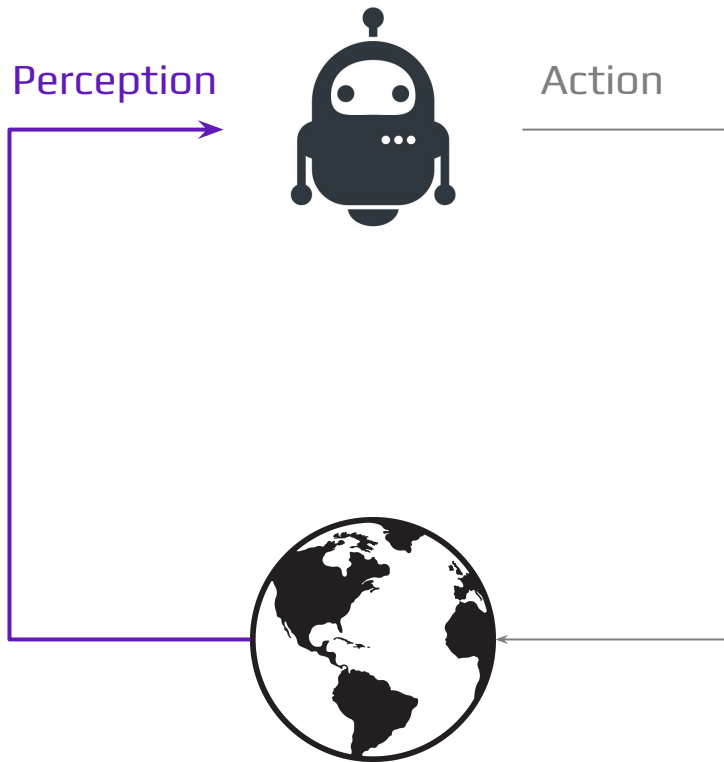


# ENGR 3421: Robotics I

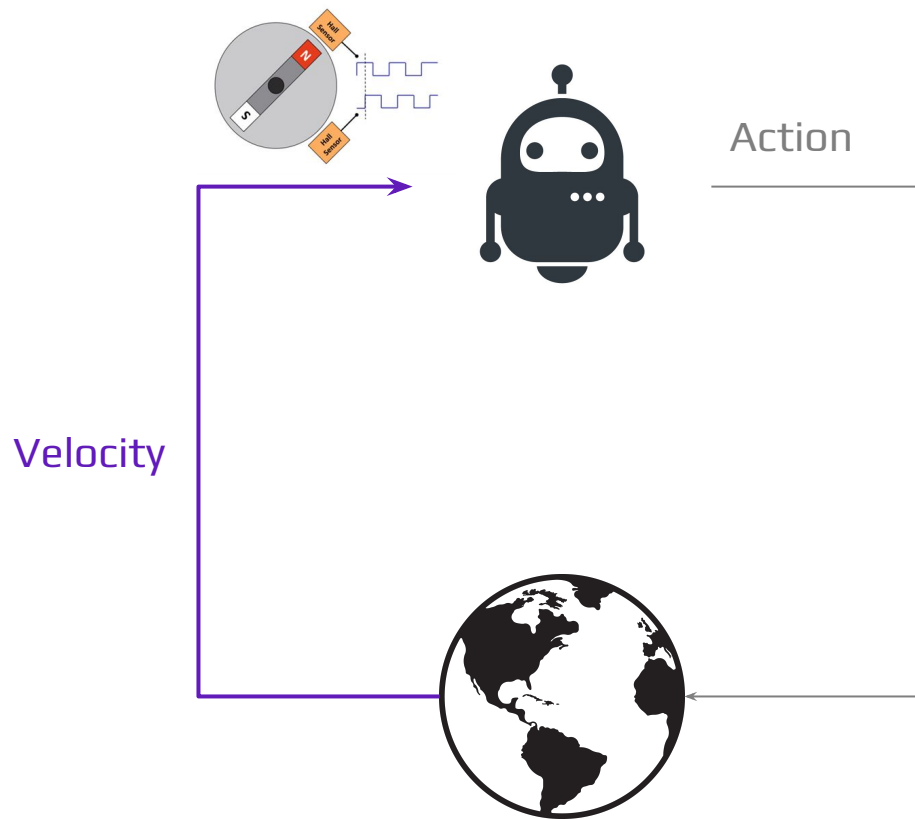
Encoder

10/07/2025

# A Robot Needs to Feel



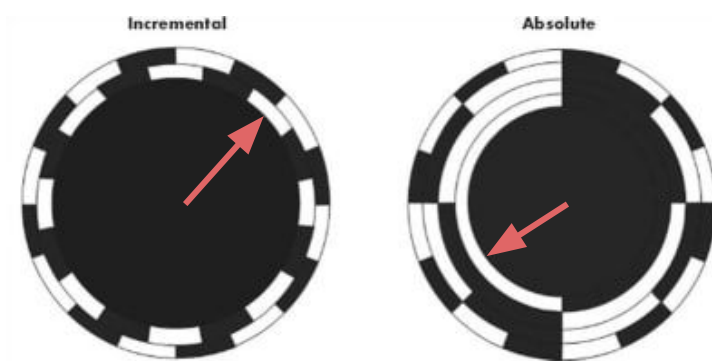
# A Robot Needs to Sense Velocity



# What is A (Rotary) Encoder

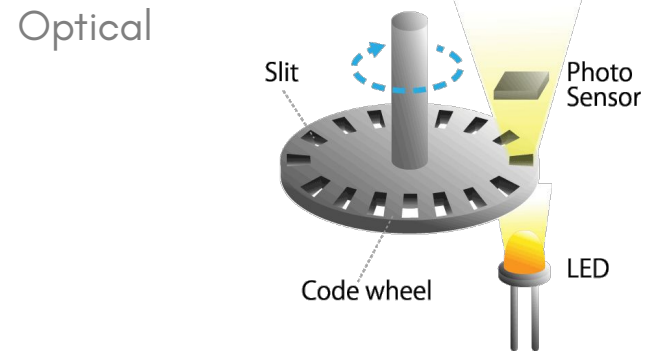
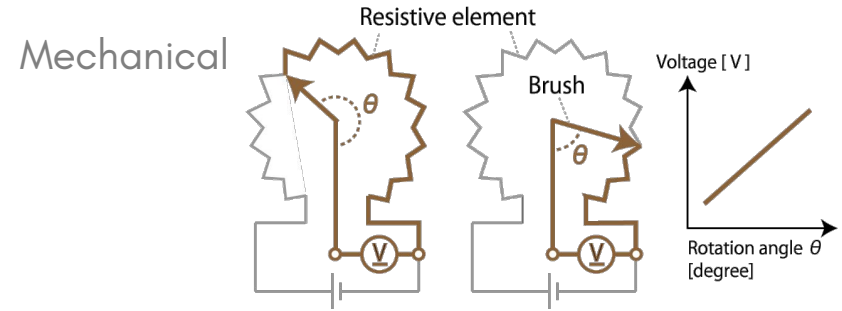
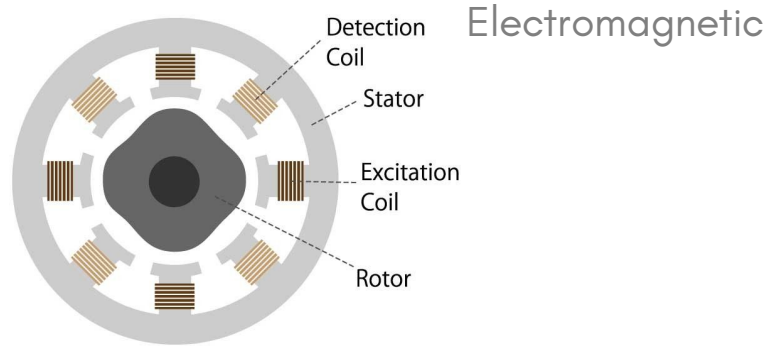
- (Rotary) Encoder measures angular movement.
- a common sensor for motors and other rotational devices.
- Provides closed-loop/feedback controls

# Incremental vs. Absolute

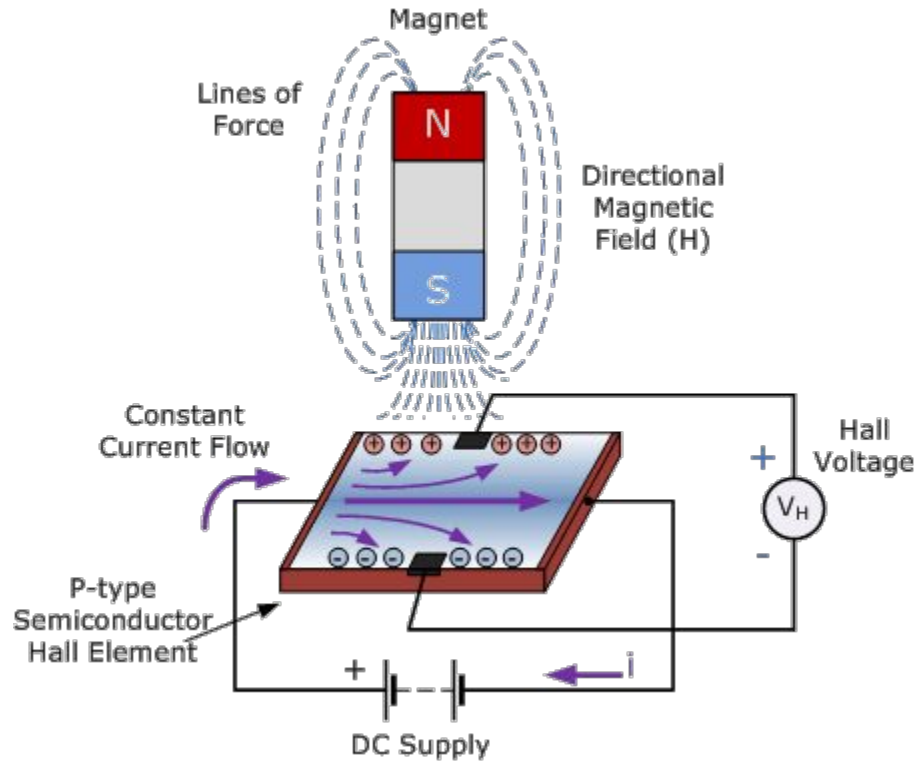


Incremental	Absolute
Simple	Complicated
Cheap	Expensive
Measures angular displacement	Measures absolute position
Floating origin	Fixed origin

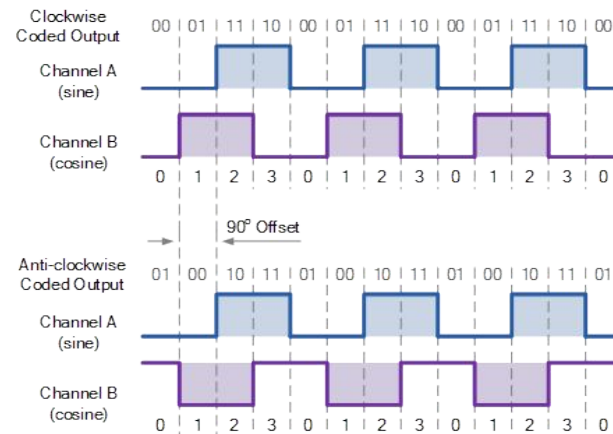
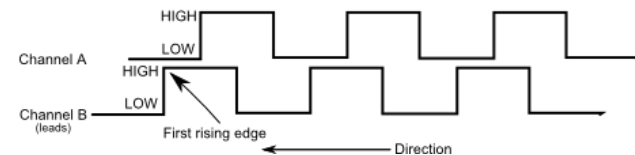
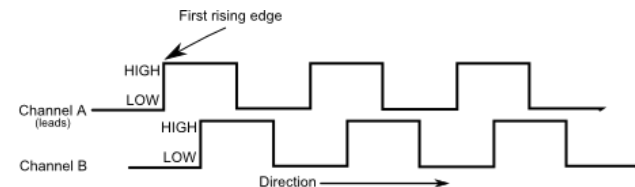
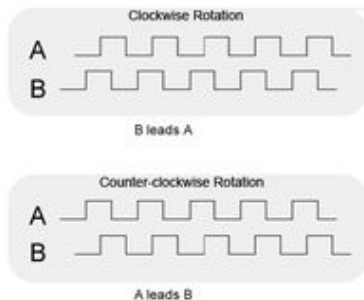
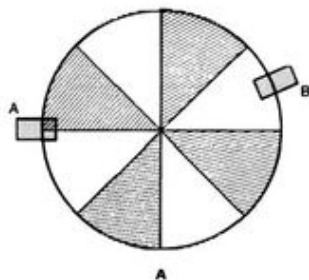
# Types of Encoders



# Hall Effect

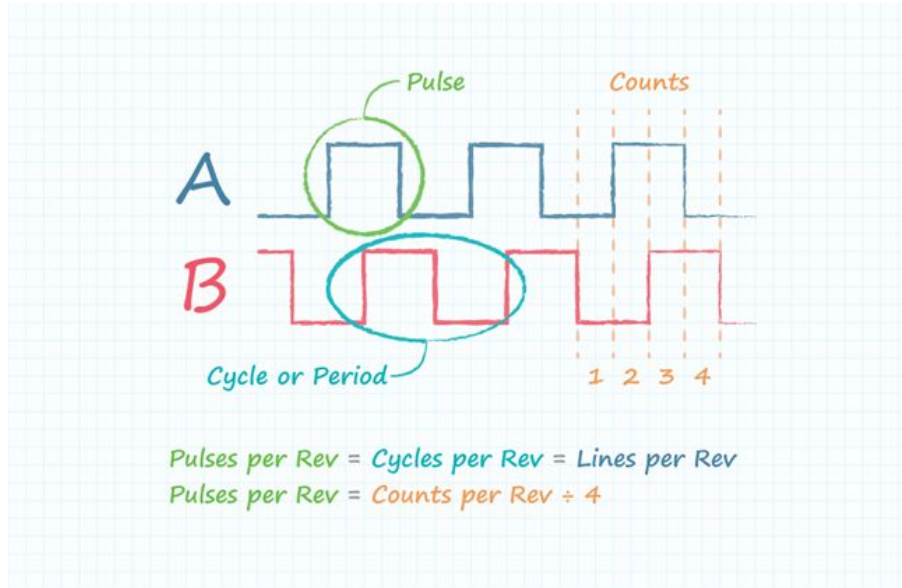


# Quadrature Encoder





# 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:

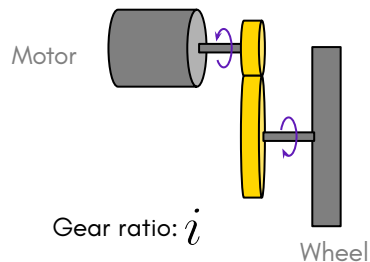
refers to the number of quadrature decoded states that exist between the two outputs A and B



# Encoder 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