FIRST® LEGO® League

TUTORIALS

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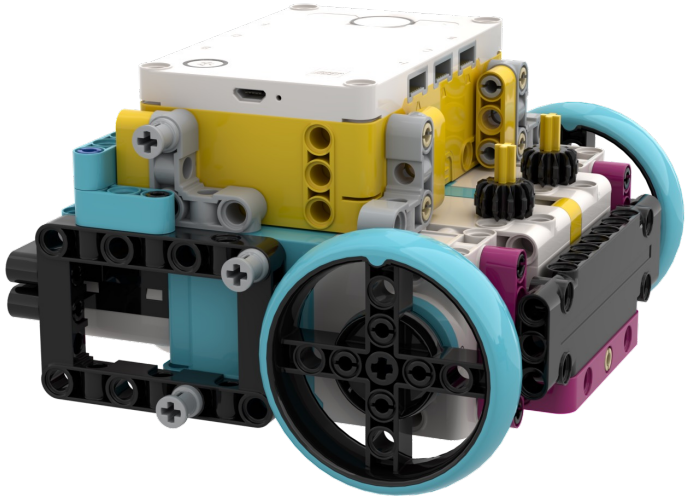
LESSON 2:
BUILDING A ROBOT THAT NAVIGATES WELL

SESHAN BROTHERS

WHAT FEATURES DO YOU NEED

- To navigate well, you will need a robot with features that allow you to navigate well



NAVIGATING RELIABLY IN FIRST LEGO LEAGUE

- Good navigation will use some or all of these techniques
  - Move straight for a distance
  - Turning robot by degrees
  - Aligning in Launch
  - Wall follow
  - Aligning on lines
  - Aligning on walls
  - Aligning on mission models
  - Line following

- Each of these techniques requires that your robot design to have specific features

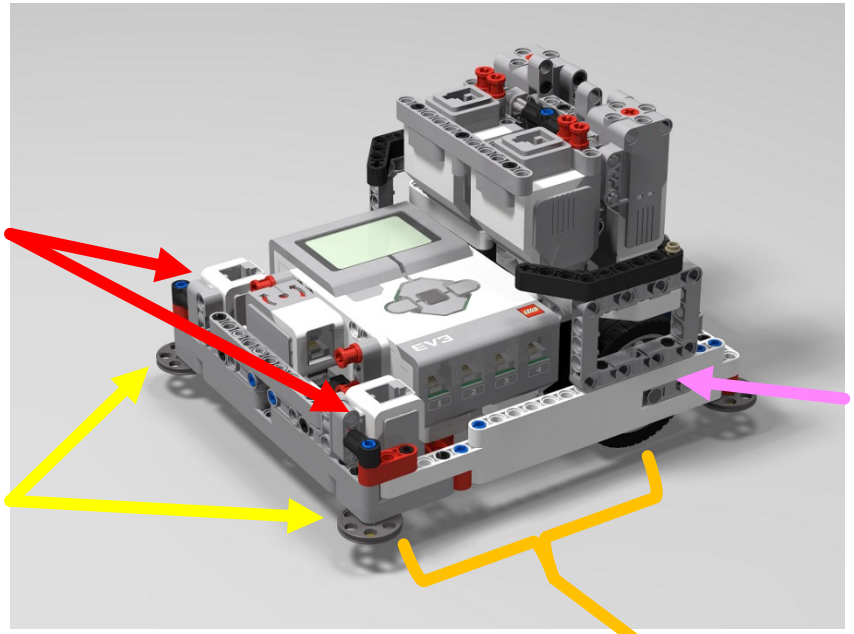
SOME KEY ROBOT FEATURES

- Outer walls
  - Makes it possible to align on flat surfaces (walls and mission models)
  - Keeps wheels well supported → improves accuracy of moving straight and turns
- Two color sensors that are aligned but separated by some distance
  - Makes it possible to align on lines
- Color sensors that are "in front" of the drive wheels
  - Makes it possible to line follow
- Wall-riding wheels
  - The quality of the walls in contests can vary greatly (different textures, wood knots, holes, etc.). Wheels improves the ability to wall follow and align on walls
- While every team's robot should be different, most successful designs have the above features

DROIDBOT MODEL C

This robot has the key features for good navigation

** Shielding of color sensors is not needed in practice. See lesson on color sensor placement.



Low center of gravity

Two well-separated, aligned color sensors

Outer walls that support wheels

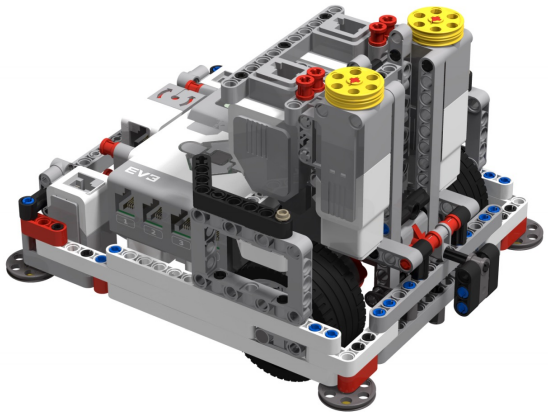
Wall riding wheels

Level construction – notice caster is level with drive wheels

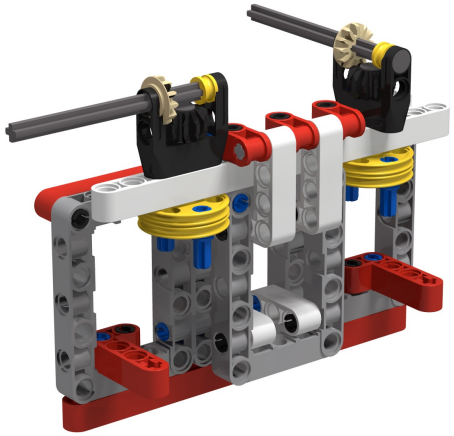
Color sensors well in front of driving wheels

ADDITIONAL FEATURES TO CONSIDER

- Quick, inter-changeable attachments that let you complete missions on many sides of the robot
- Adding the attachment should not cause weight distribution issues on the robot
- Can be made with minimal parts – DroidBot Model C is made with a single kit plus just 2 additional parts

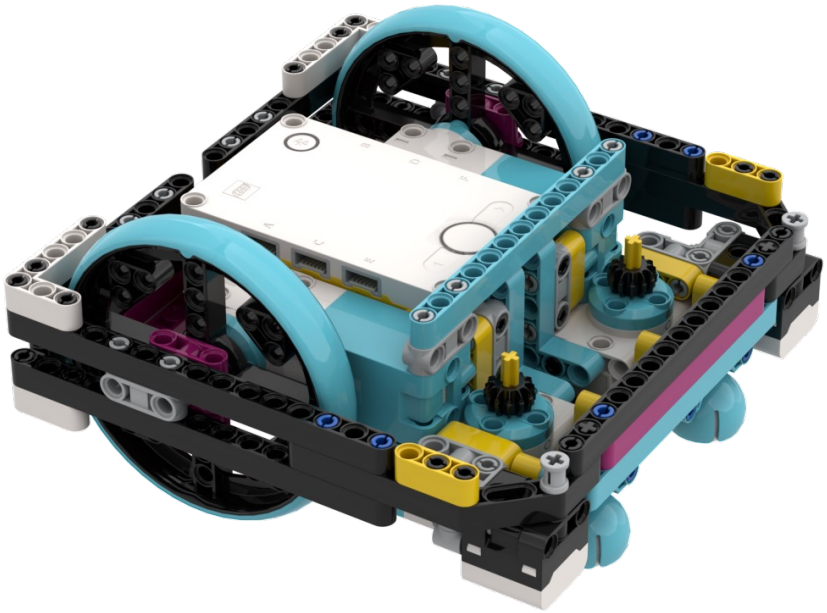


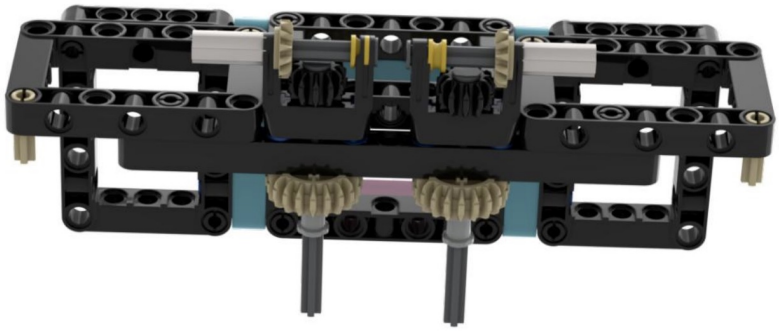
Pulley wheels added to motors for easy attachments



Pulley wheels and pegs on attachment connect quickly to motors on the robot. This attachment slides into DroidBot Model C.

SIMILAR FEATURES ON DROID BOT E





WHAT'S NEXT

- As you build your team's robot, take these features into consideration
- There are some alternative designs available on FLLTutorials.com, PrimeLessons.org and EV3Lessons.com that you can try and learn from

CREDITS

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