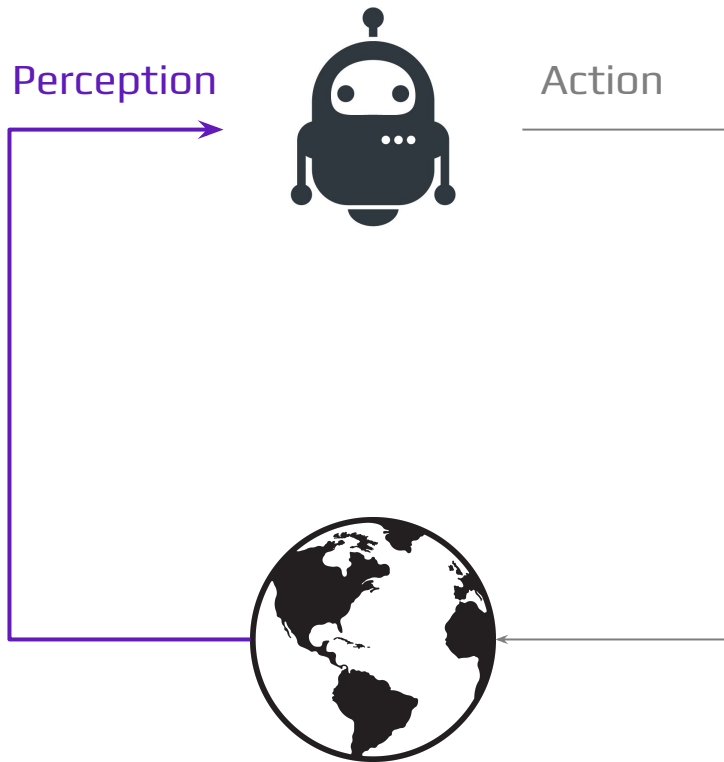


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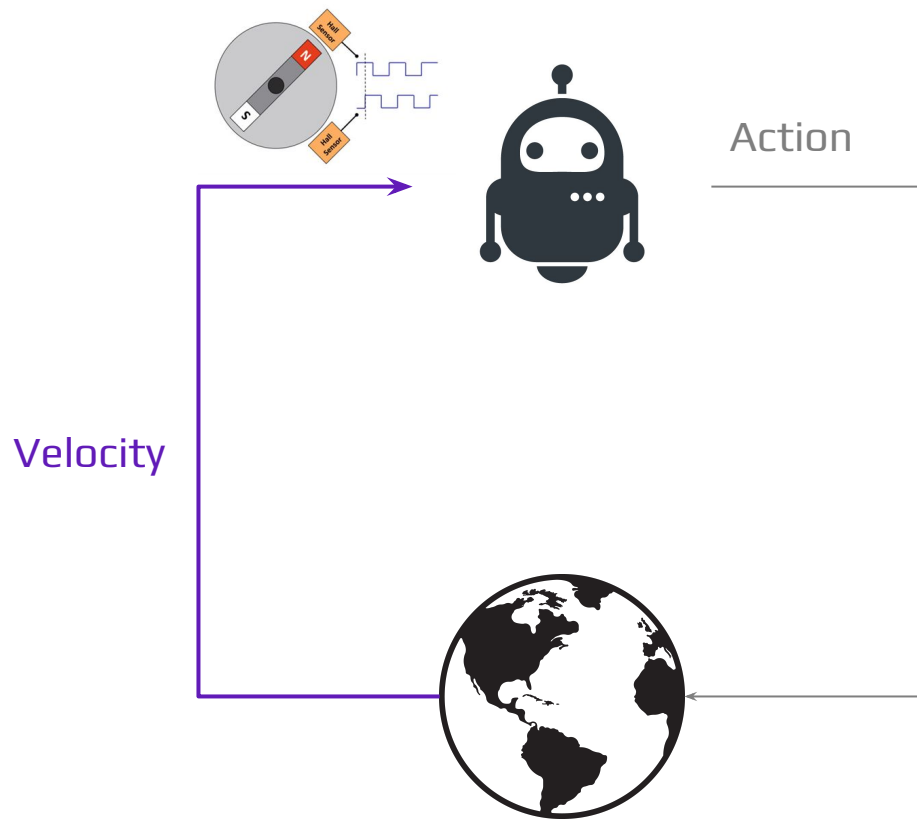
Encoder

10/07/2025

A Robot Needs to Feel



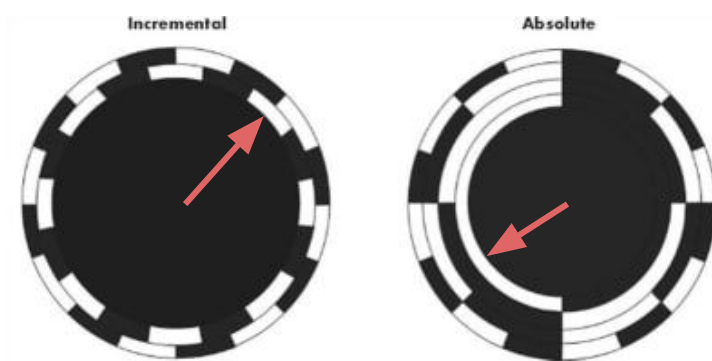
A Robot Needs to Sense Velocity



What is A (Rotary) Encoder

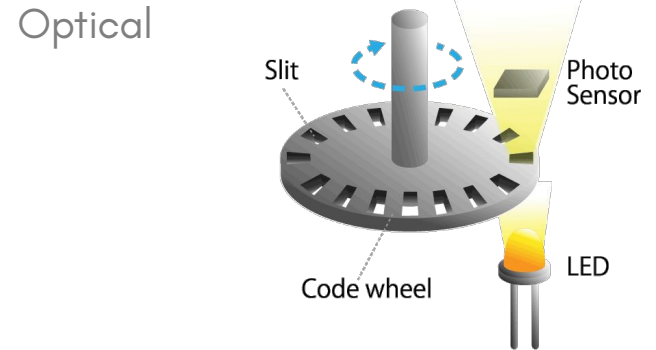
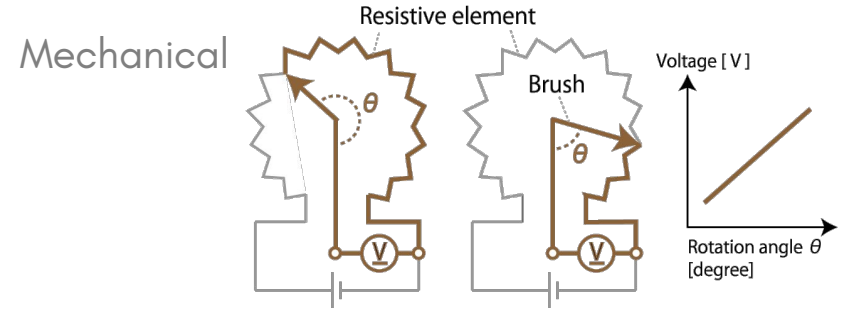
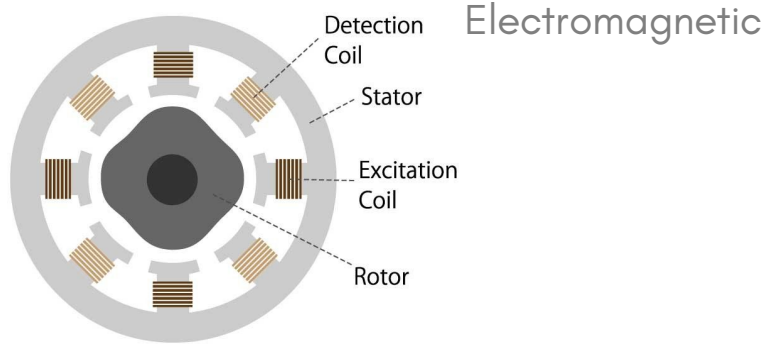
- (Rotary) Encoder measures angular movement.
- a common sensor for motors and other rotational devices.
- Provides closed-loop/feedback controls

Incremental vs. Absolute

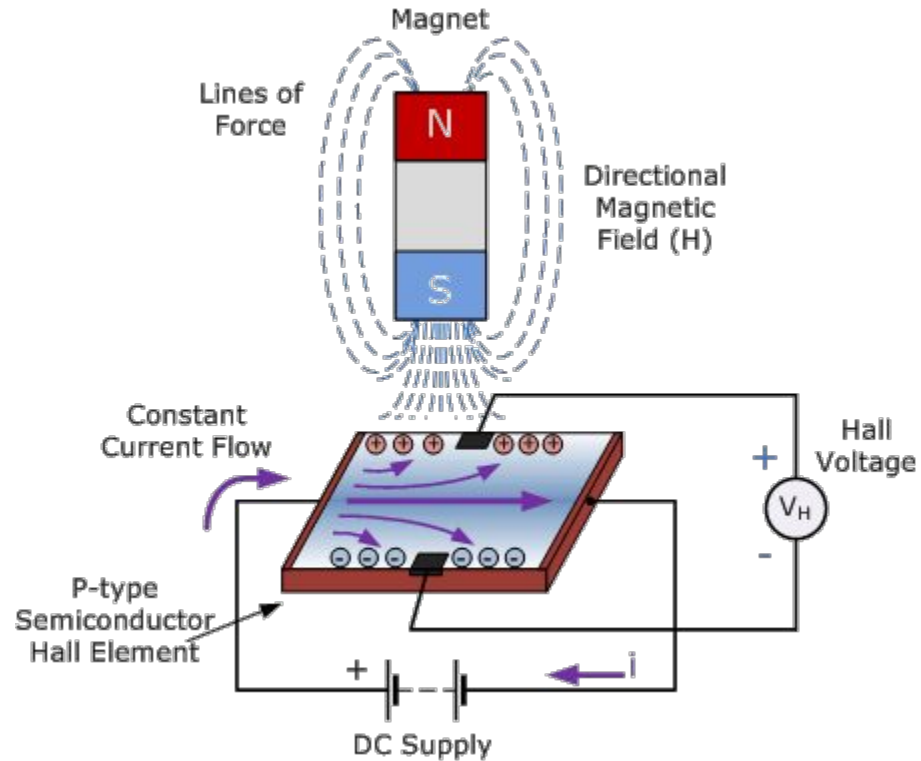


Incremental	Absolute
Simple	Complicated
Cheap	Expensive
Measures angular displacement	Measures absolute position
Floating origin	Fixed origin

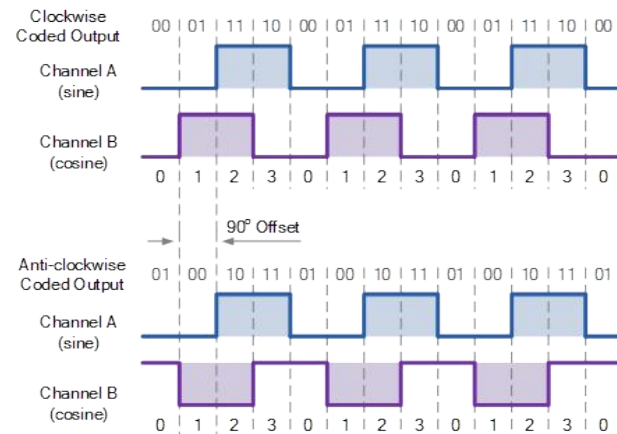
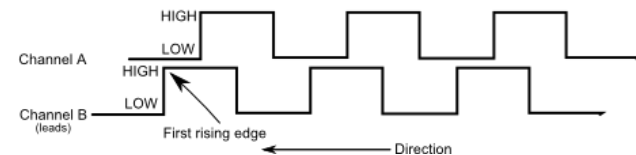
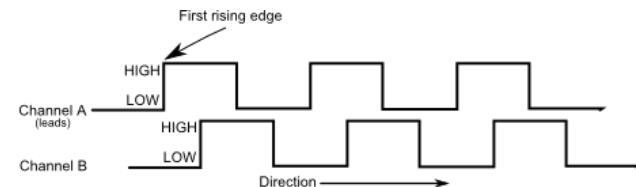
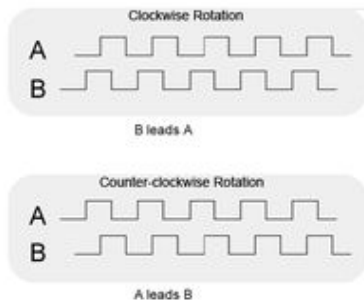
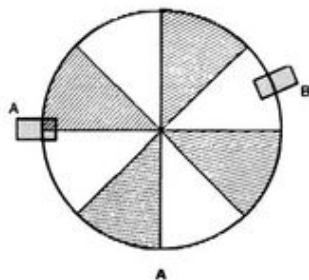
Types of Encoders



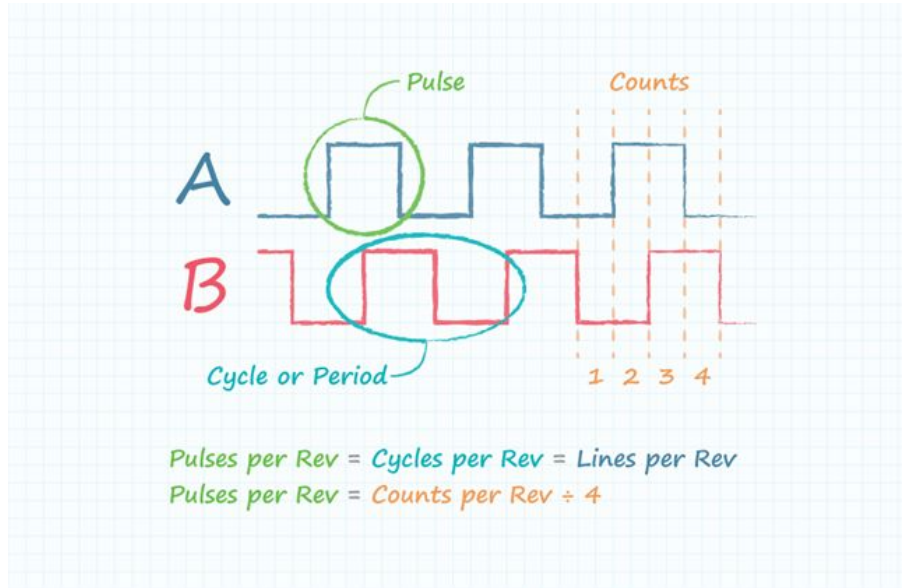
Hall Effect



Quadrature Encoder



PPR & CPR



Pulses Per Revolution:

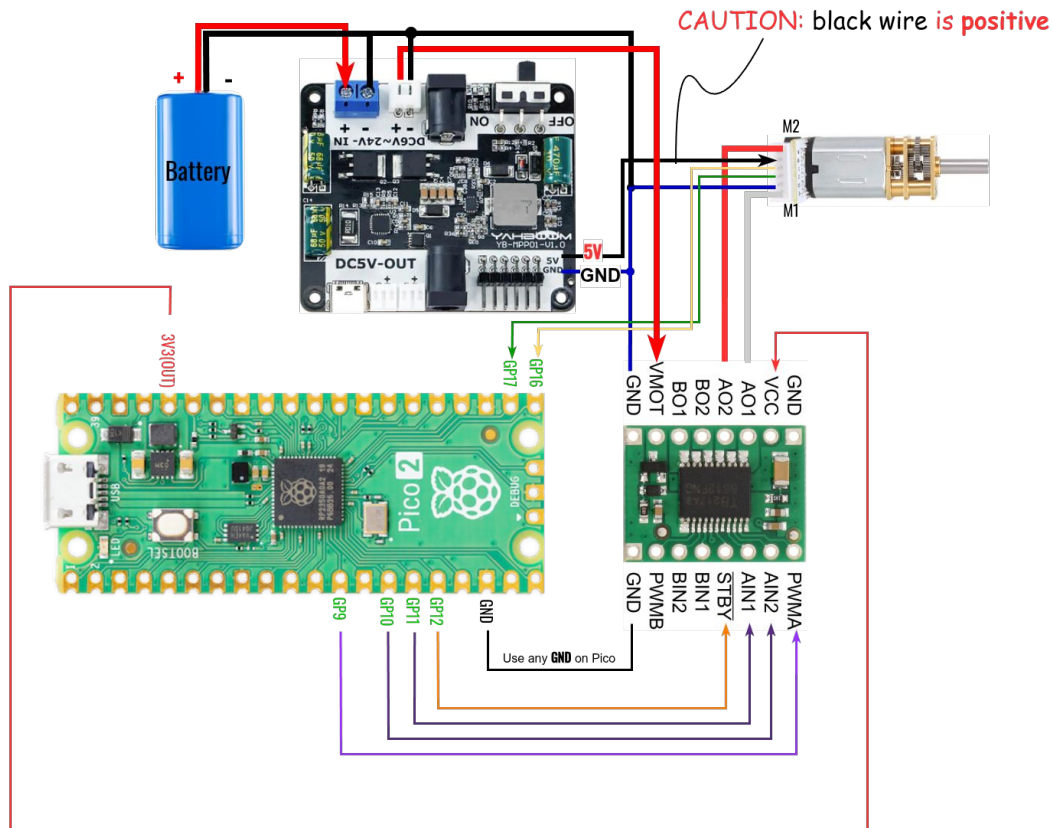
describes the number of high pulses an encoder will have on either of its square wave outputs A or B over a single revolution.

Counts Per Revolution:

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

Encoder Wiring

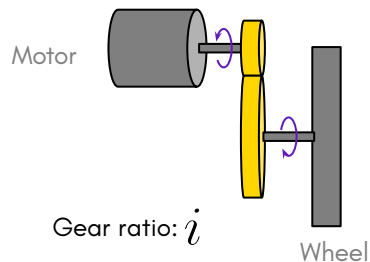
Color	Function
Red	motor power
Black	encoder power +
Yellow	encoder A signal
Green	Encoder B signal
Blue	encoder power - (GND)
White	motor power



Encoder Counts \rightarrow Wheel Revolutions

C_{enc}

$Revs$



$$Revs = \frac{C_{enc}}{CPR \cdot i} = \frac{C_{enc}}{28 \cdot 100}$$

100:1 Micro Metal Gearmotor Erata

28 counts per revolution

98.5:1 gear ratio

Coding Examples