Choosing the Right Drive System

An Introduction to Drive Systems

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Drive Systems Selection

A Quick Overview

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Purpose of a Drive Systems

Put Simply, it should:

- Move around the field
- Push/Pull important game objects
- Climb ramps, move over/around obstacles
- Must be durable and reliable
- Your speed, agility, and reliability are critical for success.

It's the most important sub-system- you need to move to score your points!

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The Types of Wheels

Traction Wheels
- The standard wheel, comes with most robotics kits.

Omni Wheels
- Rollers perpendicular to rotation of the wheel
- Allows omni-directional motion

Mecanum Wheels
- Rollers attached 45° to axis of wheel rotation
- Also allows for omni-directional motion

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Tank Drive

Key Features:
- Left and right wheels are driven independently
- Could 4, 6, or more wheels with 2 or 4 motors using either traction or omni wheels.
- Cheap & simple to design, build, drive, and program.
- Higher speed, and pushing force
- Slightly less agile than other drivetrains

**Is fast and easy to build, so it's perfect for first year teams!**

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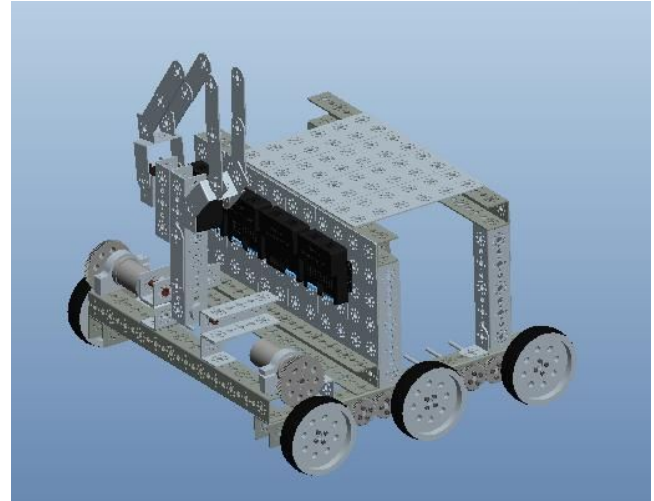
Mecanum Drive

Key Features:

- Similar layout to the tank drive, but requires each wheel to be driven independently
- Must use 4 mecanum wheels and motors
- Fairly easy to design and build
- Agile, but **expensive** to build
- Challenging to program and learn to drive well

While it is slightly more difficult and expensive to build, its increased agility might pay off.

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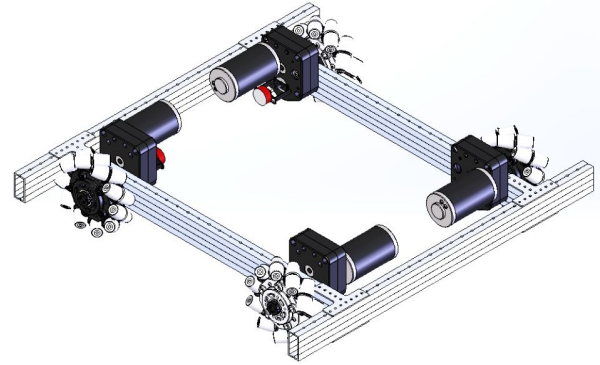
X or Holonomic Drive

Key Features:
- 4 omni wheels positioned at 45° angles in the corners of the frame
- Each wheel must be independently driven
- Nearly just as agile as mecanum drive
- Nearly no pushing force
- Very challenging to program and learn to drive well

Overall, X drive is a cheaper alternative to the mecanum drive, with similar capabilities
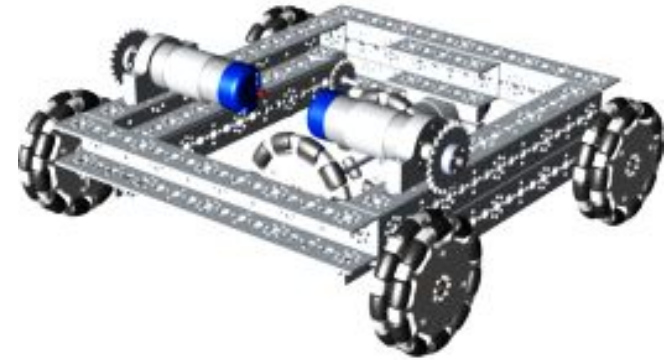
Slide Drive

Key Features:

- Similar layout to the tank drive, just with an extra wheel.
- Must use all omni wheels
- Agile, but barely any pushing force
- Nearly no pushing force
- Extra wheel(s), motor(s), and gearbox(es) required for sideways motion

Similar capabilities to holonomic and mecanum drives, but less challenging to program.

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Swerve/Crab Drive

Key Features:
- Wheel modules rotate around vertical axis to control direction
- Typically consisting of 4 tracking wheels
- Potential for high speed/pushing force
- Highly agile
- Extremely complex and expensive to design, build, and program
- Extra motors required for rotation of robot frame

Extremely agile, but also extremely expensive and complicated to build.

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Weighted Objectives Tables

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- Give each attribute of each drivetrain a relative score between 1 and 5

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- Weights are dependant on
  - Strategic analysis of the game (priority list)
  - Teams resources

Weighted Objectives Tables

Criteria	Weight	Tank	Swerve	Slide	Mecanum	X
Agility						
Strength						
Climb						
Motors						
Program						
Design						
Total						

Weighted Objectives Tables

Criteria	Weight	Tank	Swerve	Slide	Mecanum	X
Agility		3	5	5	5	5
Strength		5	4	1	3	2
Climb		5	3	3	3	3
Motors		5	1	3	5	5
Program		5	1	3	2	3
Design		5	1	3	3	3
Total						

Questions?

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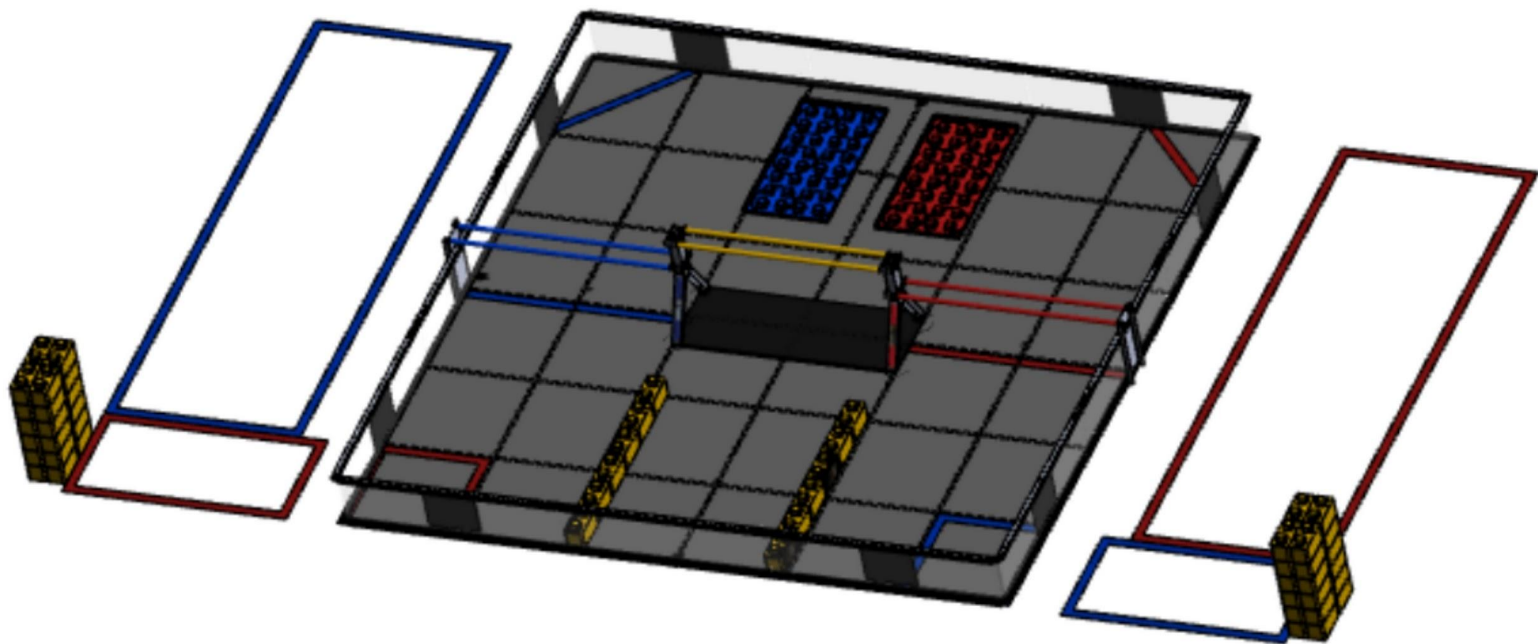
Upcoming Events in Victoria

Sept. 28:

The Royal BC Museum - STEM Symbiosis

Free Hands-on STEM Fair

Victoria Conference Centre - Start UP Slam

Free Tech Showcase

Oct. 2:

Women in Engineering and Computer Science Event

from 4:30 to 8:30- http://tinyurl.com/uvic-engineering

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Assembling a Robot in CAD
Oct. 4   4:30 - 6:00

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