



Oregon Robotics Tournament & Outreach Program

FIRST LEGO League Challenge

Mission Lesson 3: Using the Built-in Gyro

July 19, 2023

Summary

In this the students will learn about gyroscopes and gyro sensors and how they can be used to increase the accuracy of a robot's navigation.

Prepare

Identify the way that the students will watch video episode 3.

Preview

- Video on gyroscope at youtu.be/cquvA_lpEsA
- Episode 3: Using the Gyro at tinyurl.com/ortop-FLL-Ep3
- The above episode uses Version 2 of the SPIKE Prime app. If you are using Version 3, you will notice that some options available in Version 2 are no longer available in Version 3. For guidance see tinyurl.com/ortop-fll-move-changes

Distribute the LEGO Classic 11005 kits if the student groups don't already have them.

Organize

Organize the classroom as you did on the previous day, incorporating any improvements you care to make.

Engage

Show students

- Video on gyroscope at youtu.be/cquvA_lpEsA
- Episode 3: Using the Gyro at tinyurl.com/ortop-FLL-Ep3

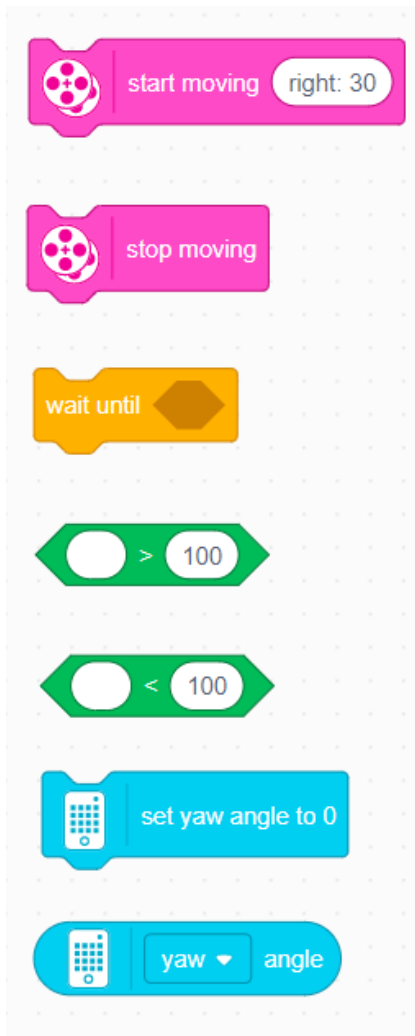
Explore

Discuss with the students the desire to make a reliable robot that can do the same thing each time. Relate this need to (1) the desire of *FIRST* LEGO League teams to score points during a competition and (2) in real life where robots do things like manufacture things, move things around a warehouse or explore Mars.

Explain

Review with students the idea that a circle can be divided into 360 degrees with quarter circles being denoted by 0, 90, 180 and 270 degrees. Demonstrate how a gyroscope works using a toy gyro if you have one. Explain that a gyro sensor uses the same principle to detect when an object rotates or tilts. Explain briefly the three axes of rotation: pitch, roll and yaw. Focus on yaw as it is the axis most used by robots navigated on a surface. Discuss how clockwise rotation is represented in positive degrees and counterclockwise rotation in negative degrees.

Explain the purpose of the following blocks:



Note: This block appears in the Sensor menu as

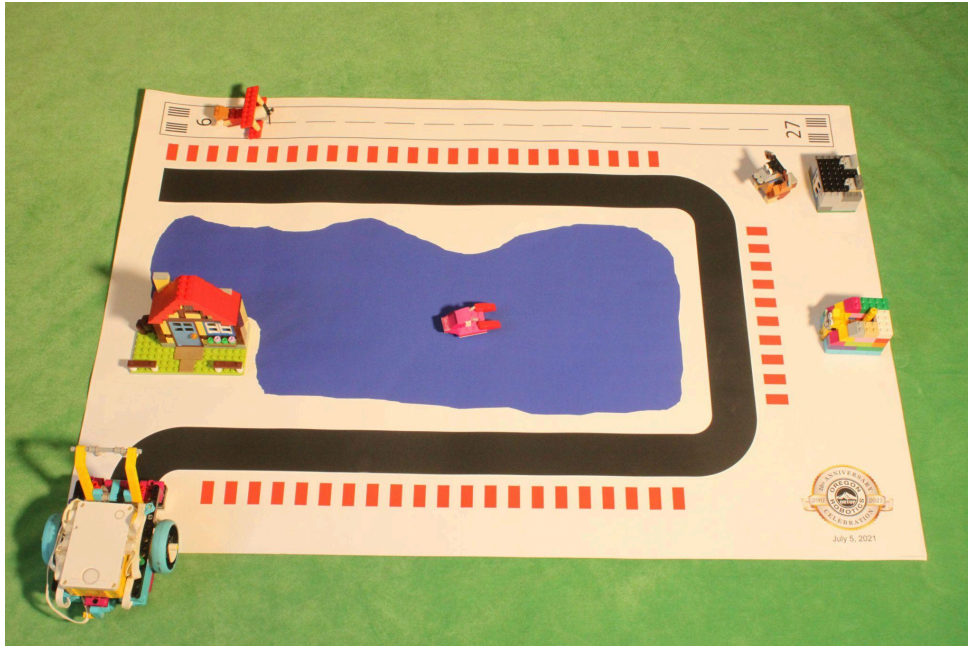


but can be changed to provide the yaw angle instead of the pitch angle.

Elaborate

Have your groups of students add blocks to their robots' programs that use the built-in gyro sensor to help the robot make more precise and reliable turns. Have them experiment with this

technique to follow the turns in the road on the mission mat.



Reflect

Facilitate a discussion between the students about what they have learned by gyro sensors and how they can be used to create more reliable programs for robots.

Evaluate

Review how far each group of students got in programming the robot to use the gyro sensor. Give feedback to each group of students..