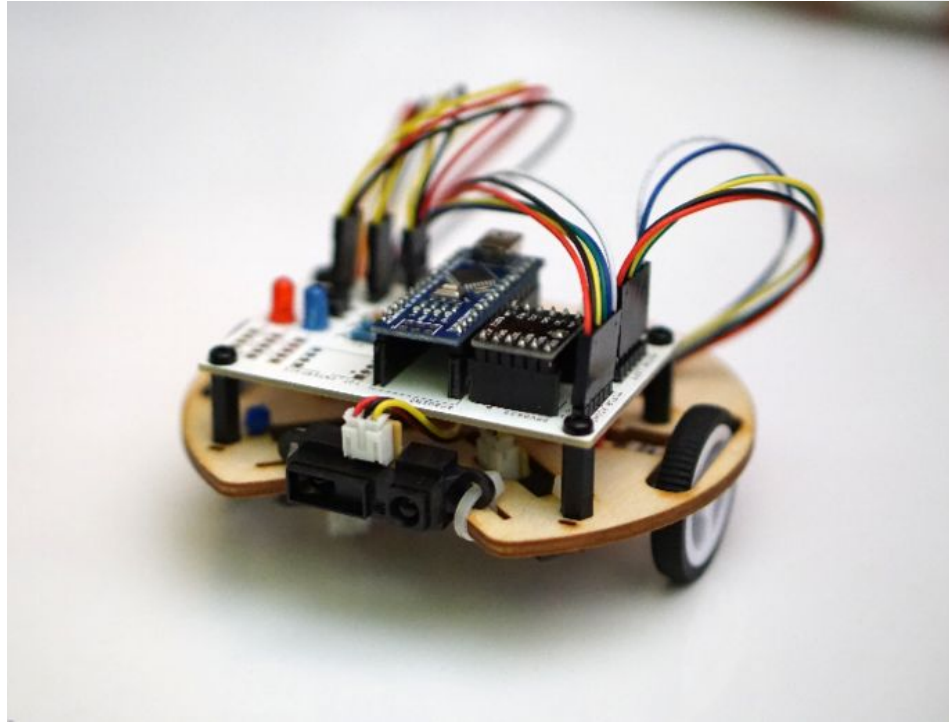


IEEE Micromouse DeCal

Week 2

Micromouse Hardware Kit



Micromouse Electronics

What electronics do we need to control our robot?

- Microcontroller
- Motor drivers
- Motors
- Sensors (distance, velocity)
- Battery

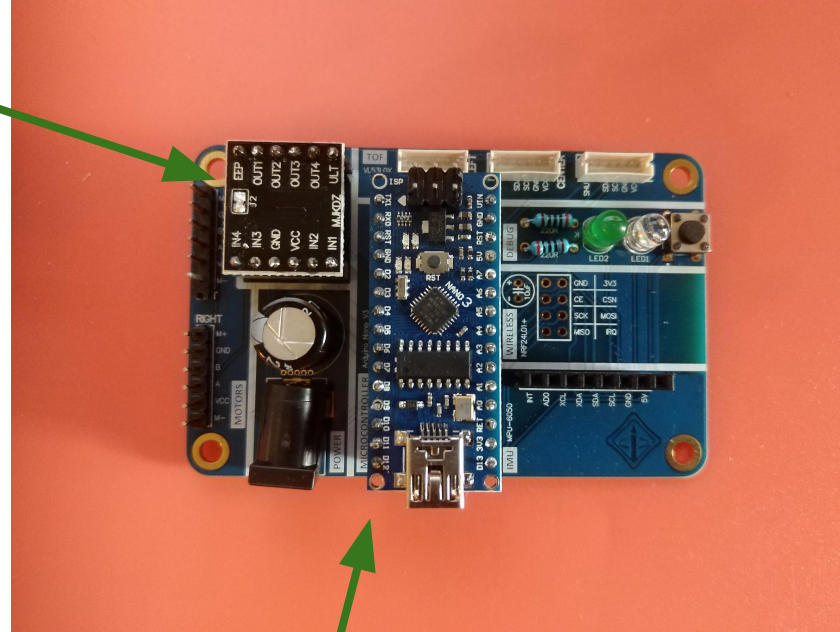
Micromouse Electronics

What electronics do we need to control our robot?

- Microcontroller
- **Motor drivers**
- **Motors**
- Sensors (distance, **velocity**)
- Battery

Micromouse PCB Parts

Motor Driver

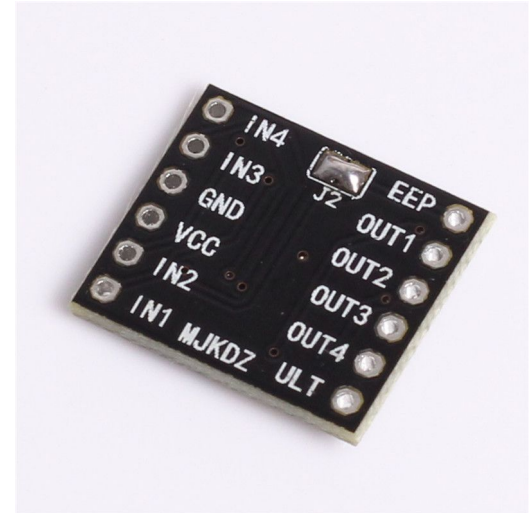


Arduino Microcontroller

Motor Driver

Why do we need a motor driver?

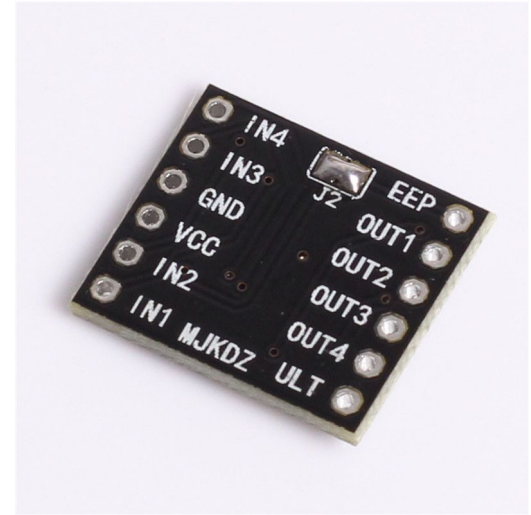
- Why can't we drive motors directly from our Arduino?



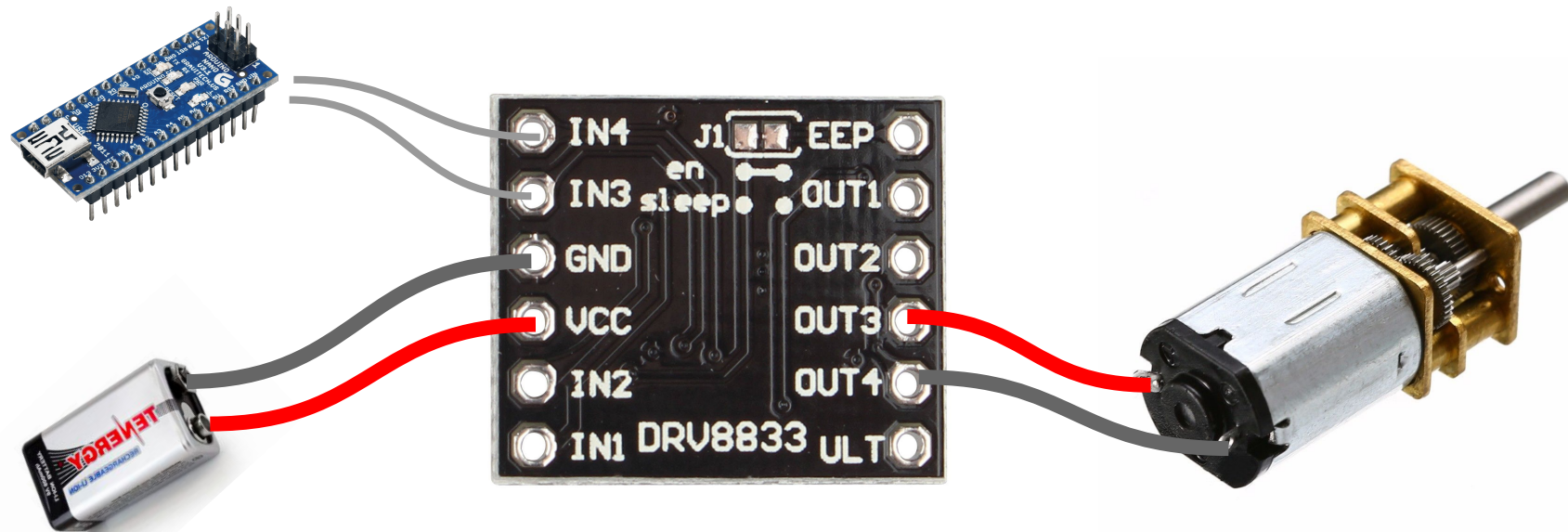
Motor Driver

Why do we need a motor driver?

- Why can't we drive motors directly from our Arduino?
- It's designed to only do logic -- the pins aren't able to supply enough current

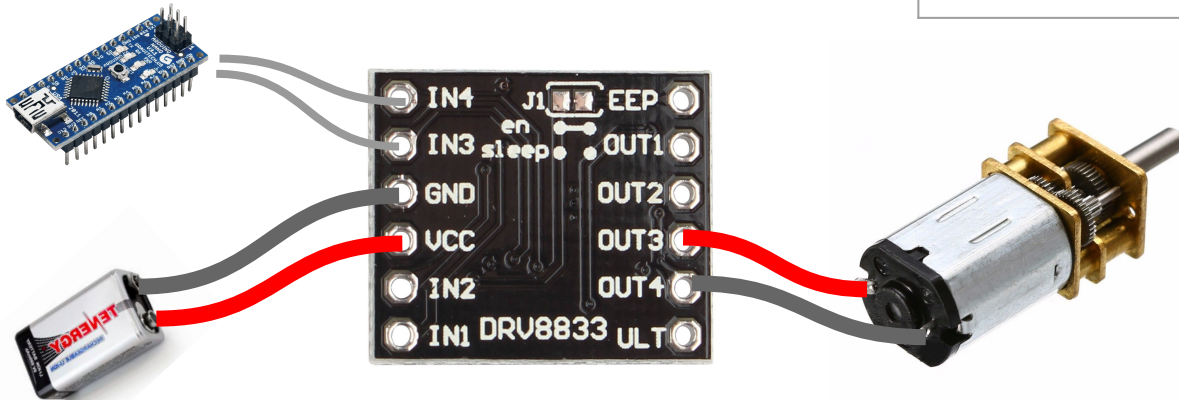


Motor Driver



Motor Driver

Direction	IN3	IN4
Forward	HIGH	LOW
Reverse	LOW	HIGH

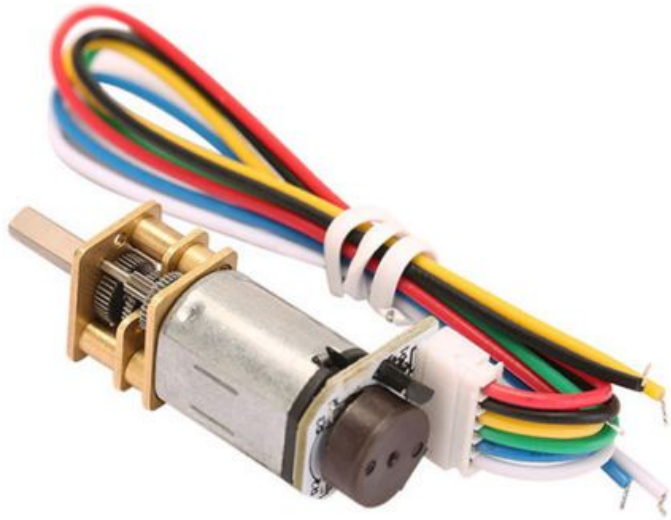


Sensing

How do we...

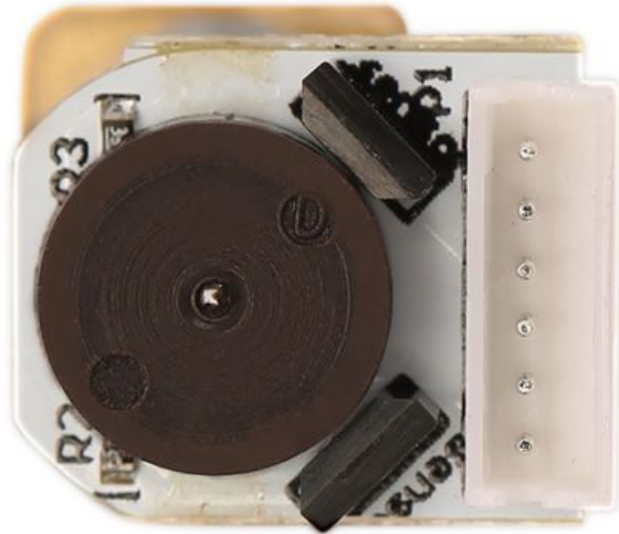
- Identify how far our mouse has traveled?
- Check the speed of our mouse?
- Make sure our mouse is driving straight?

Encoders!

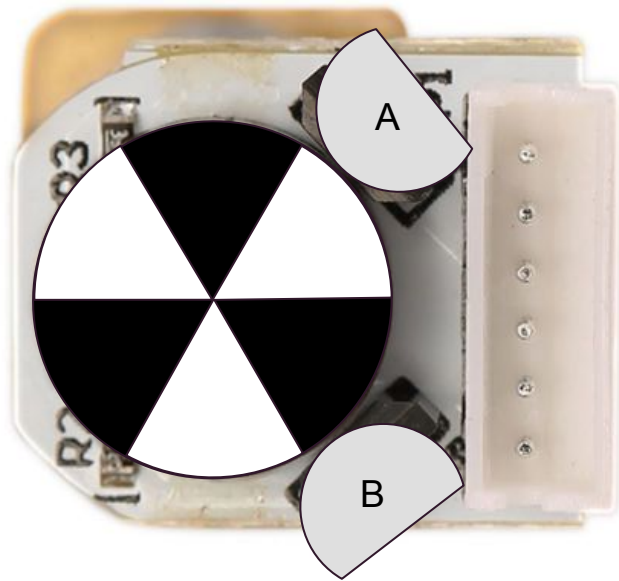


- 1: M1 - Motor +**
- 2: VCC - Encoder +**
- 3: C1 - Encoder A Phase**
- 4: C2 - Encoder B Phase**
- 5: GND - Encoder -**
- 6: M2 - Motor -**

Encoders!



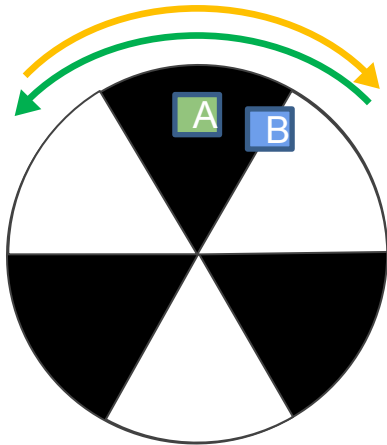
Encoders!



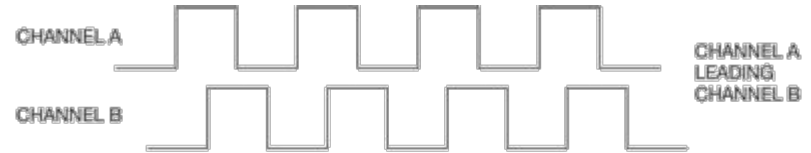
Hall effect sensor

Quadrature Encoding

- Each sensor looks at a different part of the code wheel
- Offsetting each encoder by 90° phase lets us see direction of rotation.



clockwise



counterclockwise

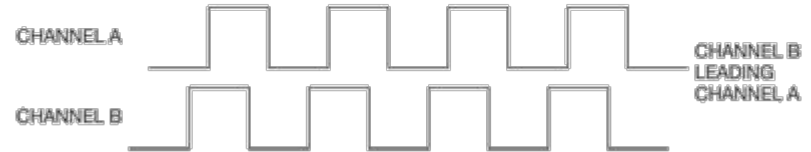
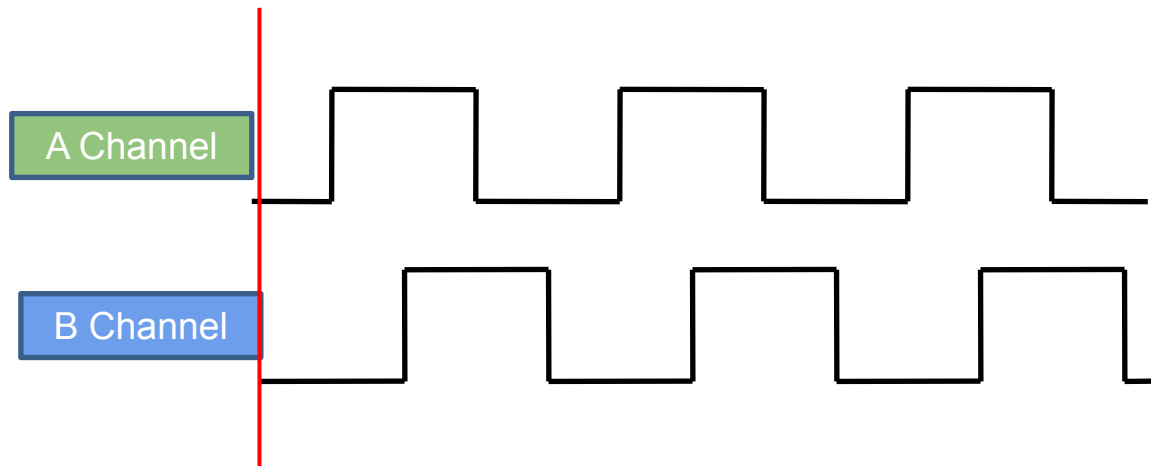
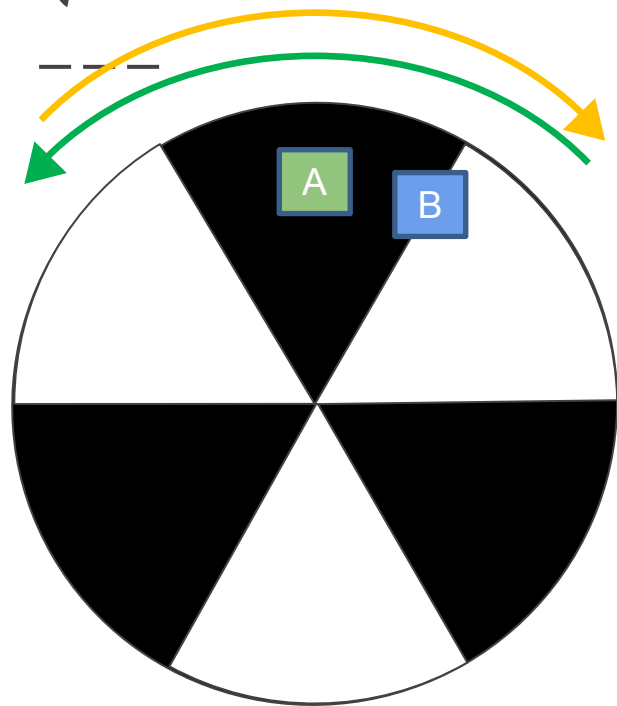
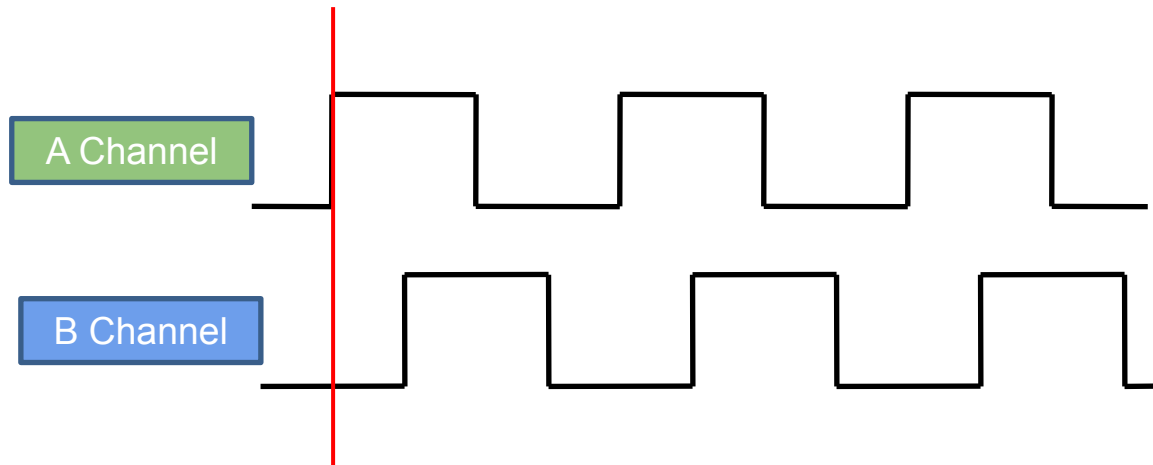
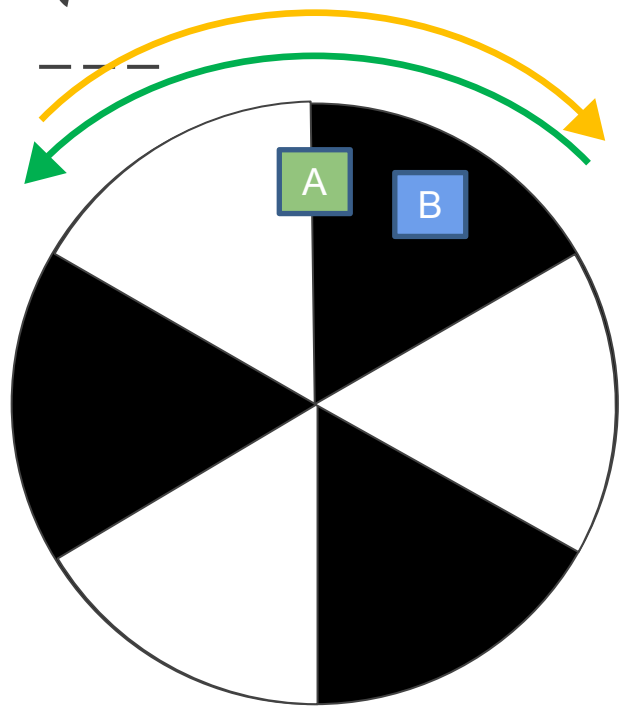


Figure 1 A quadrature encoder produces pulses that are 90° out of phase.

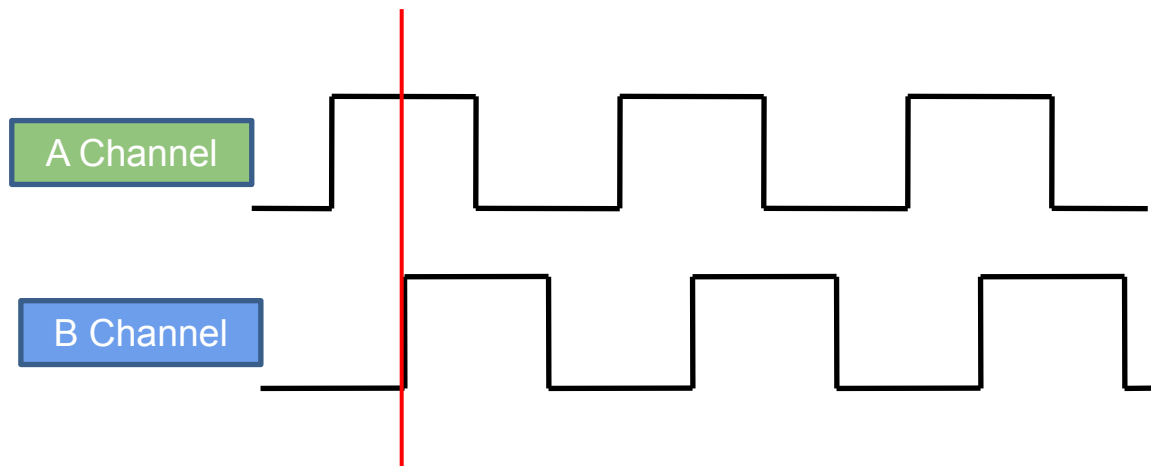
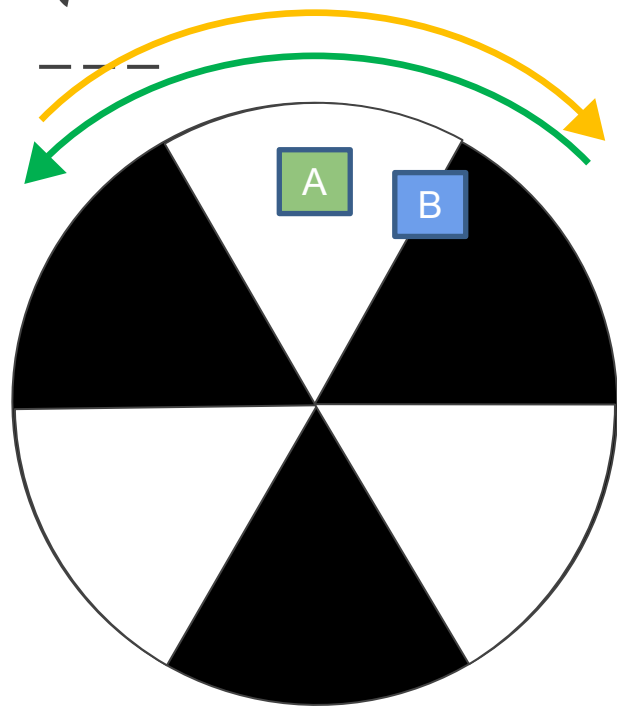
Quadrature Encoder Animation



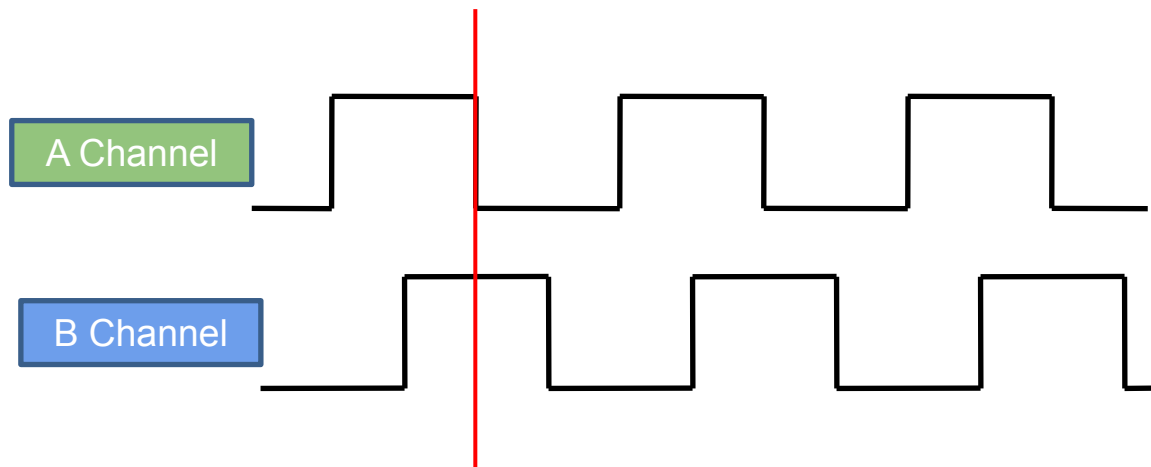
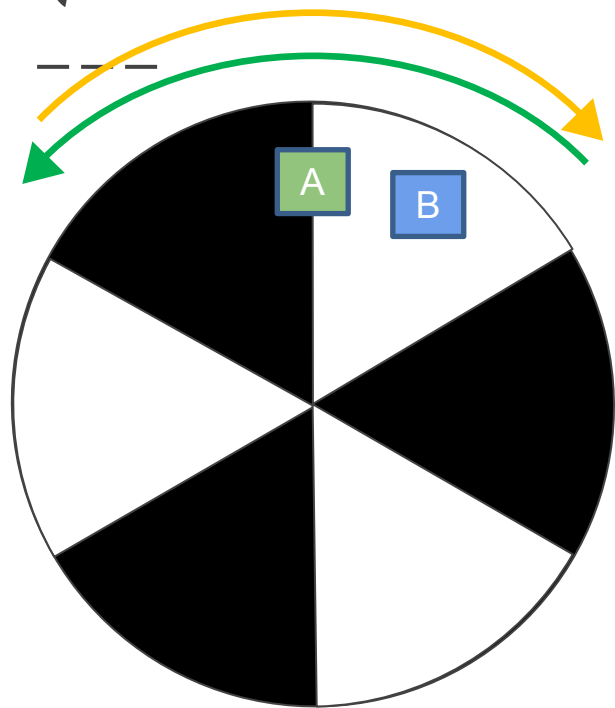
Quadrature Encoder Animation



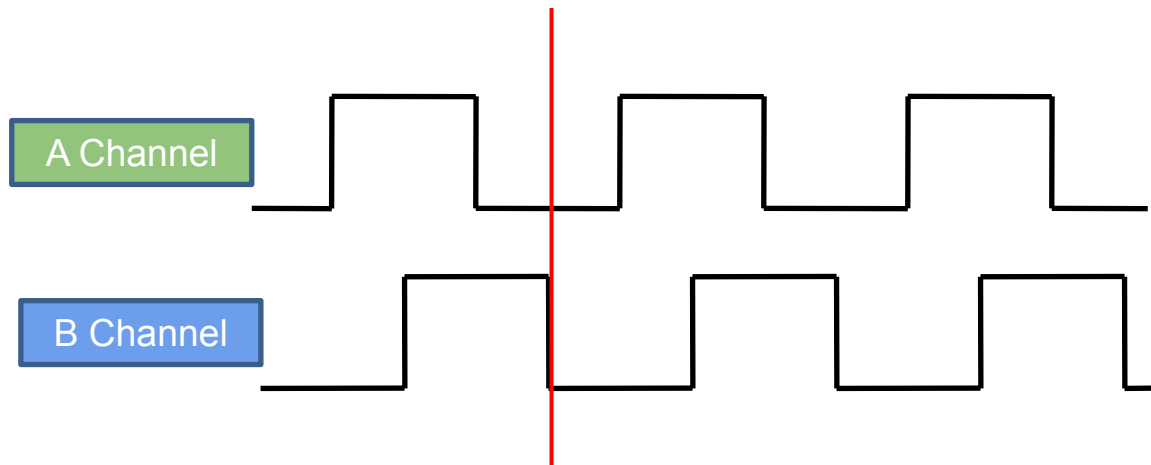
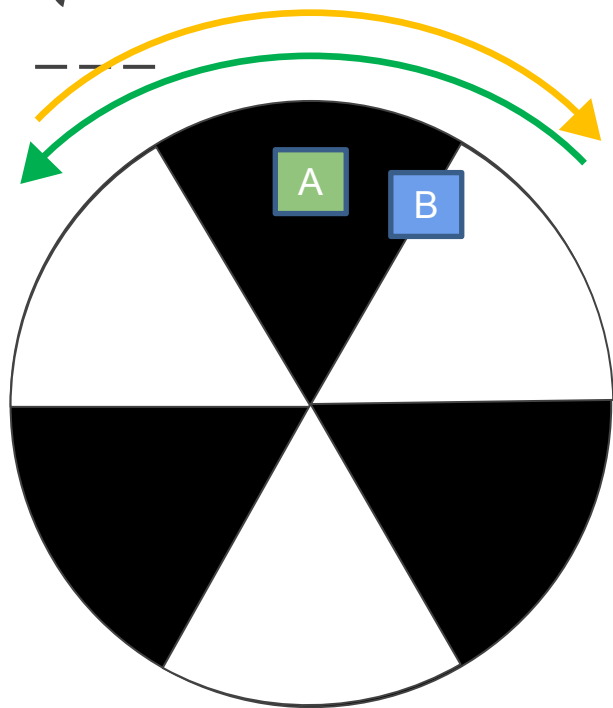
Quadrature Encoder Animation



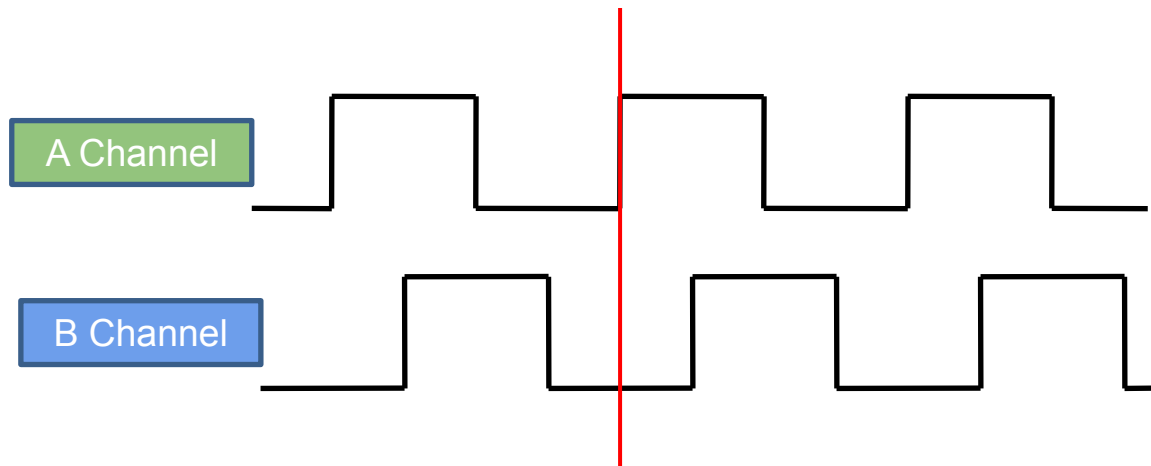
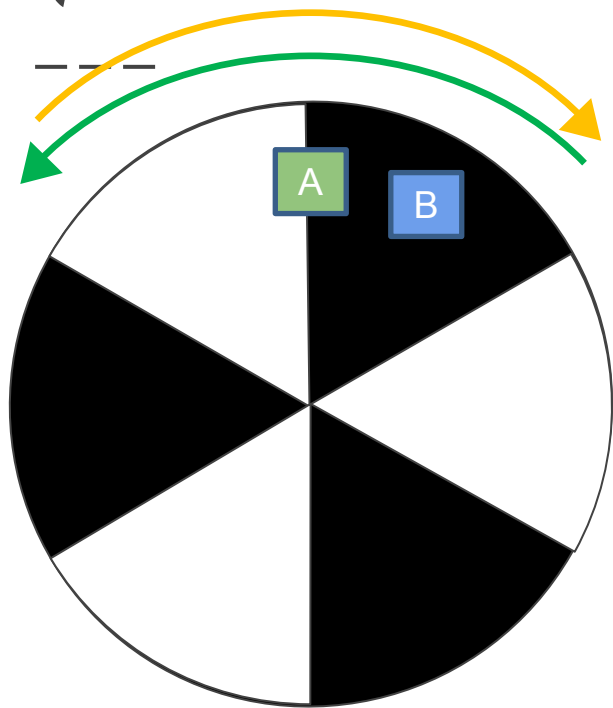
Quadrature Encoder Animation



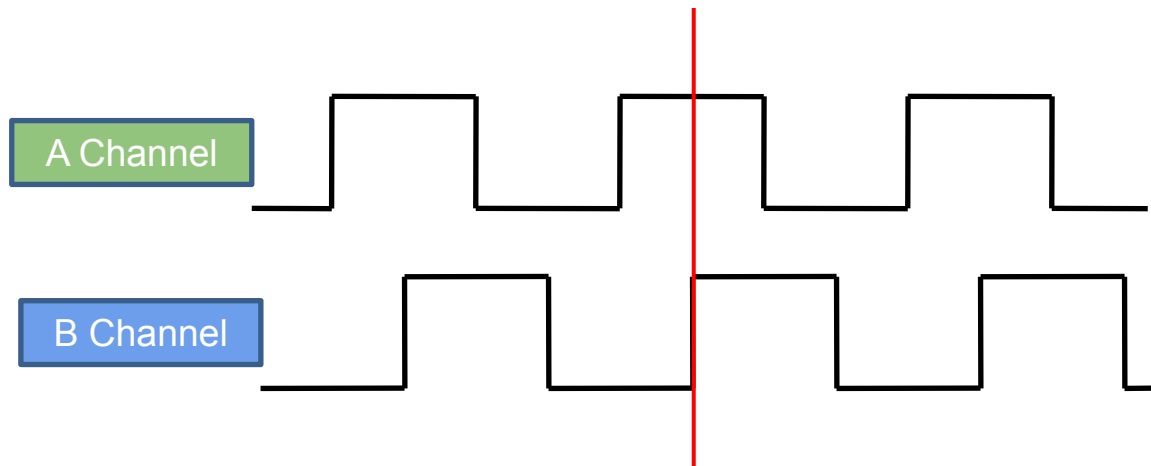
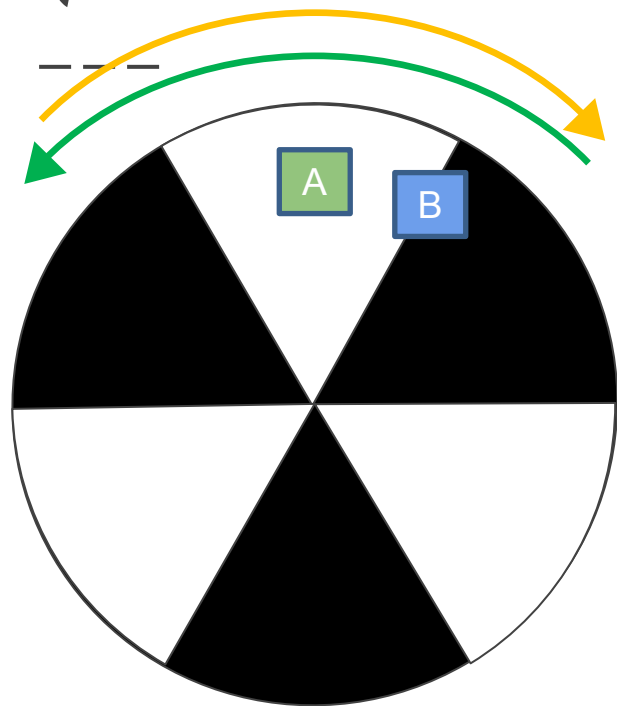
Quadrature Encoder Animation



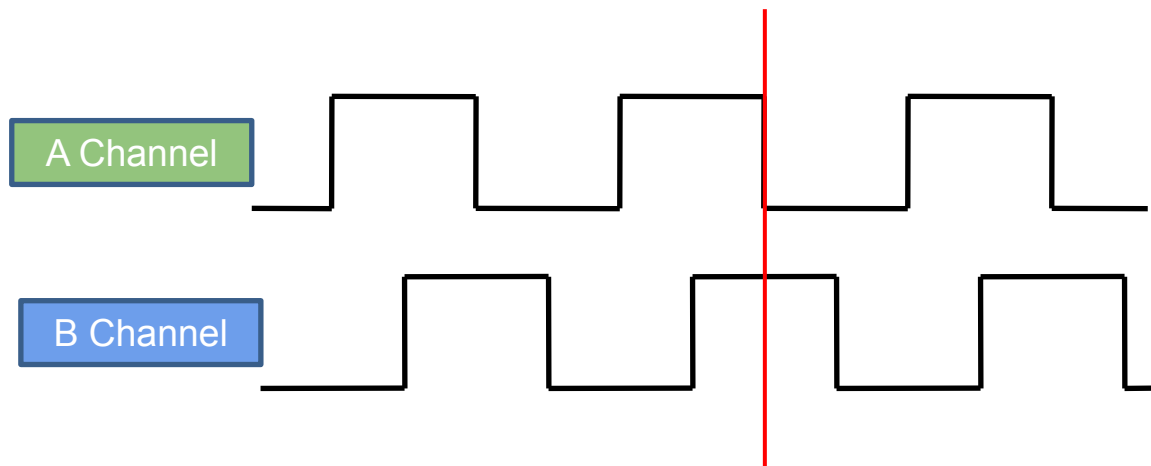
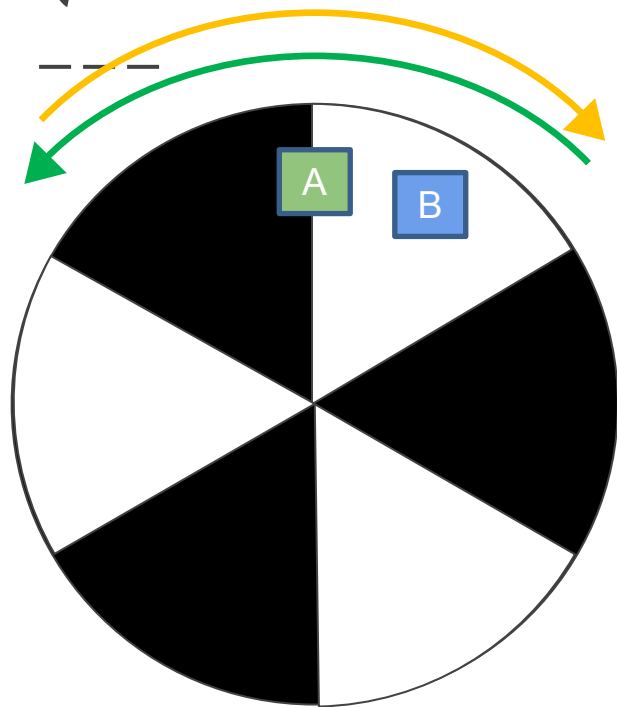
Quadrature Encoder Animation



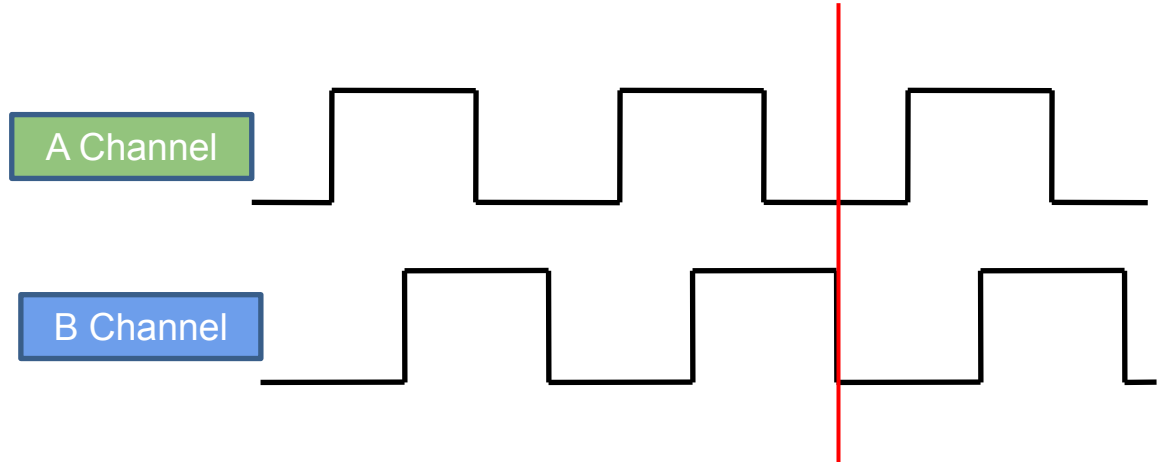
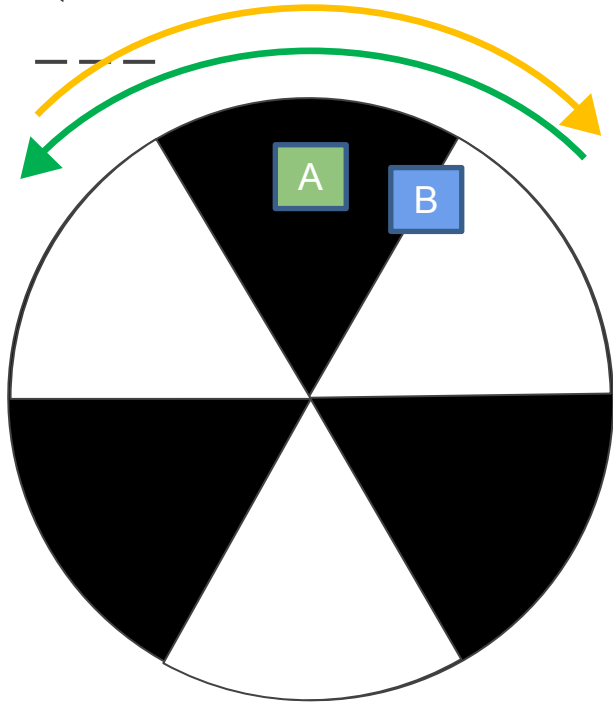
Quadrature Encoder Animation



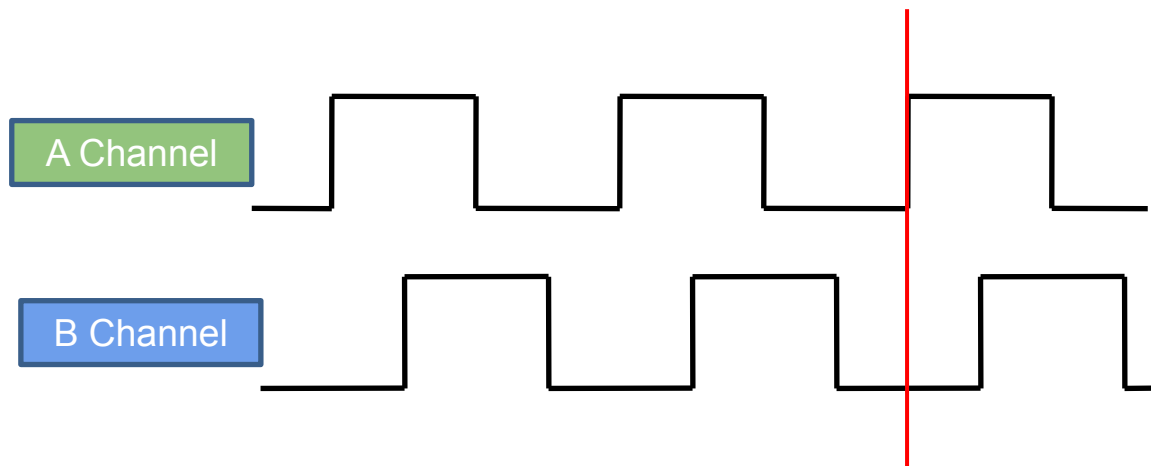
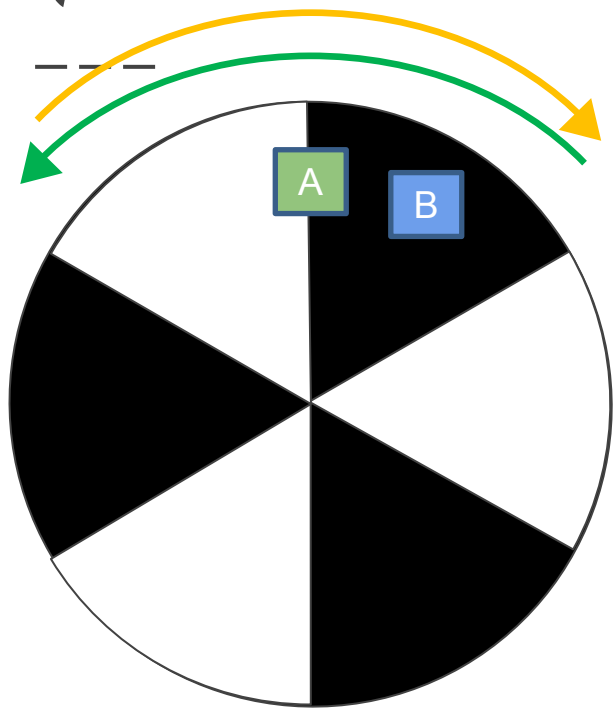
Quadrature Encoder Animation



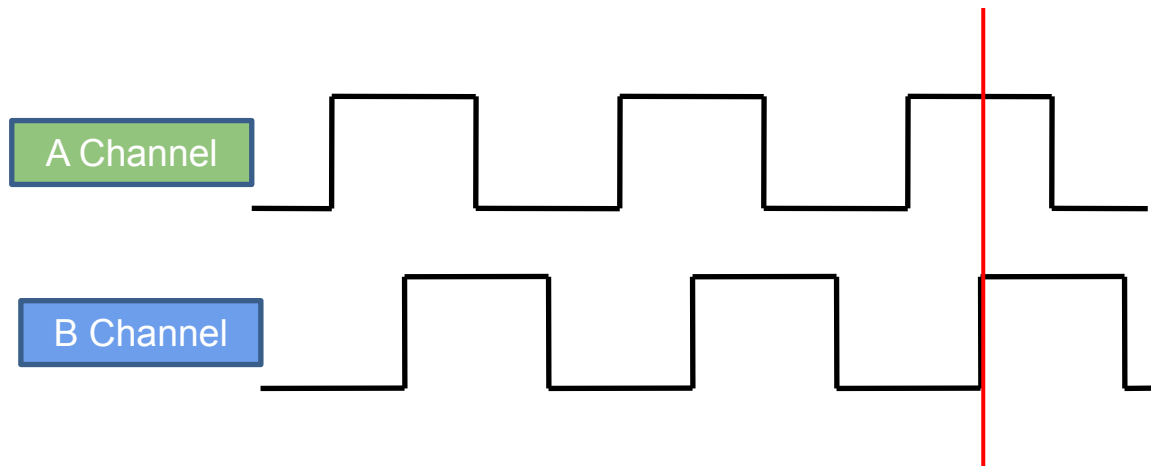
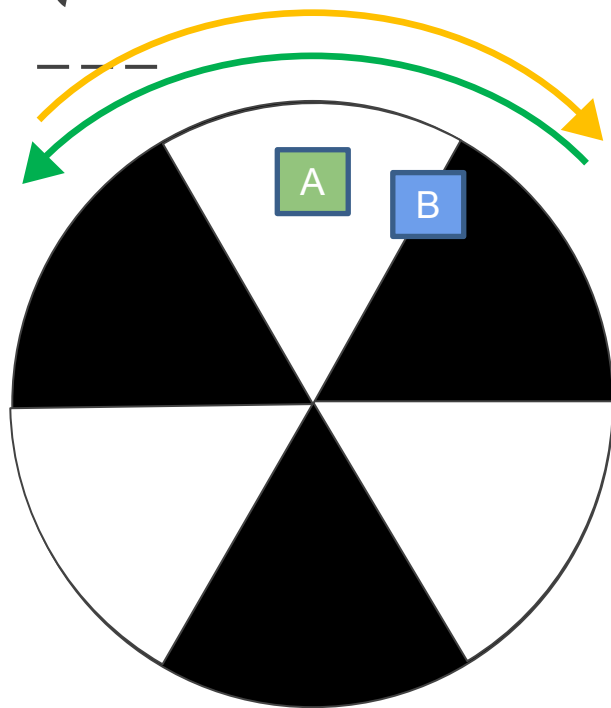
Quadrature Encoder Animation



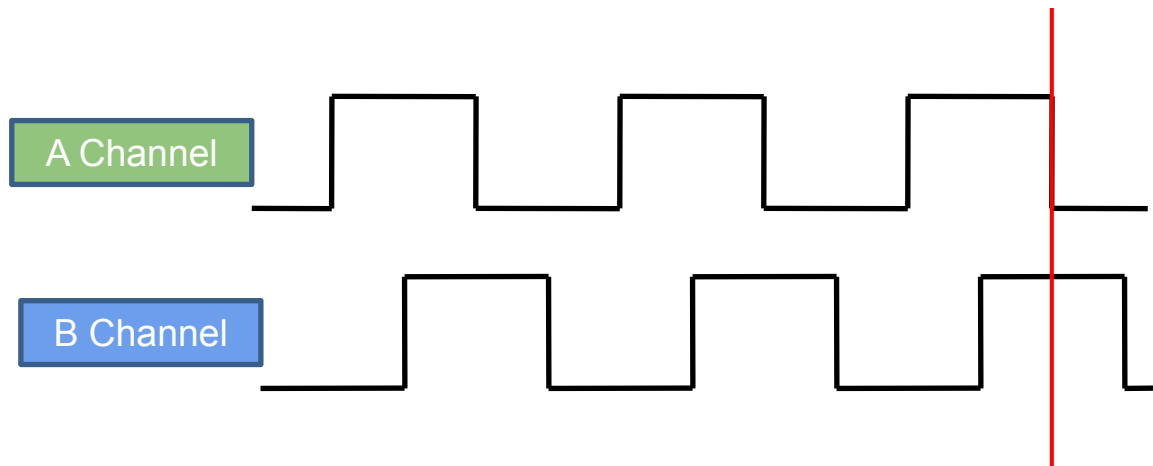
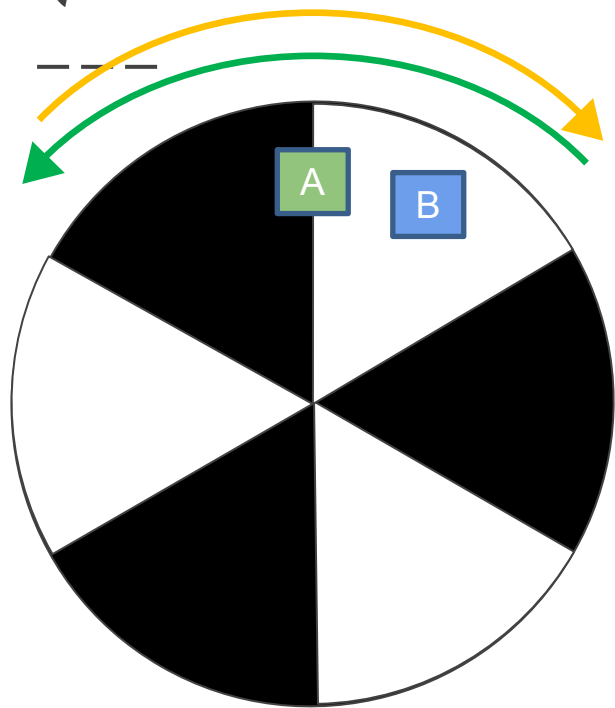
Quadrature Encoder Animation



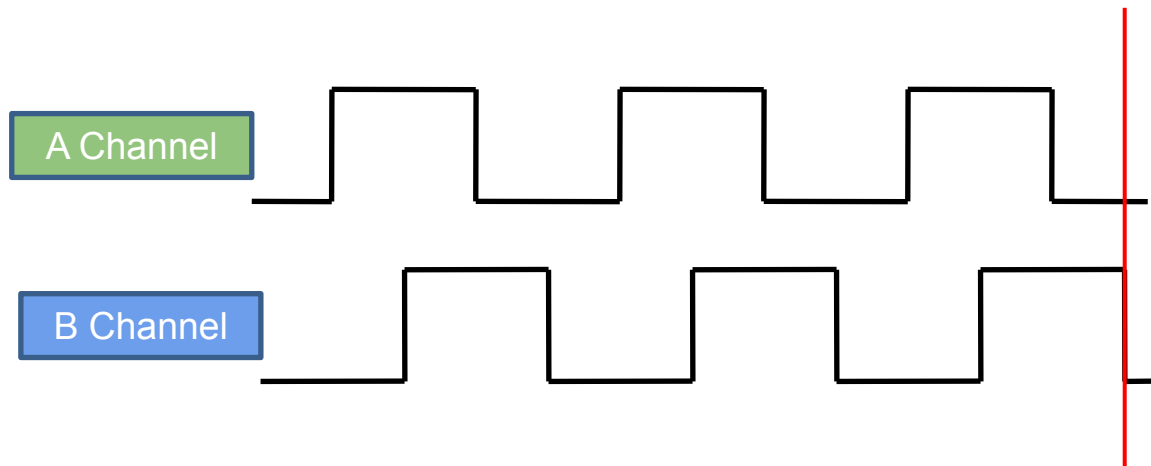
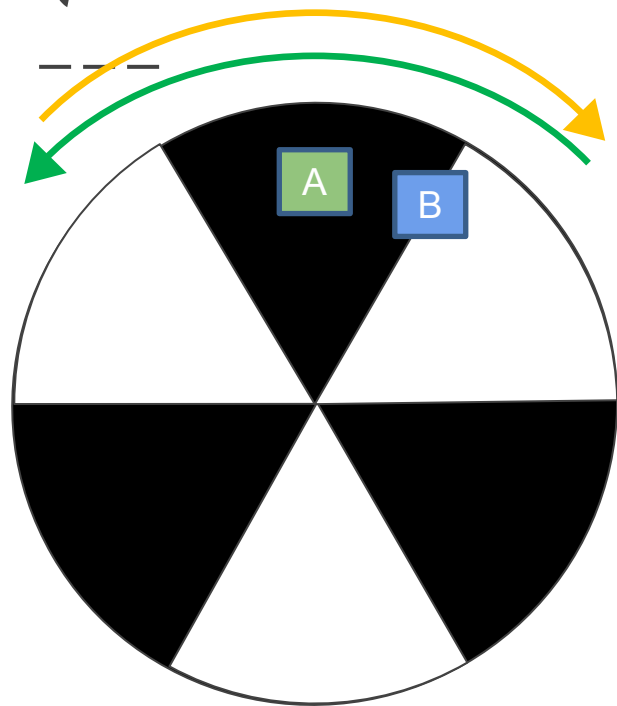
Quadrature Encoder Animation



Quadrature Encoder Animation



Quadrature Encoder Animation



Encoders!

How do we...

- Identify how far our mouse has traveled?
- Check the speed of our mouse?
- Make sure our mouse is driving straight?

Distance Sensors

- Use them to sense how far away an object is
- Why is this relevant for Micromouse?

Today: Brushed Motors & Encoders



- Lab link on bCourses
- Tips
 - The lab assumes that the left motor is the one plugged in