ADVANCED EV3 PROGRAMMING LESSON

EV3 Classroom: Gyro Move Straight

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EV3 CLASSROOM LESSON
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Lesson Objectives

- Learn what proportional control means and why to use it
- Learn to apply proportional control to get your robot to move straight
- Learn to apply proportional control to the Gyro sensor move at a particular angle

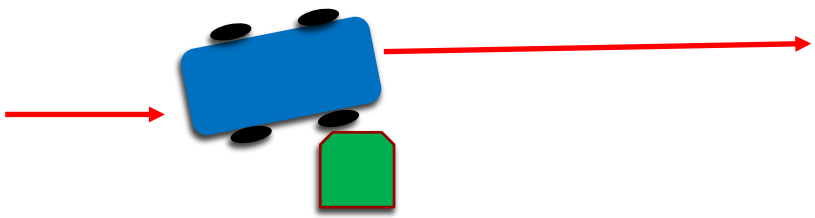
- Prerequisites: Math Blocks, Proportional Control, Gyro Sensor lessons

Tips For Success

- You must go through the Proportional Control Lesson and the Proportional Line Follower Lesson before you complete this lesson
- You must also complete the other two Gyro Lessons

What is Gyro Move Straight?

- Imagine that you want to drive for 200 cm straight
- As you travel, your robot gets bumped by something
- A gyro move straight program helps the robot correct itself back to straight, but offset by how much it was bumped



How it Works

- A proportional line follower and a gyro move straight code share similar properties
- To write a gyro move straight program, you must first think about what the error is and what the correction needs to be

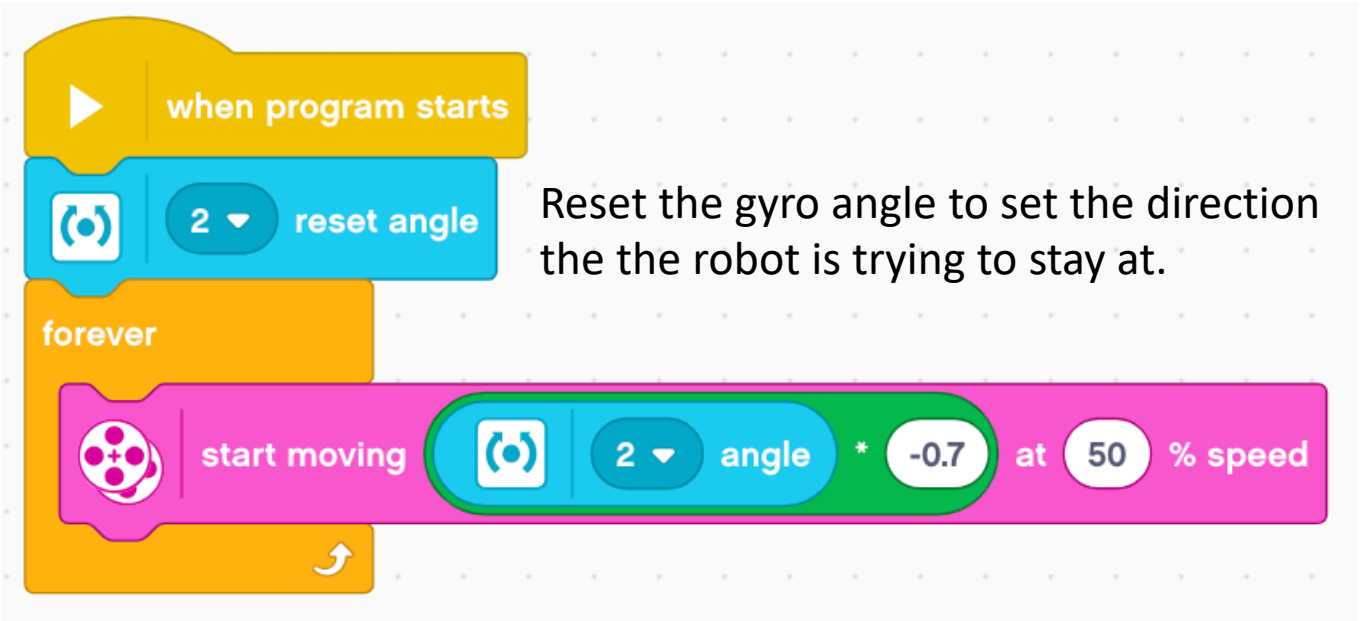
Application	Objective	Error	Correction
Gyro Straight	Make the robot at a constant heading/angle	How far you are from that heading/angle	Turn sharper based on how far you are from that angle
Line Follower	Stay on the edge of the line	How far are our light readings from those at line edge (current_light – target_light)	Turn sharper based on distance from line

Pseudocode

- Reset your gyro (yellow gyro block set to reset mode) so that the value starts at “0” and there is no drift
- In a loop, compute the error and apply the correction
  - Part 1: Compute Error (How far from target angle)
    - To move straight → Target gyro angle=0
    - Distance from target angle is just current gyro reading
  - Part 2: Compute a Correction that is proportional to the error
    - Multiply the Error from Part 1 by a constant (that you must experiment and discover for your robot)
  - Plug the value from Part 2 into the steering input into a Start Moving With Steering at Speed Block
- Exit loop as required by changing loop block

Solution: Gyro Move Straight

*Remember to recalibrate your gyro when you turn on your robot **before** running this code in case the gyro is drifting*



Reset the gyro angle to set the direction the the robot is trying to stay at.

Start moving and adjust the steering based on how far off the robot is from its target

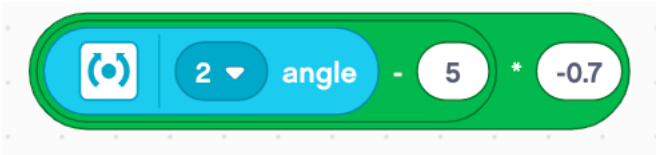
Loop so that the robot keeps updating its correction

Discussion Guide

1. Compare the proportional line follower code with the proportional move straight code. What similarities and differences do you see?
   Ans. The code is almost the same. The one difference is how the error is calculated. The error is calculated using the gyro sensor. The correction is identical.

2. What if you wanted to travel at a particular angle (not just straight)? How would the code look different?

   Ans. In Part 1 of the solution code, there is no subtraction block because we were just subtracting "0" since our target heading is moving straight. You would have to subtract your current angle from the target angle if you wanted to move at some other angle.



Target angle = 5 degrees

Credits

- This tutorial was created by Sanjay Seshan and Arvind Seshan
- More lessons at www.ev3lessons.com