

ENCODERS

CONCEPTS

- We use rotary incremental quadrature encoders
 - Rotary versus Linear
 - Rotary: measures rotational motion (counting the number of revolutions)
 - Linear: measures motion along a path (tape measure)
 - Incremental versus Absolute
 - Incremental: position at power up is reported as zero
 - Incremental encoders only record the movement since being powered up, not the movement at power up.
 - Absolute: position at power up is the real position value
 - Absolute encoders can determine exactly what location it is at during power-up, but like incremental encoders, it does not hold onto data prior to power up (unless multi-turn).
 - Quadrature
 - Having two sensors to determine [direction](#). One sensor is placed ahead of the other, and designated as the “forward” sensor. Therefore, if the “forward” sensor is read first, we know that the movement is in the forward direction.
- For our drive train, we use optical (Grayhill). For our EVOM parts (eg. shooters) we use magnetic (CTRE).
 - Magnetic
 - The shaft spins a magnet, the movement of the magnet is read by a hall sensor.
 - Less accurate but more robust (magnets won't get contaminated by dust)
 - Optical
 - The shaft spins a transparent disk with lines on it, the number of lines are counted by one (or two, in the case of quadrature encoders) light sensors
 - More accurate but needs protection dust, vibration
 - Outside contaminants may affect the disk and therefore the readings from light sensors

TIPS

- Grayhill is optical, CTRE is magnetic

RESOURCES

- Videos
 - [SparkFun Video](#)
 - [Magnetic Encoder](#)
 - [Optical Encoder](#)
- [Motion Control Tips - Encoder Types Overview](#)
- [Grayhill Encoders - Product Page](#)
- [CTRE Encoder - Product Page](#)