

FIRST[®] LEGO[®] League ***TUTORIALS***



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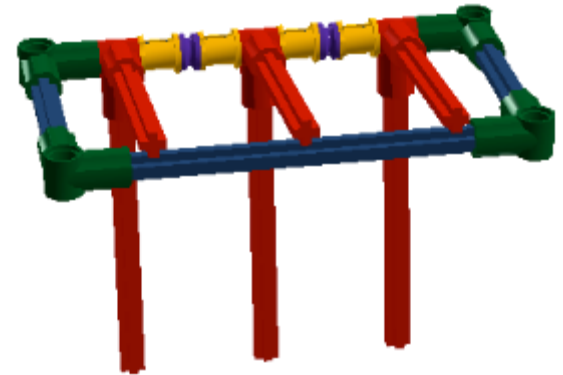
Introduction to Attachments

By Sanjay and Arvind Seshan

ROBOT DESIGN LESSON

WHAT IS AN ATTACHMENT?

- A mechanism you build that can assist your robot in accomplishing a task(e.g. pick up an object, drop off an object)
- This mechanism is “attached” to the base robot
- For a competition robot, the goal is to design attachments that work consistently every time you run the robot and also take up the least amount of time and space



PASSIVE VS. MOTORIZED

Passive vs. Motorized

- Passive attachments do not require any motor power
- Motorized attachments require a connection to a motor

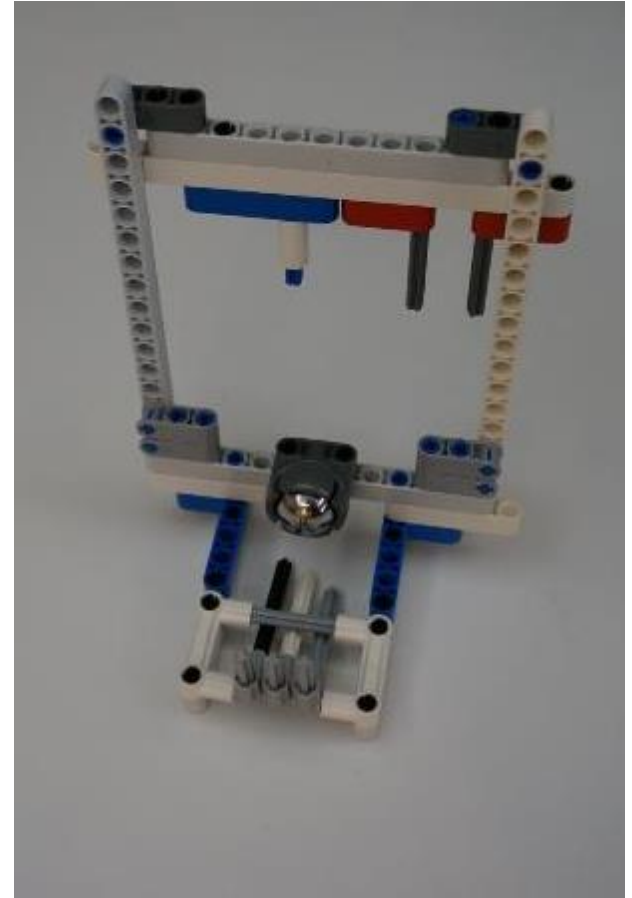
Power sources in MINDSTORMS

- Motors – can be control by software and reusable across many missions, but physically large
- Pneumatics – relatively powerful, but need to pump up in advance and be careful regarding pressure and leaks
- Rubber bands – compact and easy to use but can get lost/wear out over time
- Gravity – make things fall using gravity

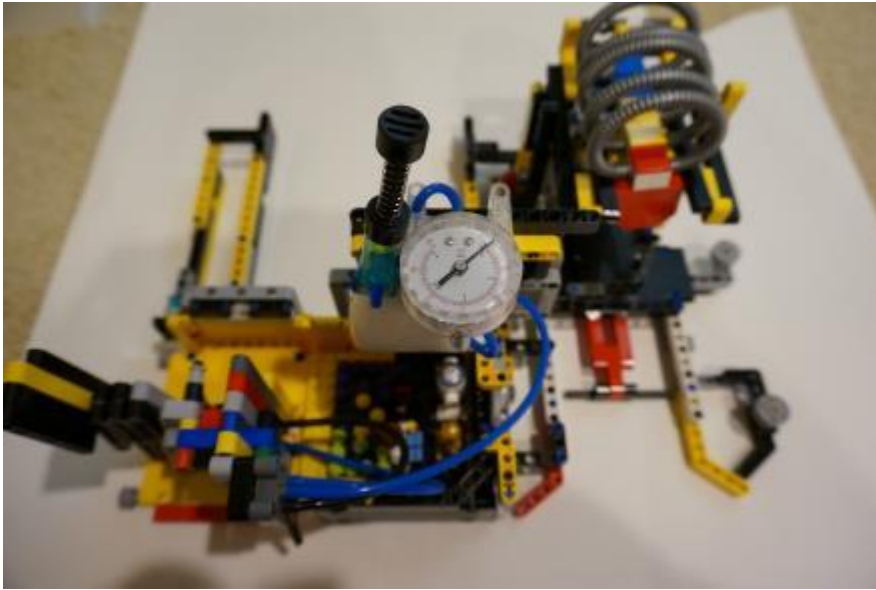


EASY ON AND OFF

- Create attachments that go on and off the robot easily
- In the image on the right, the attachments connect to the robot only using the three axels you see protruding off the top beam



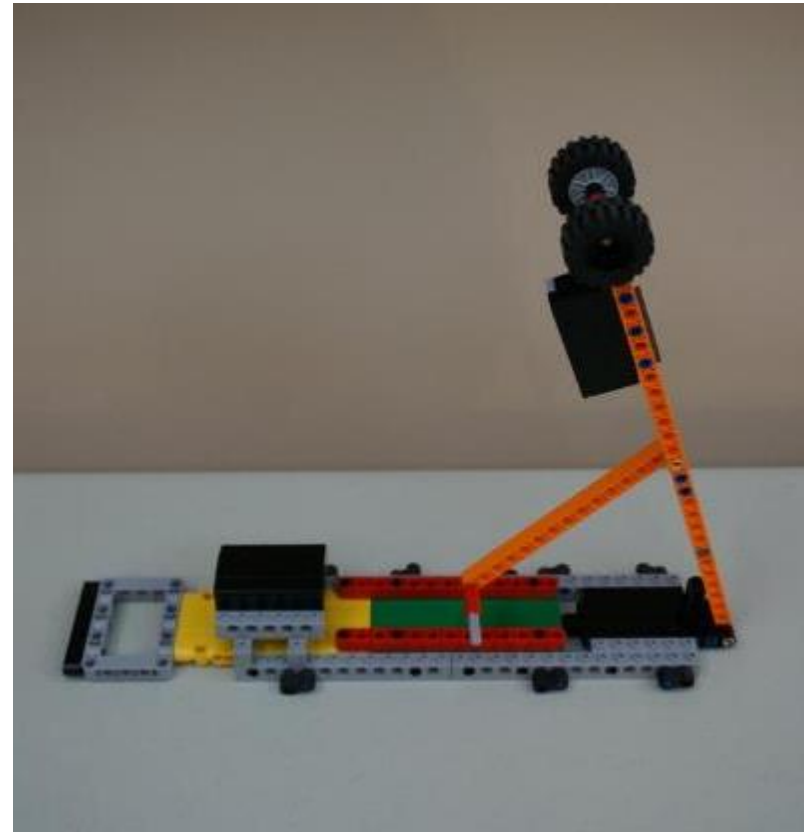
CREATE ATTACHMENTS THAT CAN DO MULTIPLE TASKS



- Instead of having to switch attachments, the same attachments can perform multiple tasks
- In the image on the left, the attachment hangs hoops and pushes a lever at the same time

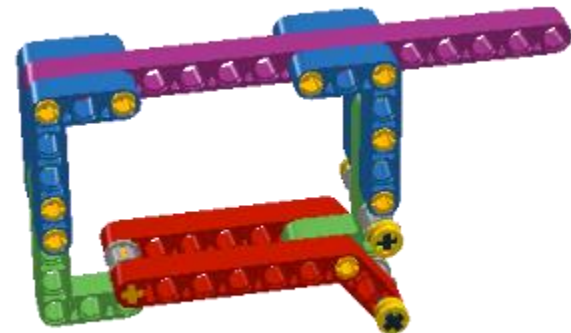
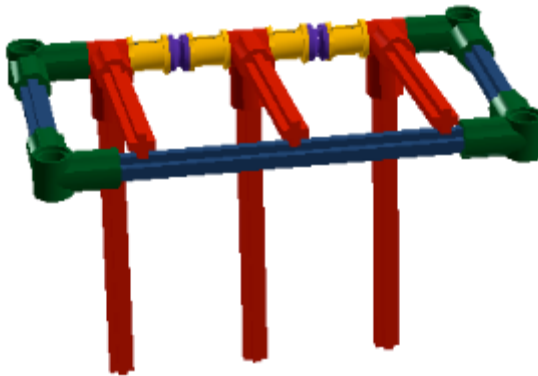
USE GRAVITY – IT'S FREE AND EASY

- Gravity can be your friend
- In the image on the right, the arm drops when the robot moves due to gravity



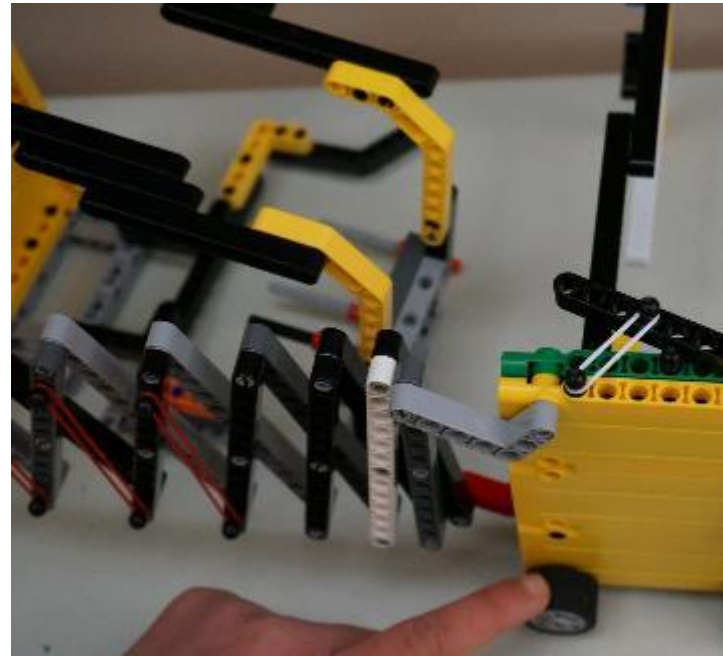
NO MOTOR, NO PROBLEM

- You don't always have to use a motor
- You can use numerous passive mechanisms from carabineers to one-way gates



RUBBER BANDS STORE ENERGY

- Rubber bands are a great way of storing energy
- They release quickly and can be used to lift up, pick up and even extend out



KEEP TRACK OF YOUR IDEAS

- Not all ideas will work. Some will get abandoned.
- Not all ideas will work the first time. Some will go through dozens of changes before the day of your competition.
- Keep a record of these ideas and trials in an Engineering Journal.

Engineering Journal
Date:
Team Member:
Today's Goal:

What worked well?

What didn't work so well?

What can you learn from this?

What are your next steps?

CREDITS

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



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