



# TECHNO TROJANS

FTC ROBOTS 101 WORKSHOP

Presented by Kris Cole

# Grants

- Make sure to check out the First in Michigan Grant site weekly
  - <https://firstinmichigan.us/FTC/grants/>

**FIRST** in Michigan | MIDDLE SCHOOL PROGRAM | **FIRST TECH CHALLENGE**

ABOUT EVENTS GET INVOLVED GRANTS RESOURCES CONTACT

## GRANTS

Amazing grants are available to *FIRST* in Michigan middle school *FIRST* Tech Challenge teams. The combination of the rookie team grants completely covers a new team's start up costs and puts money in the team's pocket!

Teams should carefully review grant eligibility requirements and application procedures. Participation in a sanctioned *FIRST* in Michigan event is a requirement of all grants.

### ROOKIE TEAMS

- + FIRST HQ FTC Rookie Team Grant - Open
- + FIRST in Michigan FTC Rookie Team Grant - Open
- + FIRST HQ FTC Jump Start Grant - Closed

### ALL TEAMS

- + PTC FIRST in Michigan Grant - Closed

### LINKS

- [PROGRAMS K-12](#)
- [STATE GRANT](#)
- [STEP BY STEP GUIDE](#)
- [FAQS](#)
- [SCECH LOG](#)
- [2019-20](#)
- [RECIPIENT LIST \(publics\)](#)

# Resources

- Many sites exist to help your team.
  - First in Michigan is a good one for all things from the game materials to logos and blogs
    - <http://firstinmichigan.us/FTC/resources/>
  - Other teams have sites with teaching videos for just about anything
- Make sure to read the manuals!
  - There is tons of information in the manuals
    - <https://www.firstinspires.org/resource-library/ftc/game-and-season-info>
- Many places will do a Robot in 3 days
  - One example is goBILDA which will be on for twitch TV for Monday - Wednesday
    - <https://www.gobilda.com/gobildatv>
  - These are great because they talk through the game and design ideas.

The screenshot shows the top navigation bar of the FIRST in Michigan website. The navigation bar includes the FIRST in Michigan logo, the Middle School Program logo, and the FIRST Tech Challenge logo. The navigation menu includes links for ABOUT, EVENTS, GET INVOLVED, GRANTS, RESOURCES, and CONTACT. The main heading of the page is "RESOURCES". Below the heading, there are several sections of resources, each with a plus sign icon to expand the list:

- TEAM COMMUNICATION**
  - + Team Eblasts
- EVENT PAPERWORK**
  - + Consent and Release Forms
  - + Team Roster
- HELPFUL LINKS**
  - + FIRST FTC HQ Resource Links
  - + FTC Community Provided Resources
- PARTS AND VENDORS**
  - + FTC Kit of Parts
  - + Android Devices
  - + Vendor Discount Codes
  - + Need More Parts?
- LOGOS**
  - + FIRST in Michigan and Sponsor Logos

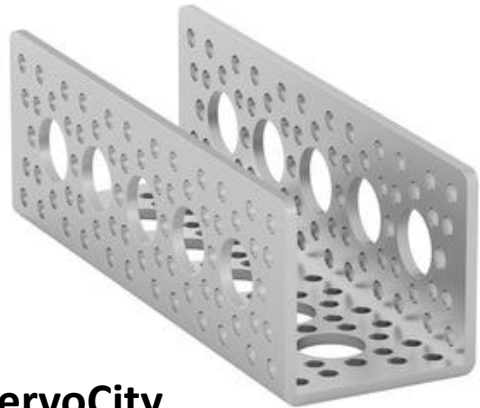
# Robot Parts

- Here are the main sites we shop from are:
  - [ServoCity](#) 25% discount for FTC
  - [Rev Robotics](#) 15% discount on select products
  - [goBILDA](#) 25% discount for FTC
  - [AndyMark](#)
  - [Pitsco](#)
- Things to pay attention to when ordering your parts
  - #1 Make sure they are legal – Most will tell you if it is FTC Legal.
  - Most everything is Metric now.
  - Many of the sites offer guides to how their hardware works together.

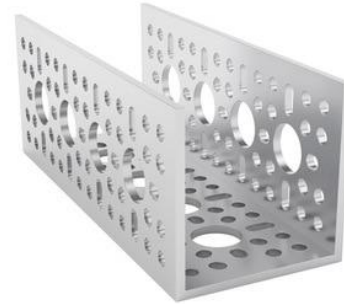
# Structure

- All the sites have their own type of structural systems with there pluses an minuses

## SAE



ServoCity  
Actobotics  
(Discontinued)



goBILDA



AndyMark

## Metric

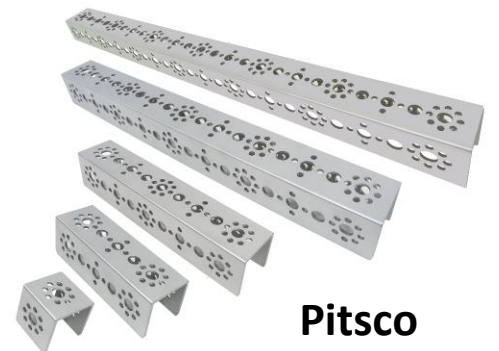


15mm Extrusion



Channel

Rev Robotics



Pitsco

# Motors and Gearboxes

<RE10> DC Motors – A maximum of eight (8) DC motors are allowed in any combination. The only allowed motors are:

- TETRIX 12V DC Motor
- AndyMark NeveRest series 12V DC Motors
- Modern Robotics/MATRIX 12V DC Motors
- REV Robotics HD Hex 12V DC Motor
- REV Robotics Core Hex 12V DC Motor

No other DC motors are allowed.



- Be careful. You may only use the motors shown in Game Manual 1
- Most come with a gearbox attached but you can buy them separate
- The only rule for Gearboxes is they must be single speed



# Motors and Gearboxes

- Most drivelines use 20:1 gear ratio
- 3 types – Planetary, Spur Gear and 90deg
  - The planetary is better for high torque
  - The Spur Gear is better for space
  - The 90deg is great for close spaces
- The Rev Ultraplanetary Gearbox kit allows unlimited gear ratios



HD Hex Motor 20:1, Planetary / REV-41-1211

HD Hex Motor - No Gearbox / REV-41-1291



HD Hex Motor 40:1, Spur / REV-41-1301

HD Hex Motor 20:1, Spur / REV-41-1298

# Servos

- There is an endless supply of servos with a wide variety of capabilities
  - Continuous rotation
  - 180deg rotation
  - High torque
  - High speed
  - Programmable
- We like the Rev Smart Robot servos and the goBilda servos because it will work in almost all our applications. It can be either continuous or set for any angle with the programmer.
- Limited to a max of 12 servos





# Driveline

- Most common driveline types are 4-6 wheels, tank tread and mecanum

- Simple and easy to build/program
- Harder to maneuver accurately

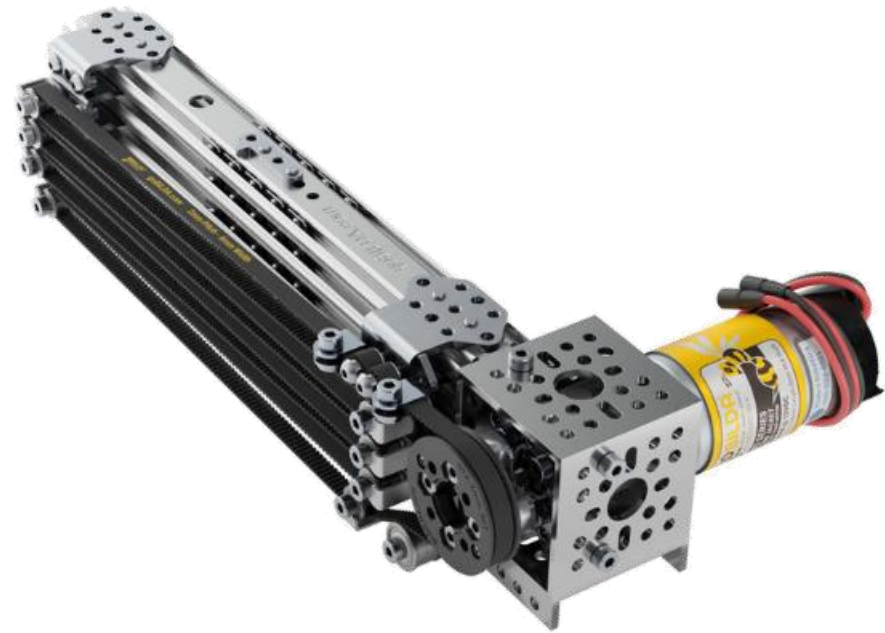
- Great for multiple terrains and climbing over objects
- Requires CG to be in the middle

- Most maneuverable
- Allows movement in all directions
- Requires CG to be in the middle



# Linear Arms

- We recommend goBilda version.
  - They have multiple extension lengths available
  - They are the most reliable we have used.



# Customize

- Design 3d printed parts
  - [www.solidworks.com/product/students/first-robotics-students](http://www.solidworks.com/product/students/first-robotics-students)
  - <https://wiki.bambulab.com/en/general/filament-guide-material-table>
  - [www.thingiverse.com](http://www.thingiverse.com)
- Modify existing things
- Have fun with lighting



# Next Level Items to Consider

## Basic Sensors



Color



Distance



Touch

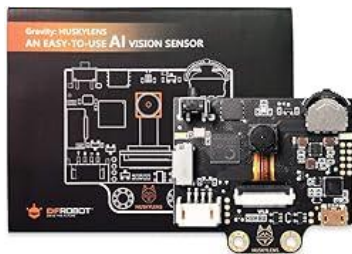


Magnetic  
Limit Switch

## Cameras



Webcam



Husky Lens



LED Controller



Odometry  
Module

Questions?