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

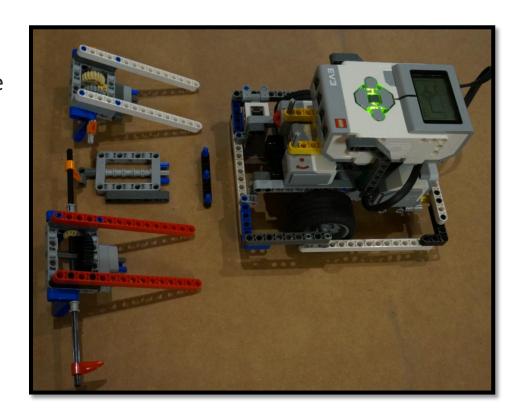
Attachment Tips Continued

- 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.
 - Author's Email: team@droidsrobotics.org
- More lessons at www.ev3lessons.com



This work is licensed under a <u>Creative Commons Attribution-</u> NonCommercial-ShareAlike 4.0 International License.