

ENGR 4421: Robotics II

Encoder

09/27/2022

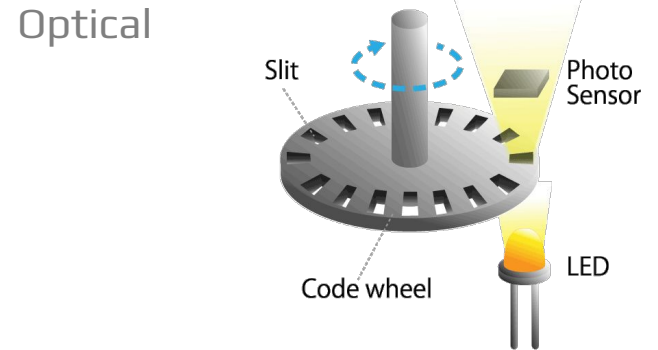
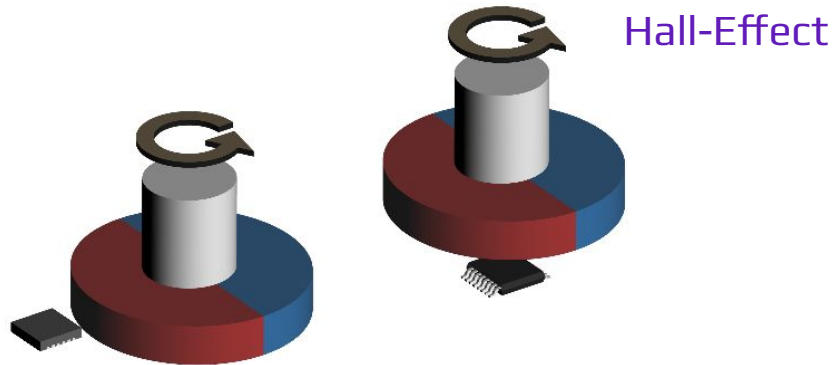
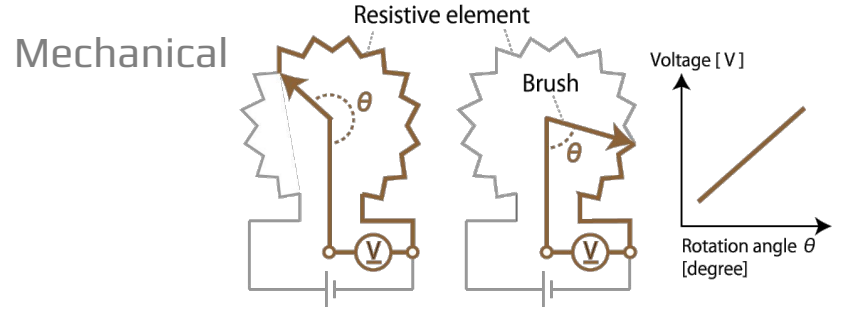
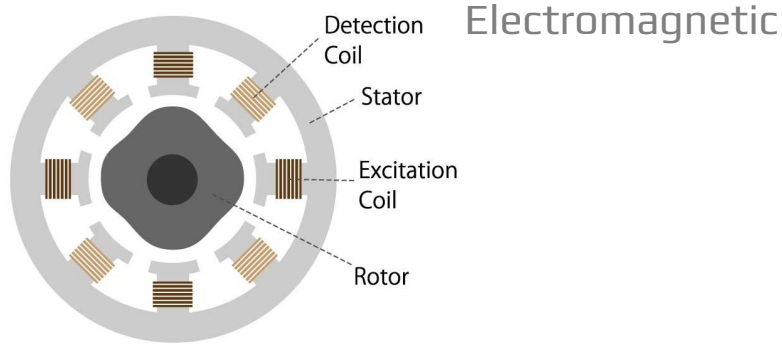
Outline

- Types of Encoders
- Quadrature Encoder
- Computations

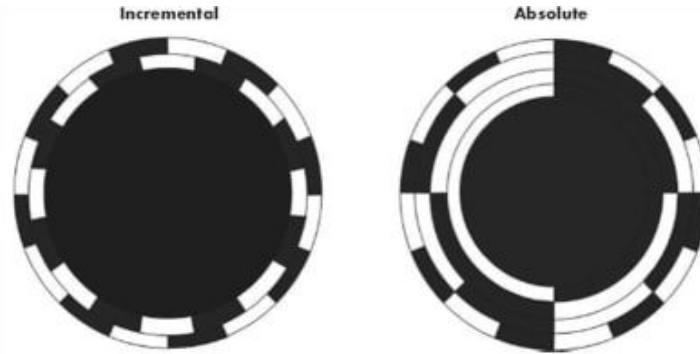
What is A (Rotary) Encoder

- (Rotary) Encoder measures angular movement.
- a common sensor for motors and other rotational devices.
- Provides closed-loop/feedback controls

Types of Encoders

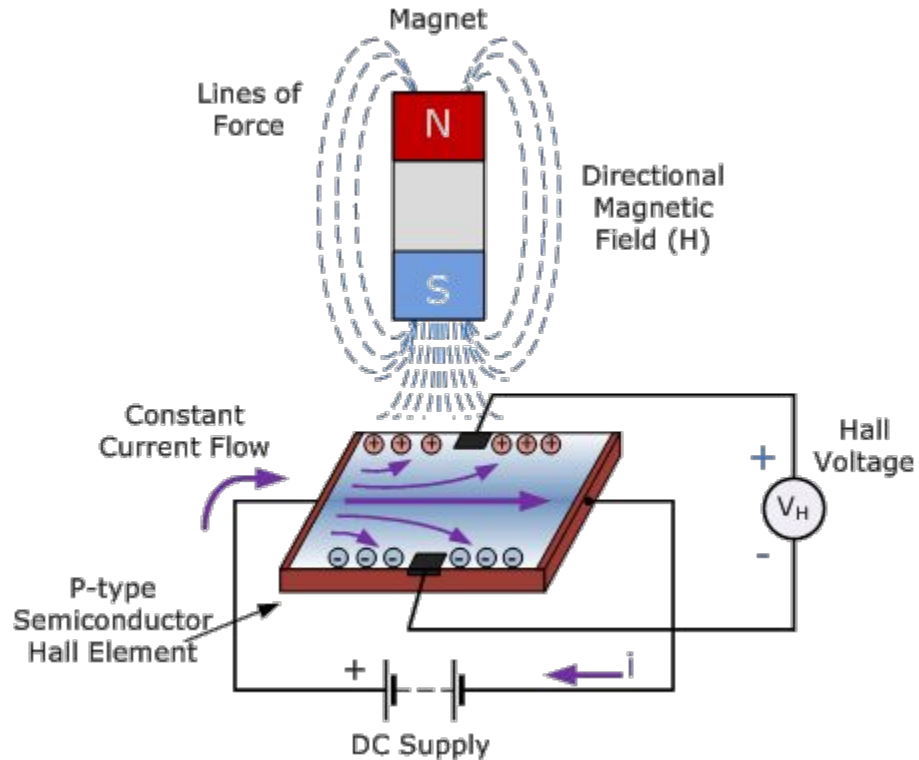


Incremental vs. Absolute

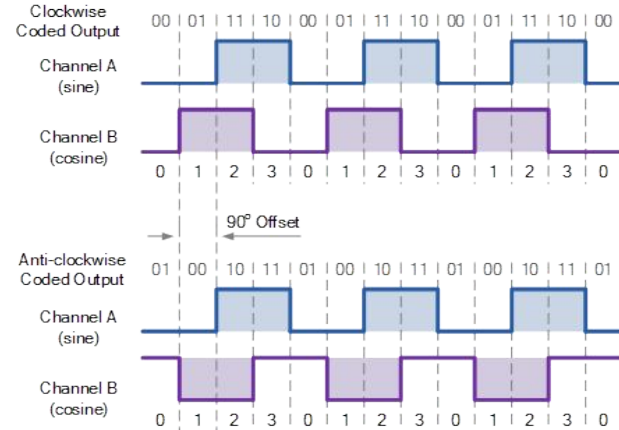
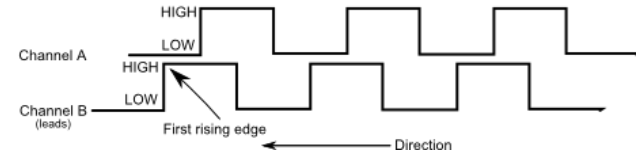
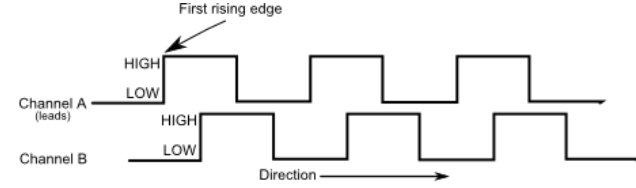
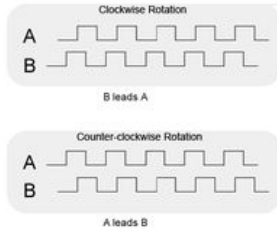
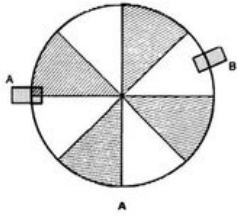


Incremental	Absolute
Simple	Complicated
Cheap	Expensive
Measures angular displacement	Measures absolute position
Floating origin	Fixed origin

Hall Effect



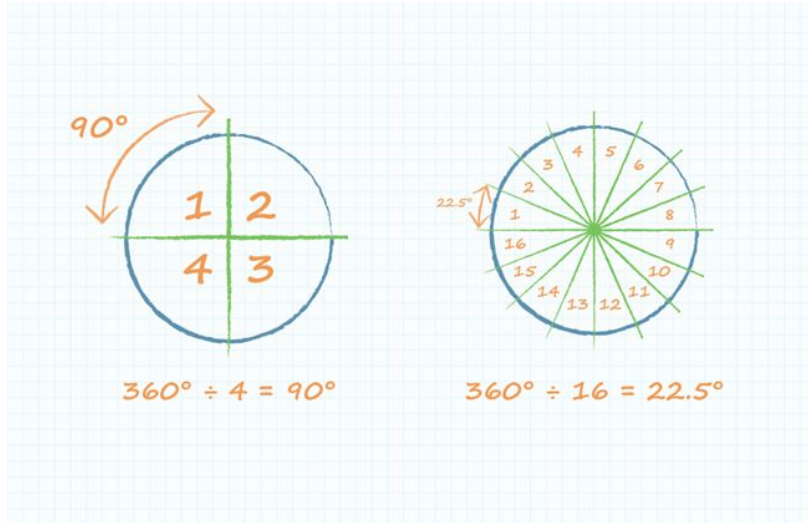
Quadrature Encoder



Pololu 4805 Motor

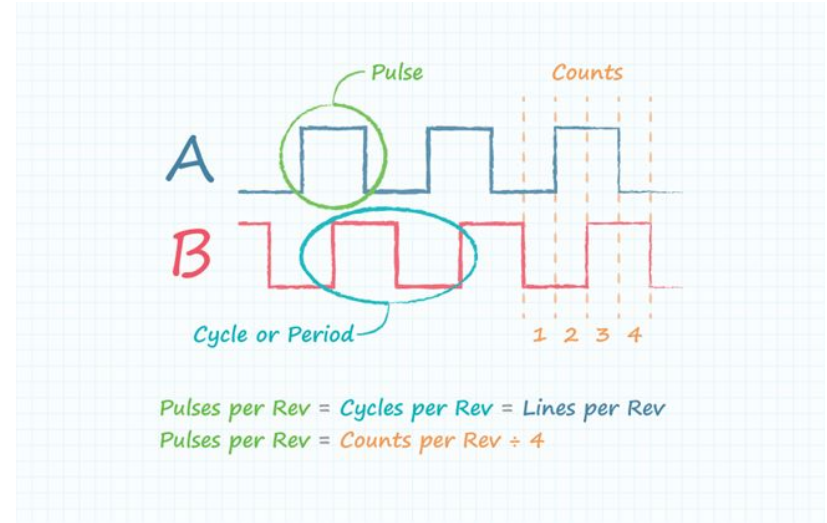
Description

PPR & CPR



Pulses Per Revolution:

describes the number of high pulses an encoder will have on either of its square wave outputs A or B over a single revolution.



Counts Per Revolution:

refers to the number of quadrature decoded states that exist between the two outputs A and B

Wheel Speed Computation

1. Time "Counts Per Second"
2. $\text{Revolutions Per Second} = \text{Counts Per Second} / \text{Counts Per Revolution}$
3. $\text{Shaft Speed} = \text{Revolutions Per Second} / \text{Gear Ratio} = \text{Wheel Angular Speed}$
4. $\text{Wheel Linear Speed} = \text{Wheel Angular Speed} * \text{Wheel Radius}$

pigpio Library

Documentation