# FIRST® LEGO® League

TUTORIALS

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LESSON 4:
ALIGNING ON LINES ON THE MAT

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WHY IS ALIGNING ON A LINE USEFUL?

- To complete a mission reliably, your robot has to be close to the same position and angle every time.

    - You have learnt how to find the line. This makes sure that your robot has travelled the right distance.

    - How do you make sure it is at the correct angle?

- You can align on walls, missions and lines to straighten the robot up. In this lesson, we look at straightening up on lines.

    - This is also referred to as aligning on a line or squaring up on a line.

- Straightening up is very important for a FIRST LEGO League robot because they don't always travel straight.

    - A slight error in your angle will result in a significant position error after a long move.

    - Angle errors add up → if each turn is off by a few degrees, your robot may be many degrees off after a few turns.

Align on a Line
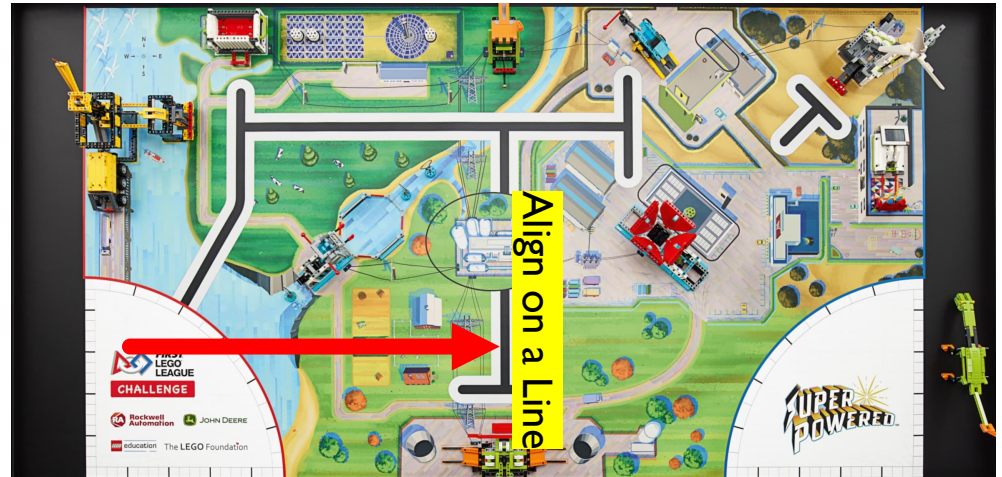
HOW DOES IT WORK?

- If you have two color sensors on the robot, you can use them to straighten out.

- First move both motors until one sensor finds the line.

- Stop the motor on that side (B).

- Then, move the just the other motor (C) until the second color sensor finds the line.

- The details of programming this are in the Advanced → Squaring on lines lessons on EV3Lessons.com and PrimeLessons.org
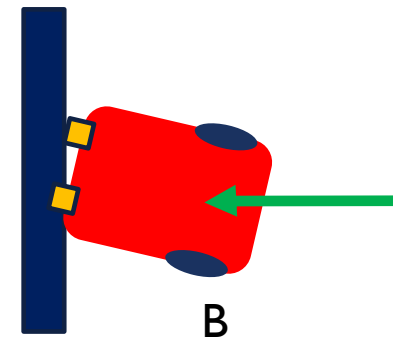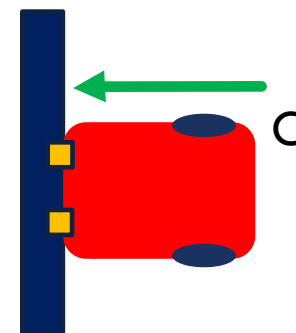
Figure 1

B

Figure 2

C

RELIABLE LINE SQUARING

Line squaring suffers from the same problem as line finding → if you try to find a white region over a large section of the mat, the sensor may report white in some spot before the line.

The solution is the same → move close to the line before having the robot start searching for the line

COMMON PROBLEMS AND SOLUTIONS

- You might find that your robot is not quite straight at the end of an align

  - The amount of error typically depends on how far from straight your robot was before you began to align

- Since the align process makes you "straighter" you can repeat the align to reduce the error

  - Each repetition will make you closer to straight

  - You will need to experiment to determine how many times you need to align

CREDITS

- This tutorial was created by Sanjay Seshan and Arvind Seshan

- More lessons at www.ev3lessons.com, www.primelessons.org and www.flltutorials.com