ROBOT DESIGN LESSON
DROID BOT

Building a Base Robot & Attachments

By Droids Robotics

Base Robot Design 101

- Take your time to build your base robot – try out multiple designs before you invest time in attachments (it might take a few weeks, but do not worry)

- Some issues to consider in your base robot design:
  1) What sensors do you need to add to accomplish your goals?
  2) Is your robot well balanced and have good traction?
  3) Can it align well by bumping into walls or mission models?
  4) Do the wheels stay in place and not flex out?
  5) Did you consider size restrictions: height limitations set by the rules, height limitations because of a mission models, width restrictions caused by the narrow openings?

As a result, you will notice that Droid Bot has the following features: balanced, outer wall, compact, uses parts in the base education kit + 1 additional color sensor

Powered and Passive Attachments

- Passive vs. Powered
  - Passive attachments are sometimes more reliable (KISS principle)
  - Powered attachments may be more complicated to attach
- Power sources
  - Pneumatics – relatively powerful, but need to pump up in advance and be careful regarding pressure and leaks
  - Rubberbands – compact and easy to use but can get lost/wear out over time
  - Motors – can control in software and reusable across many missions but physically large

Attachment Tips

- Reduce errors/time wasted by avoiding adding/removing attachments. Design attachments that can stay on for entire time.
  - See Droids Robotics Food Factor run on YouTube for example of very few additions across multiple runs
- Removing attachments may be easier, less error-prone than adding them
  - See Droids Robotics Senior Solution run on You Tube for example of removing most complex attachments, but not adding more
- Reduce space and complexity of attachments by building attachments that can work for multiple missions
  - See forklift attachment used in Droids Robotics Nature's Fury run (You Tube) for its use in multiple missions

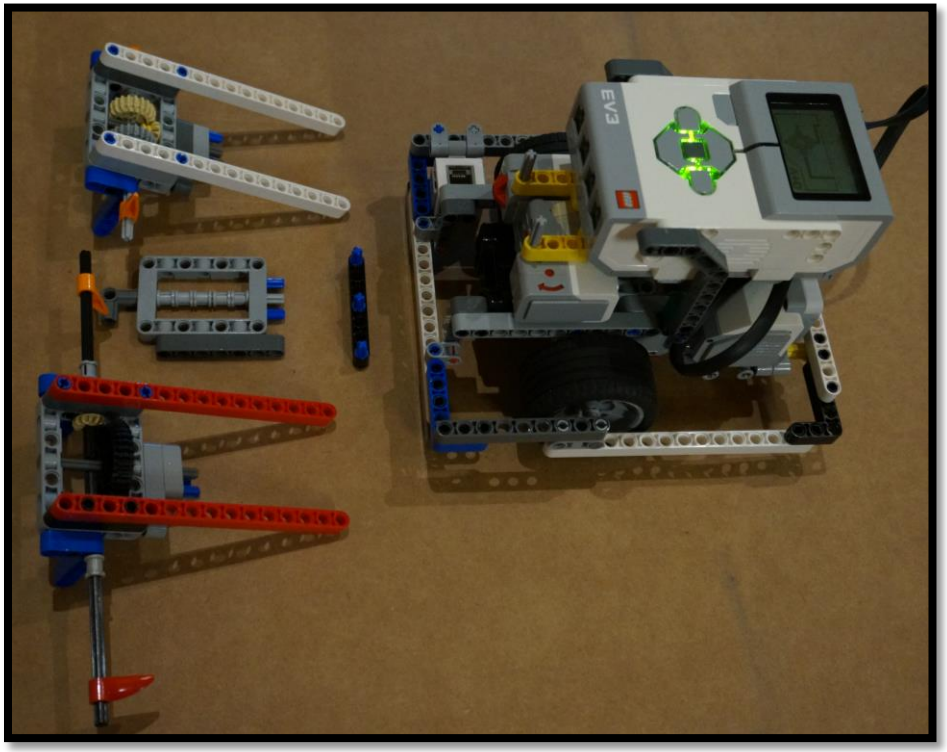
Attachment Tips Continued

- Use reliable and easy-to-add mechanisms to connect to motors/robot
  - Avoid hard to add/remove pins
  - Connecting directly to motor can be more reliable (avoids gear slip, etc.) but takes longer
  - Using gearing mechanisms to connect to motor can make it easy to add attachment but the connection may not be as reliable
- Use gears to deliver power to where you need it on the robot and in the direction that you need it
  - Look at various LEGO sets for inspiration on how to connect gears
  - Look at books by Isogawa to learn about gearing

S.N.A.P Attachments for Droid Bot

Some features to notice:

1. Swappable: Easy to put on and take off
2. No Problem: Strong, reliable connection to motor (hard to remove accidently)
3. Attachments with Power: Reliable gearing mechanisms to increase or decrease the power of the attachment
4. Gearing mechanisms to deliver power to either side of the robot



Credits

- This tutorial was created by Sanjay Seshan and Arvind Seshan from Droids Robotics.
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