FIRST® LEGO® League

TUTORIALS

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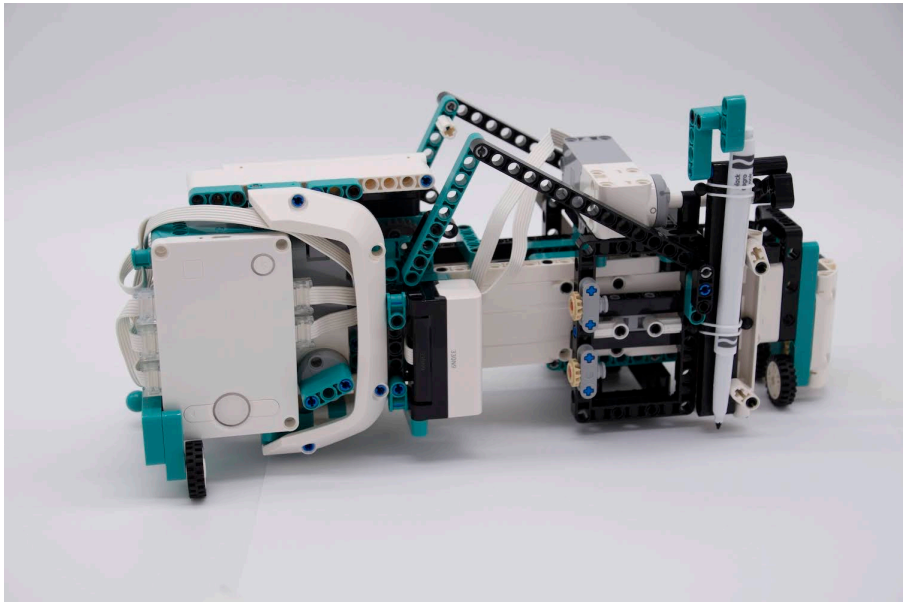
CABLE MANAGEMENT

SESHAN BROTHERS

WHAT IS CABLE MANAGEMENT?

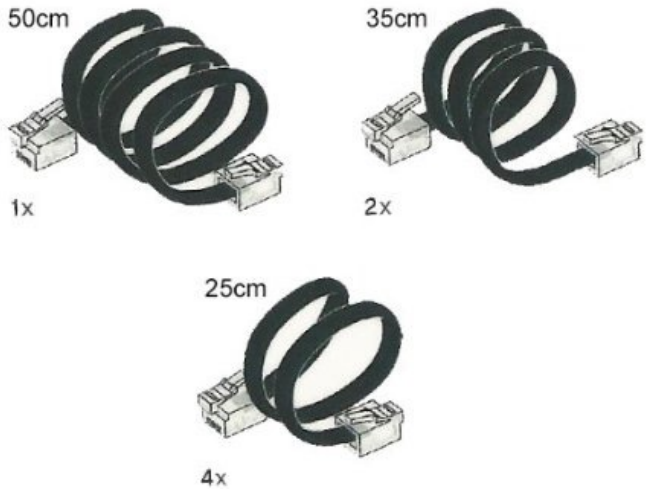
- No matter what robot you are building (for fun, for a class, or competition), you have to be able wire your robot well
- There are three reasons:
  - Aesthetics – The robot needs to look nice
  - Convenience – The wires should not be in the way of operating the robot
  - Identification – If you need to replace a part on the robot or rewire, you should be able to trace which wire goes where



Printer created by Seshan Brothers

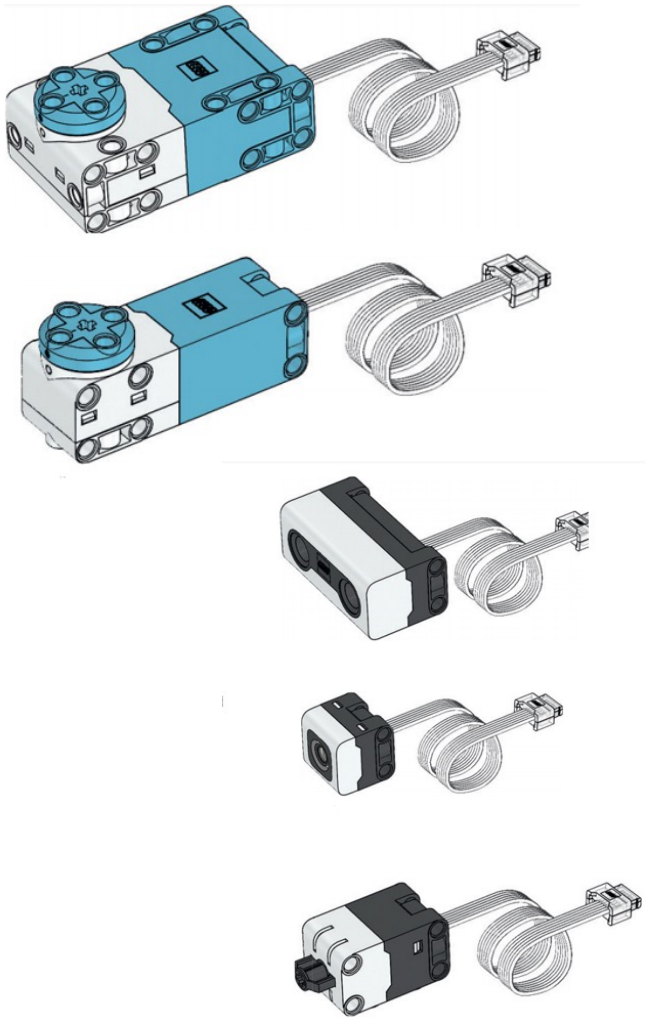
EV3 CABLES

- The EV3 Edu Core set (#45544) and the Retail set (#31313) come with the following cable lengths
  - 4 x 25 cm/10 in. cables, 2 x 35 cm/14 in. cables, and 1 x 50 cm/20 in. cables.
- If you break the tip on the cables or you need extra wires, you will need to purchase replacements



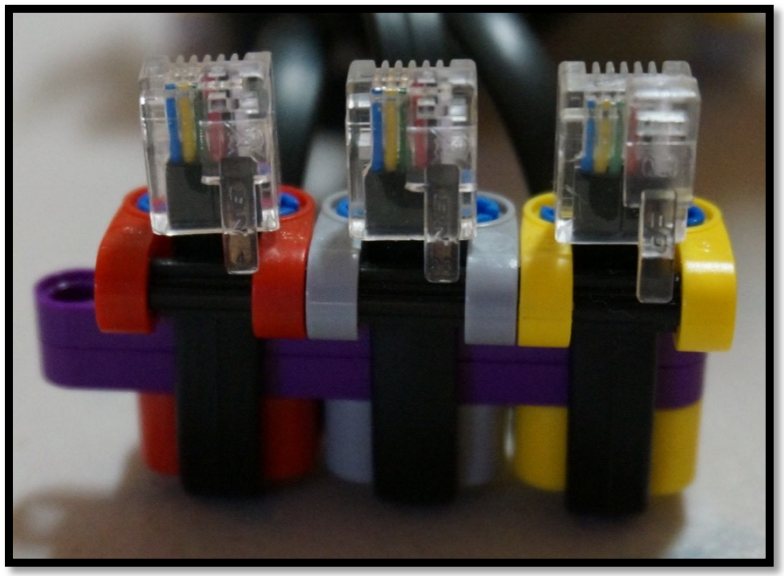
SPIKE PRIME CABLES

- SPIKE Prime cables are permanently attached to motors and sensors and come only in fixed lengths
- If you damage the cable or the plug at the end, you cannot replace the wire so take care of them!
- SPIKE Prime cables are much thinner and more flexible compared to EV3 cables. This allows you to tuck them into your robot more easily
- While some 3rd party plugs/adapters/replacement parts may exist, you may not use these in *FIRST* LEGO League



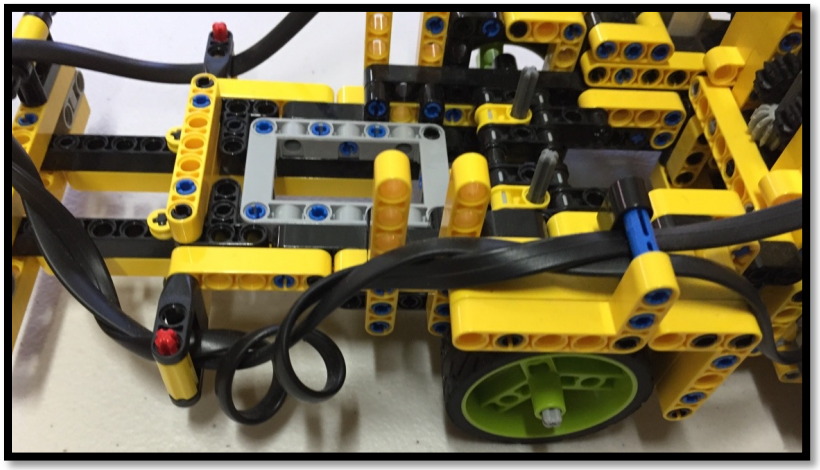
CABLE IDENTIFICATION

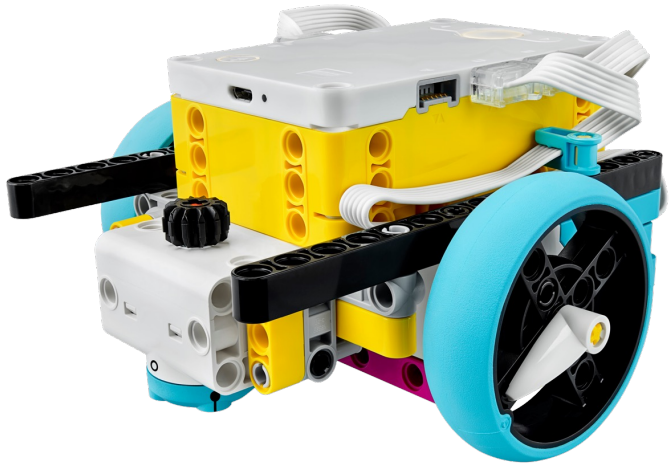
- You can use LEGO rubber bands to indicate with wire is for which sensor or motor. However, LEGO rubber bands are expensive and fragile, and not that easy to replace.
- Instead, consider wrapping your wire with colored LEGO pieces if using an EV3, or using the colored clips that come with SPIKE Prime



SHORTEN CABLES

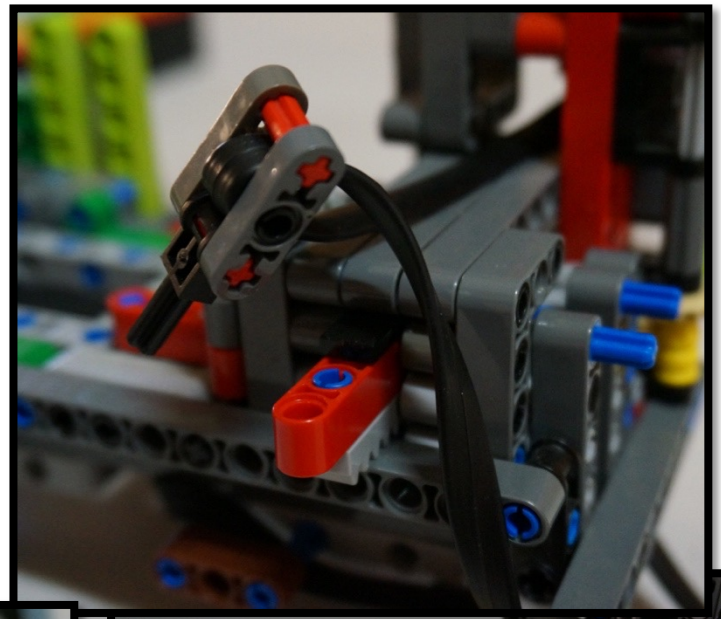
- If you are using an EV3, use the most appropriate length cable for the connection first
- If the cables are too long on your EV3 or SPIKE Prime, you can wrap them around each other or beams, or fold & tuck them into available places, etc.





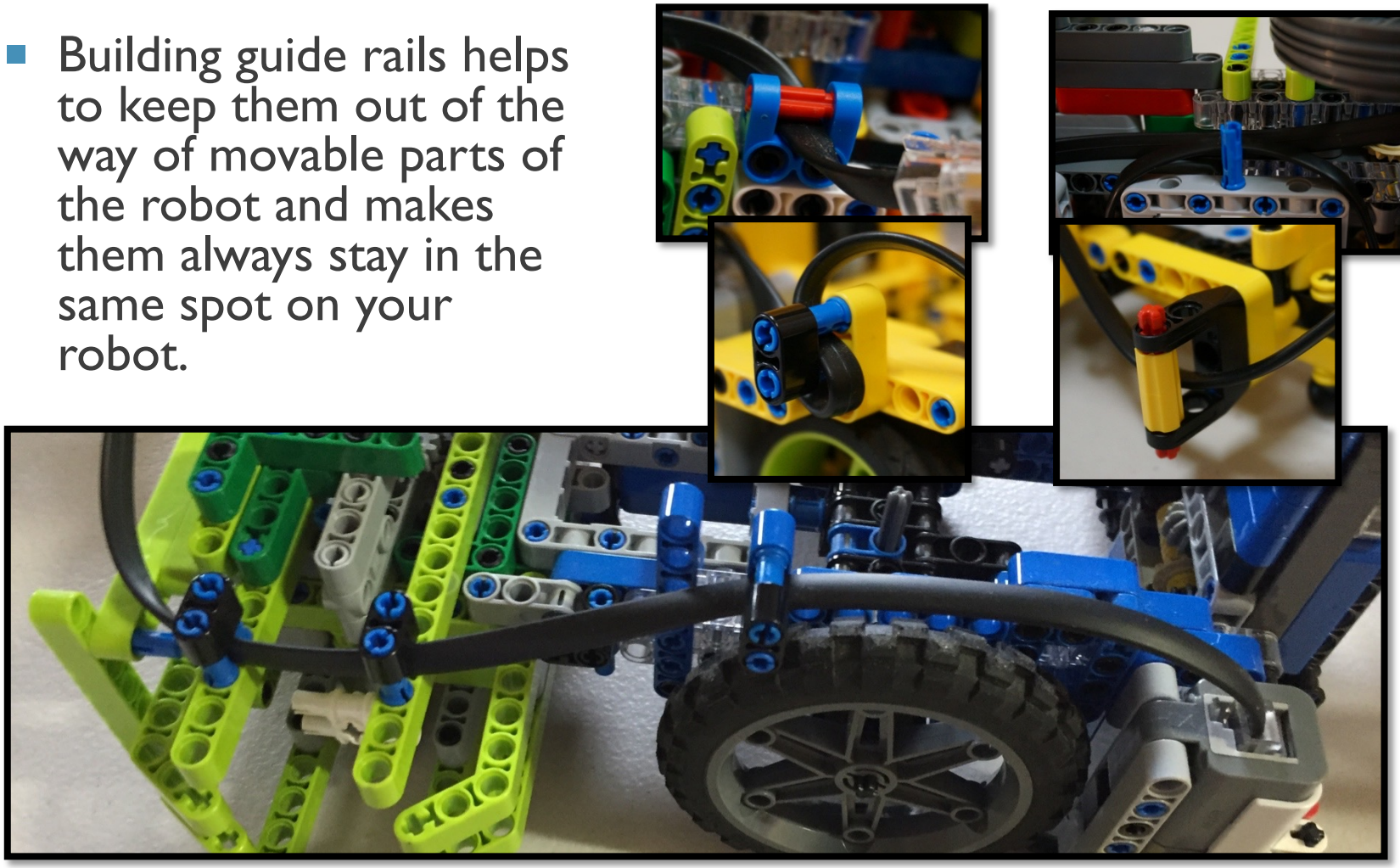
CABLE HOLDERS FOR BUNDLING

- Cable holders can identify what they are (use different colors for each sensor/motor)
- They can be used to keep multiple wires together (EV3 or SPIKE Prime)
- They can be used to attach the wire to a beam (see next page for examples)
- LEGO gear boxes can find a new use as cable holders. In the images, cables are fed through a gear box piece. They are spacious enough to hold multiple cables.



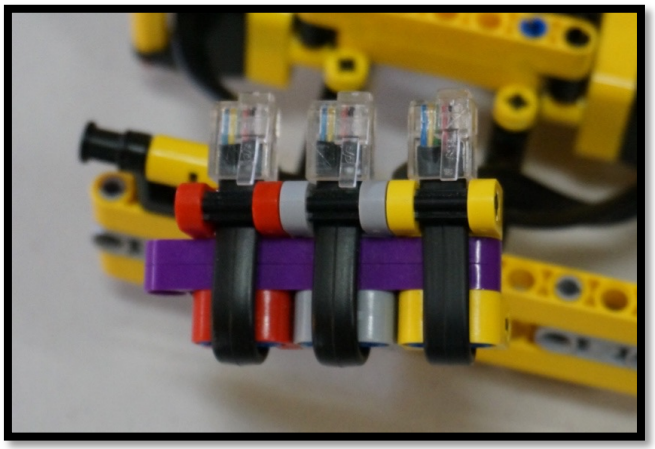
CABLE GUIDE RAILS

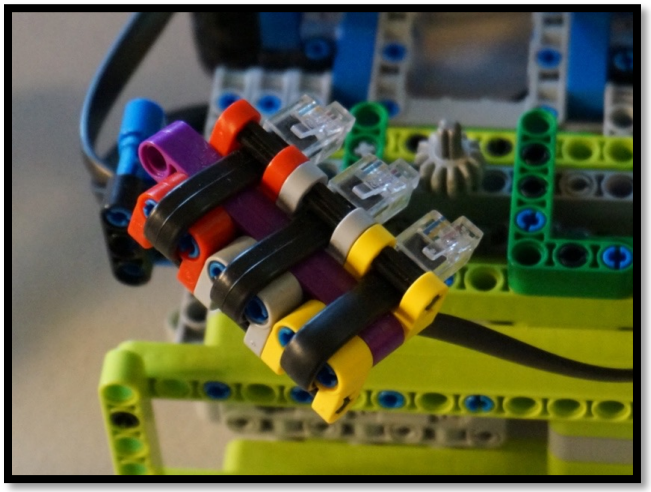
- Building guide rails helps to keep them out of the way of movable parts of the robot and makes them always stay in the same spot on your robot.



PLUG-IN GUIDES

- If you design a robot where you have to frequently change your motors/sensors out, you need a way to plug the cables in efficiently
- The technique in the image on the right keeps the spacing between the wires correct at all times and lets you install them all at the same time.
- Using different colors lets you color code which wire goes to which sensor or motor.





CREDITS

- This tutorial was created by Sanjay Seshan and Arvind Seshan
- Photos and ideas from FIRST Tech Challenge 8393 Giant Diencephalic BrainSTEM Robotics (Former FIRST LEGO League Team)
- More lessons at www.ev3lessons.com