Detroit FTC Kickoff

September 9, 2017

FRC Team 503
FROG FORCE

Agenda

- Walk through simple autonomous
- What is an encoder?
- What are encoders used for?
- Calculating CPI/CPD
- Modify autonomous to use encoders
- Testing/Q&A

What is an Encoder?

- Used for measuring precise movement
- Has an internal wheel that is used to measure the number of rotations of the motor axle
- That number can be used to calculate the number of inches traveled or the number of degrees turned by the robot
- Used because they are more consistent than driving based on a timer

Calculating CPI

- Encoder pulses (counts) per rotations (C) = 1440
- 4 inch wheel diameter
- 2:1 gear ratio
- Distance travelled in one rotation (D) = pi * wheel diameter / gear ratio = 2 pi
- Counts Per Inch (CPI) = C/D = 1440/(2 pi) = 229.18
- To travel 10 inches, you want the encoder value to change by 2291 counts

Calculating CPD

- Distance between wheels = rotation diameter (D) = 14 inches
- Rotation circumference in inches (I) = Pi * D = 14 Pi
- Counts Per Inch (CPI) = 229.18
- Rotation circumference in encoder counts (C) = CPI * I = 3206 Pi
- Counts Per Degree (CPD) = C/360 = 3206 Pi/360 = 28
- Have to adjust for friction/slipping from wheels
- To turn 10 degrees, you want one encoder to change by +280, and the other to change by -280

Modifying Autonomous

- Counts Per Inch (CPI) = 229.18
- Counts Per Degree (CPD) = 28

Testing

- Counts Per Inch (CPI) = 229.18
- Counts Per Degree (CPD) = 28
- Find actual values through testing

Q&A

Any Questions?

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Frog Force FTC Resources:
http://www.frogforce503.com/page-ftc-resources.html