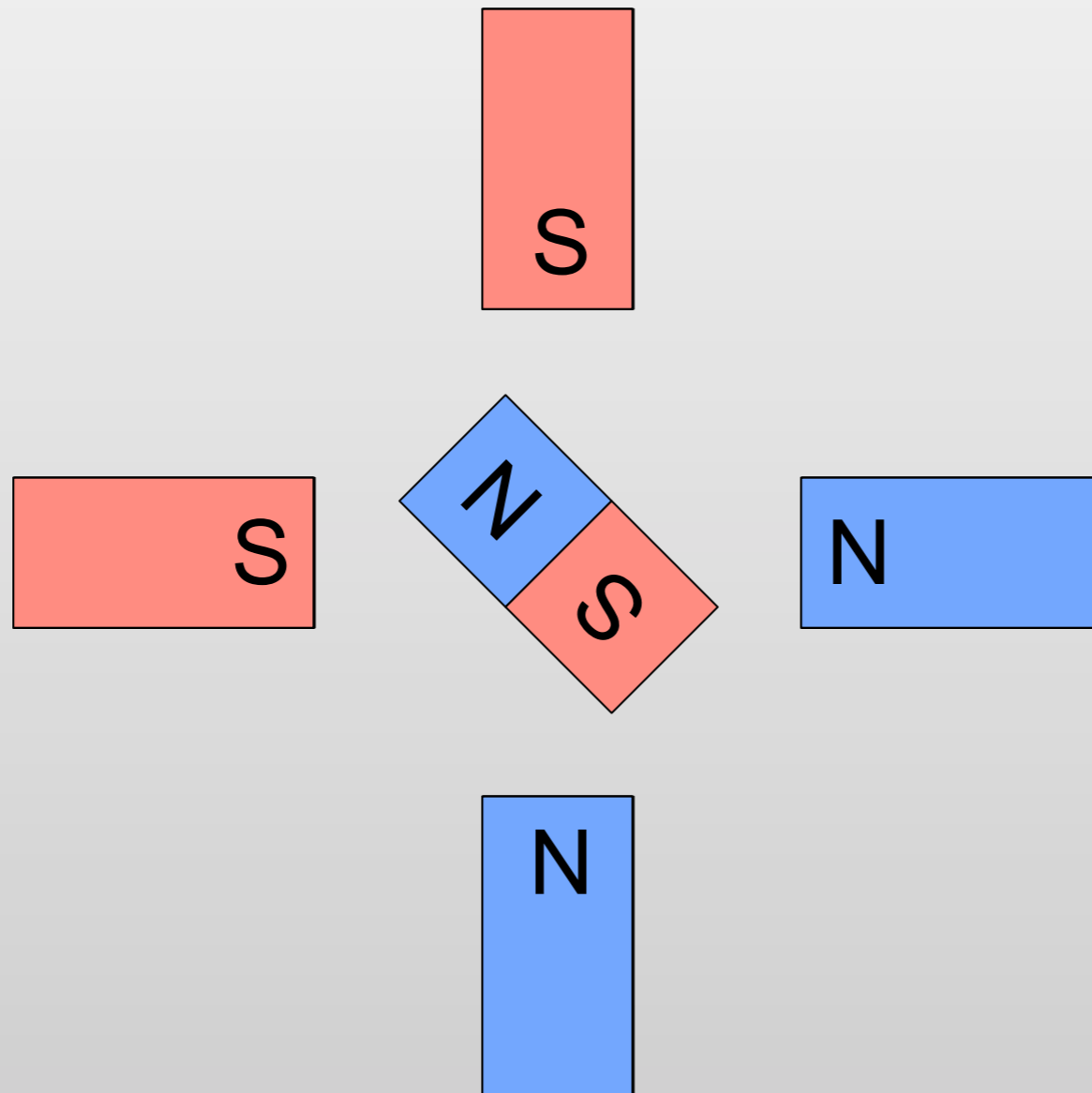
- Move commutation from rotor to stator
- Requires electric controller



Brushless DC Motors



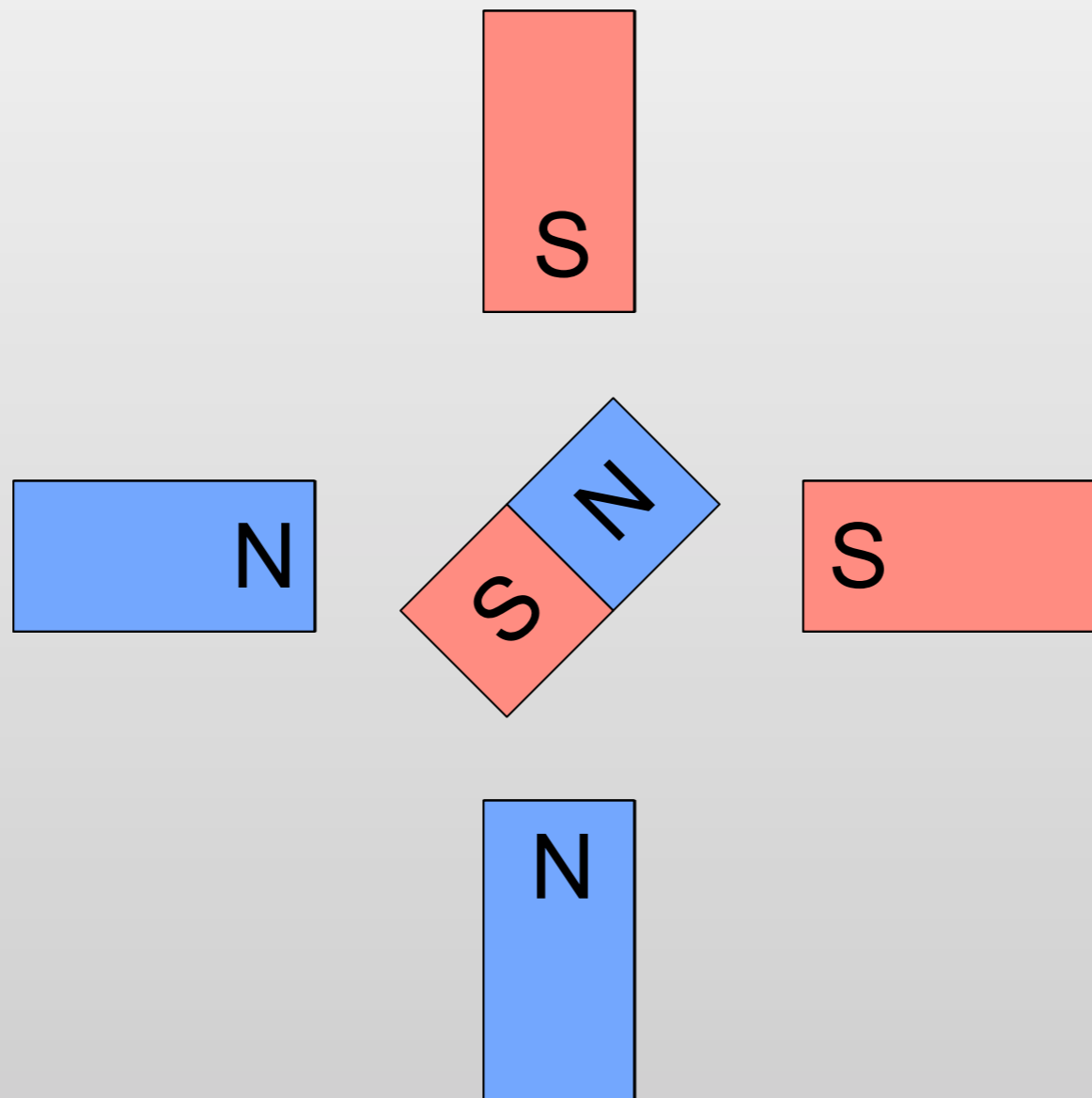
- Move commutation from rotor to stator
- Requires electric controller



Brushless DC Motors



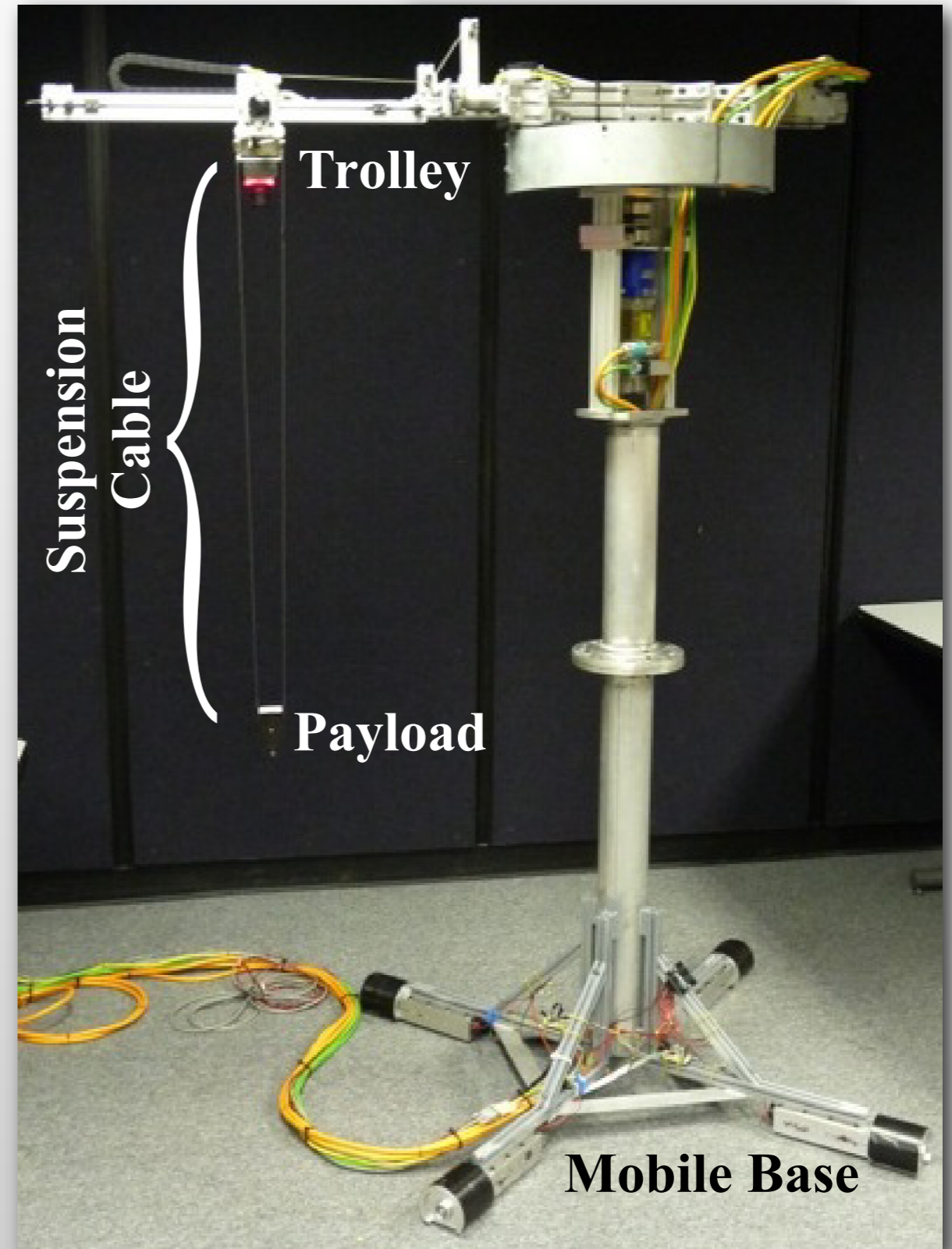
- Move commutation from rotor to stator
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Servomotors (Servos)



- Feedback used to control
 - Position
 - Velocity
- Typically use:
 - Potentiometers
 - Encoders



Servomotors (Servos)

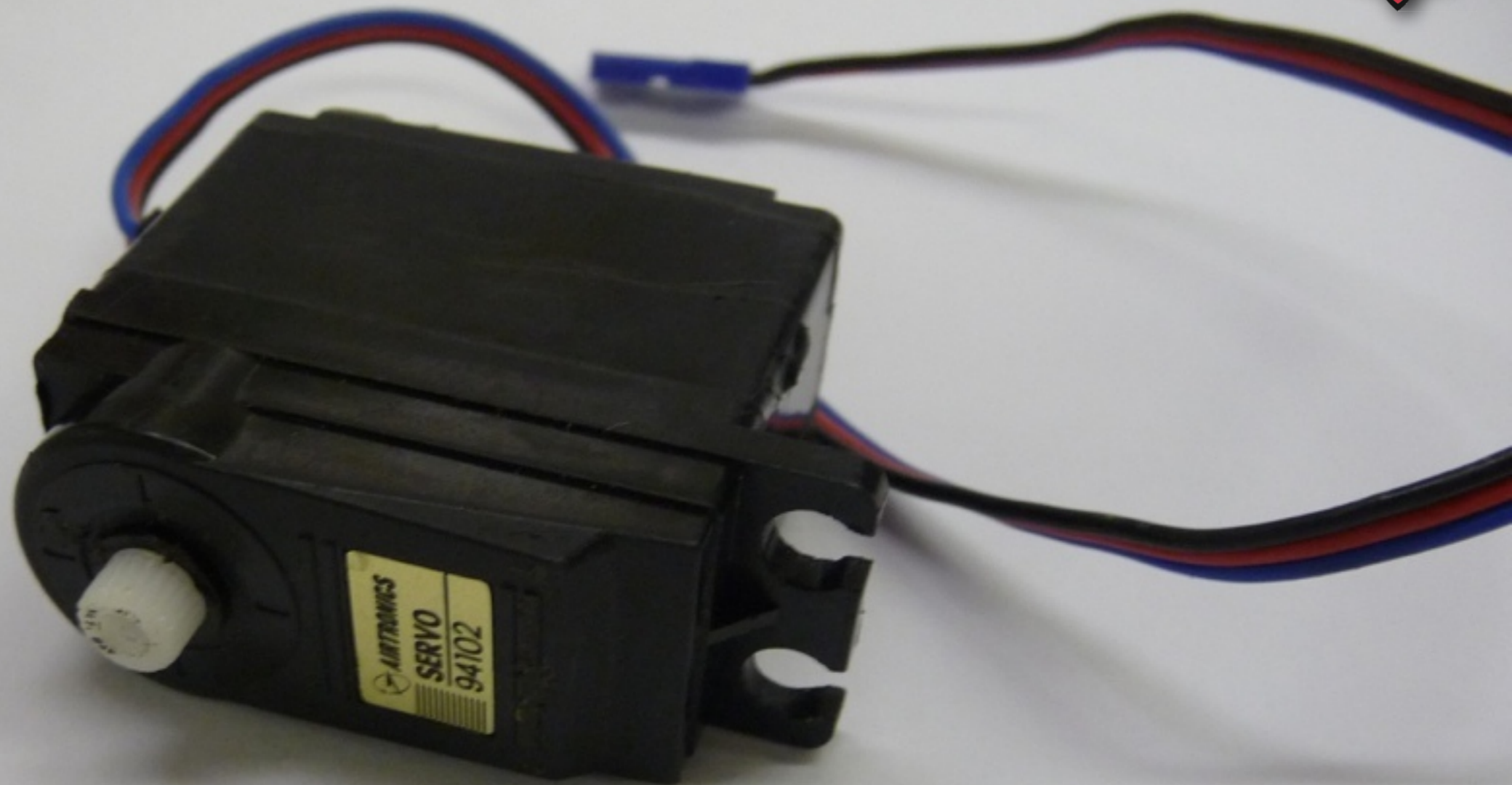


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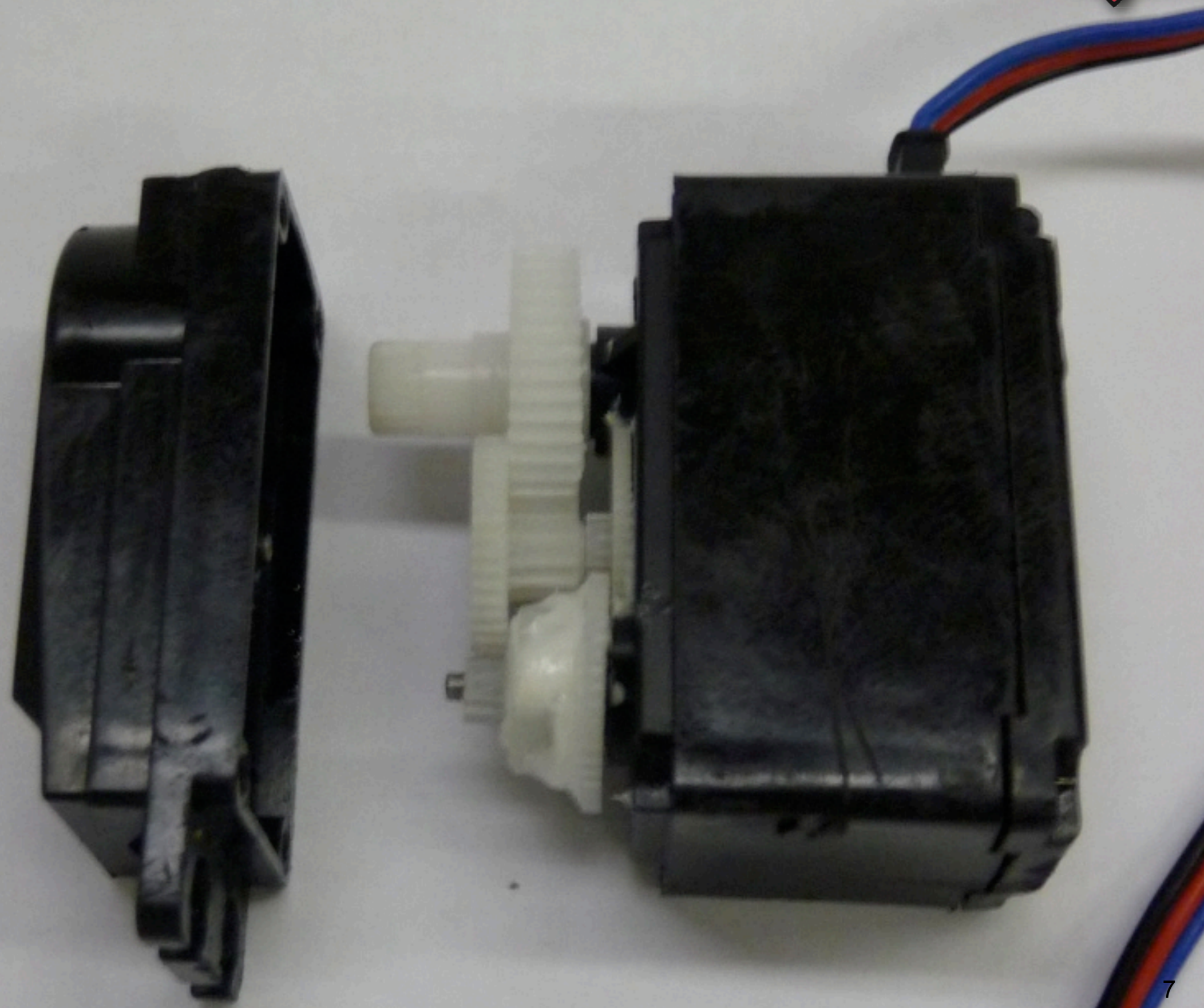


Encoder

Example Servomotor



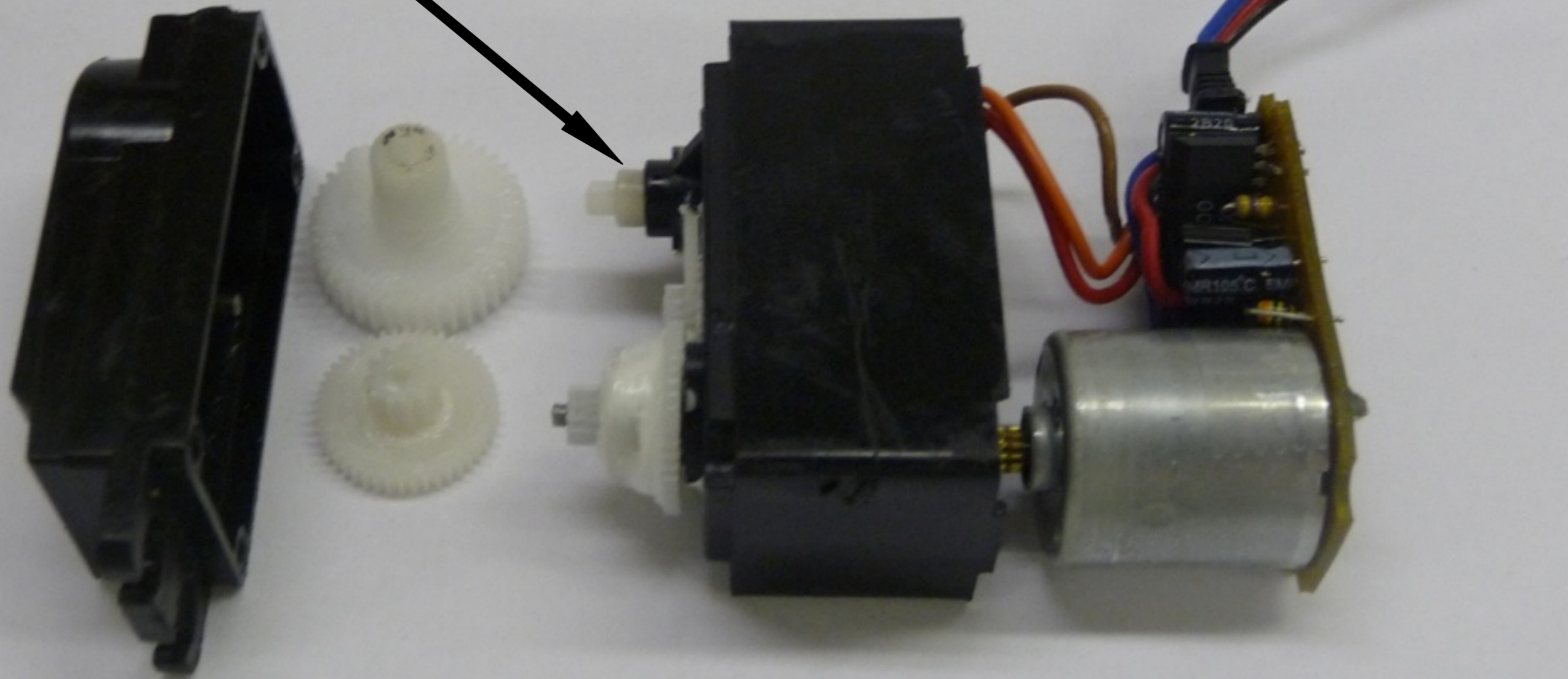
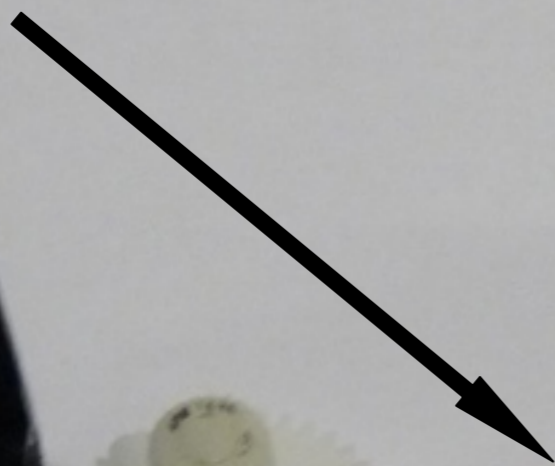
Example Servomotor



Example Servomotor



Potentiometer

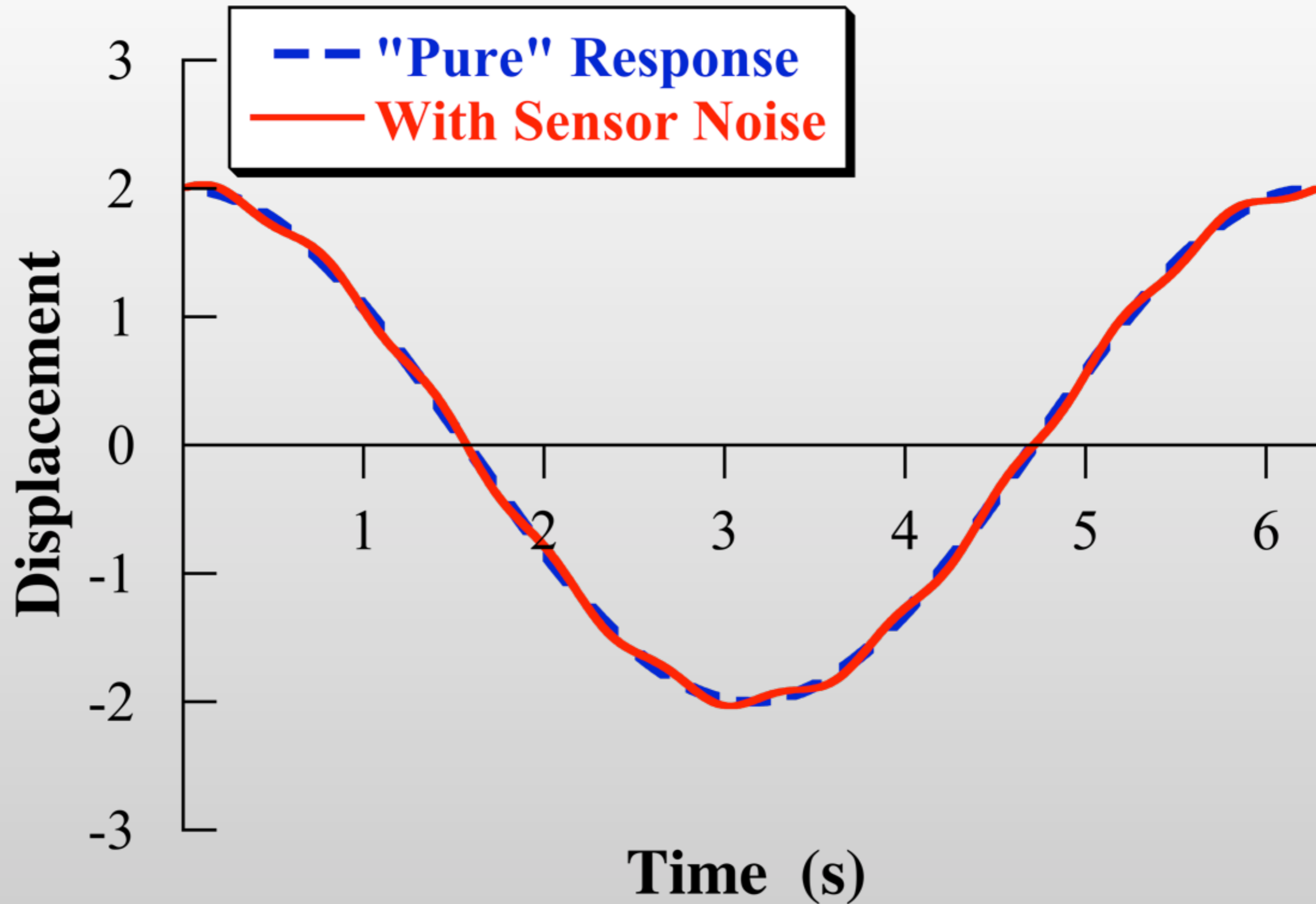


Changing Domains

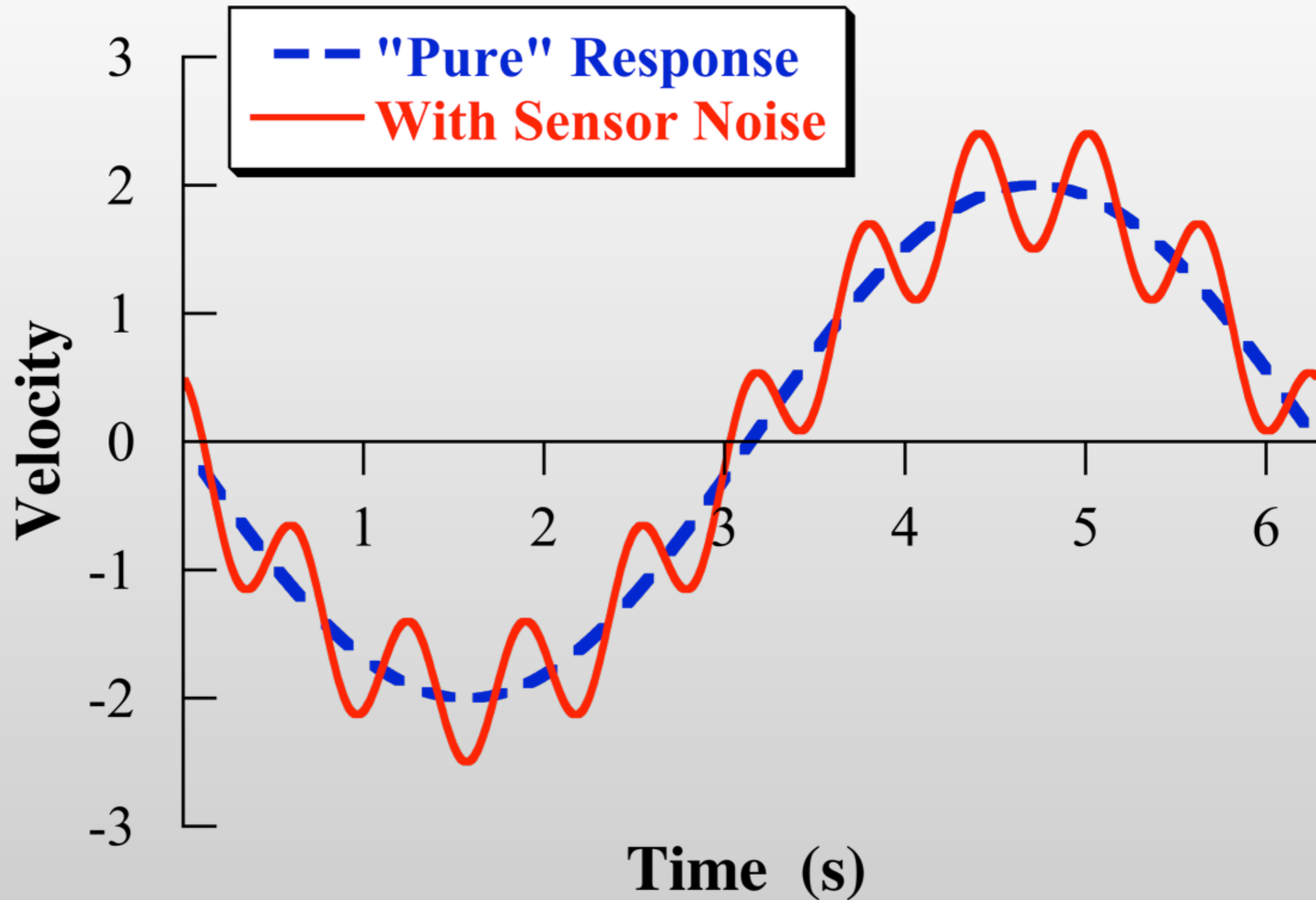


- Can we get reliable acceleration data from a position sensor like a potentiometer or encoder?

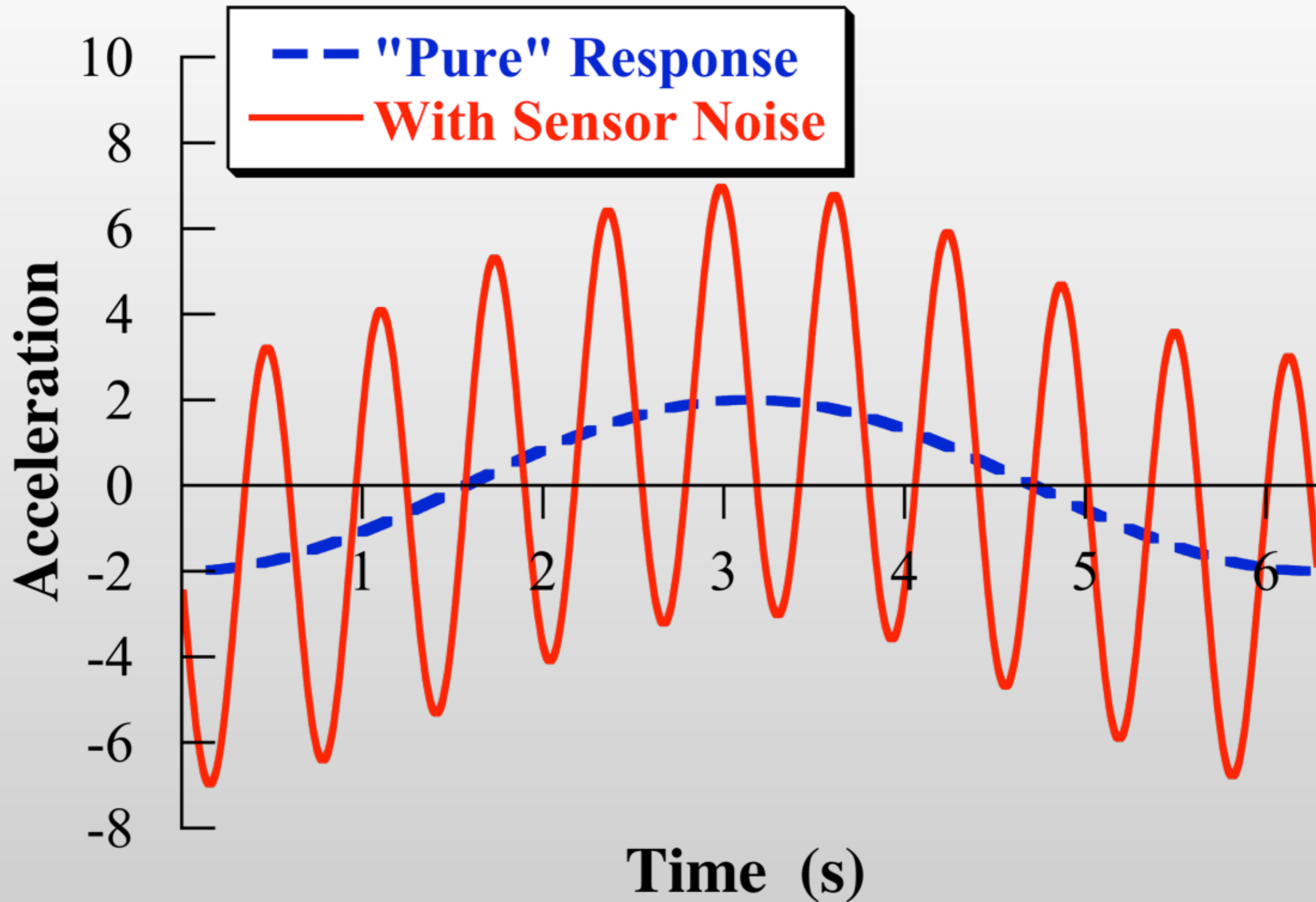
Sensor Noise



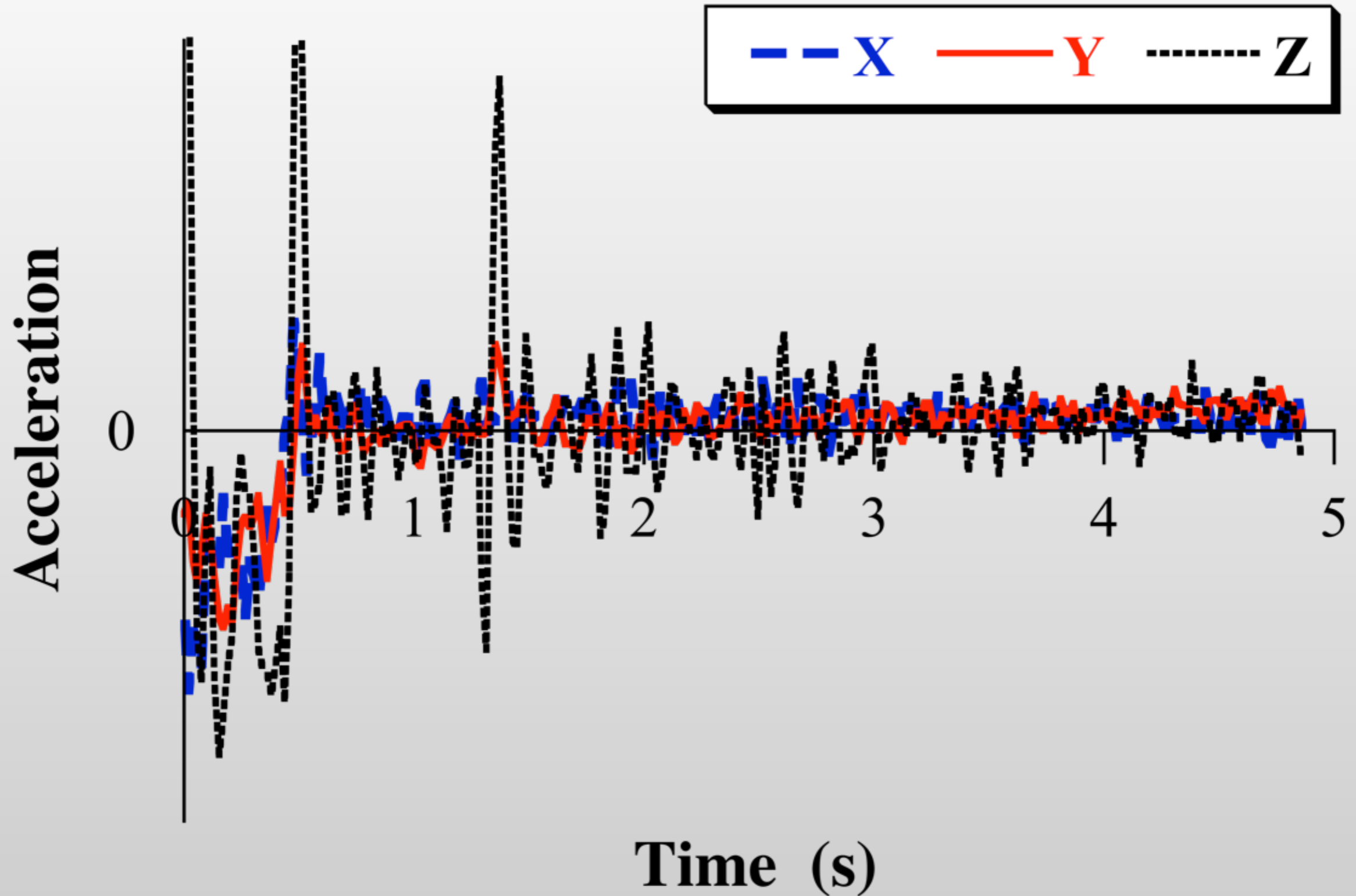
Sensor Noise – Velocity from Displacement



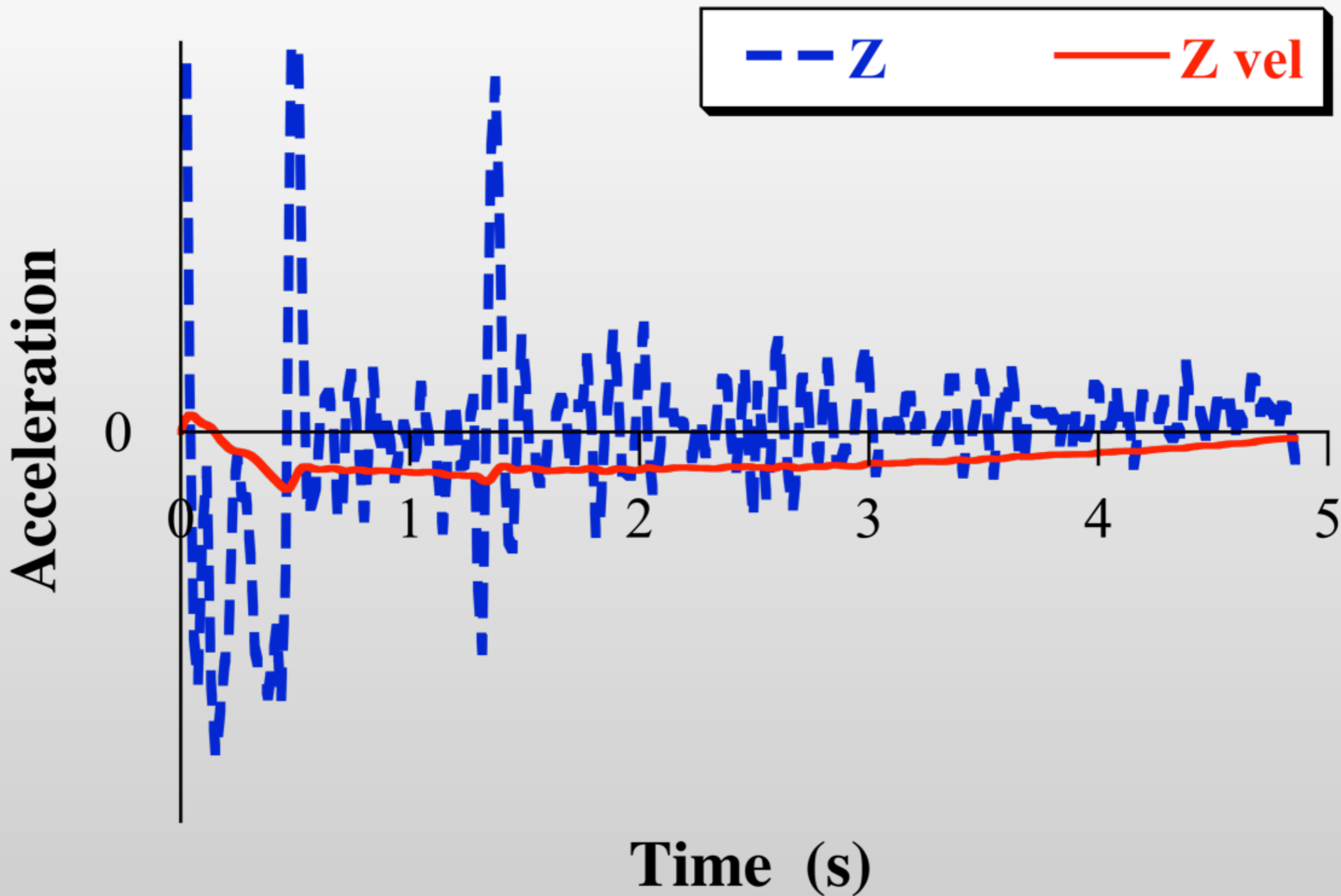
Sensor Noise – Accel. from Displacement



iPhone Accelerometer Data



Velocity from iPhone Accel?



Position from iPhone Accel?

