



# CHAIN DRIVETRAIN BUILD GUIDE

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Revision History		
Revision	Date	Description
1	08/11/2017	Initial Release
2	08/28/2018	Updated to reflect changes in 2018/19 FTC Kit Contents

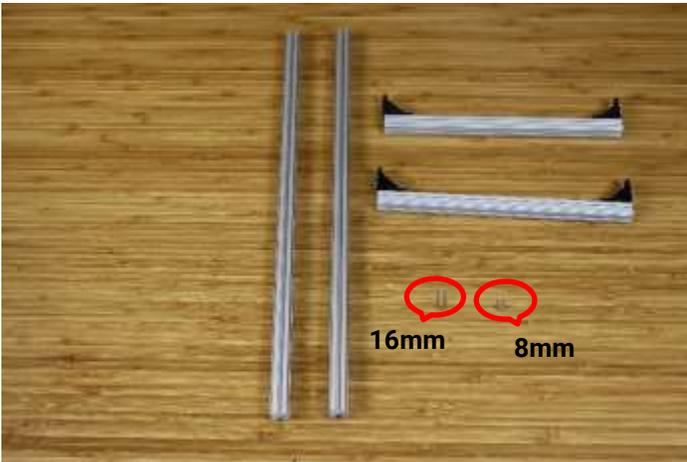
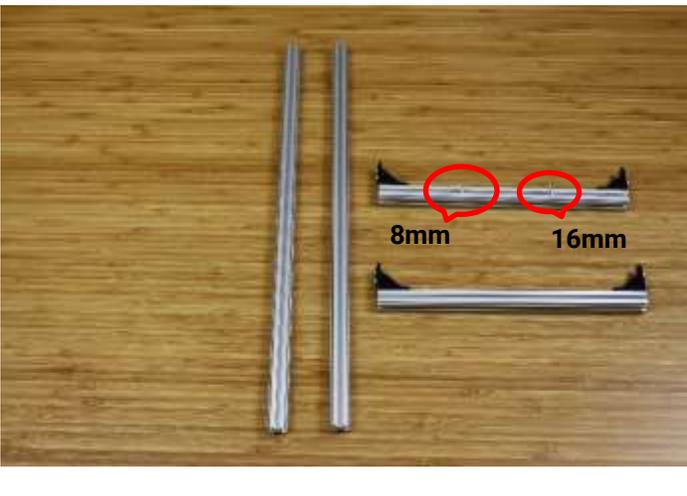
# 1 DESCRIPTION

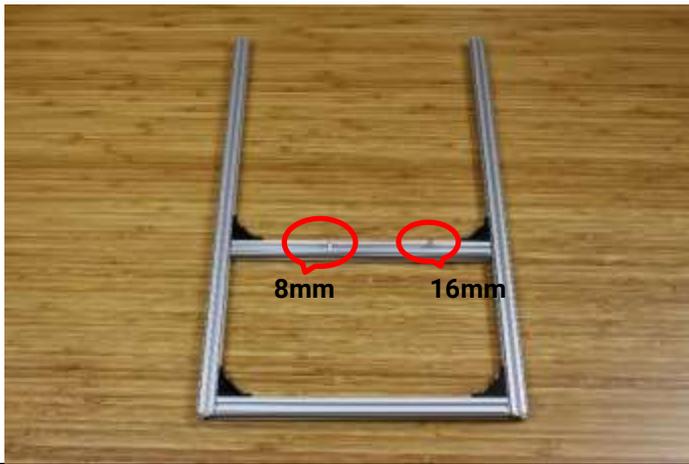
This document outlines the steps required to four-wheel, chain-based drivetrain. This design should be treated a starting point and will require modification in order to address the specific needs of the robot being designed. It should be noted for best performance the center of gravity should be biased towards the Traction wheels to ensure the robot rotates about the axis at the midpoint between the Traction wheels.

## 1.1 BILL OF MATERIALS

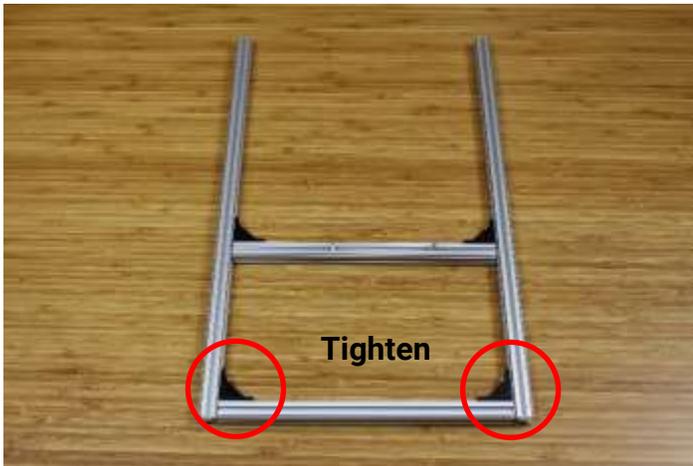
<b>PART NUMBER</b>	<b>DESCRIPTION</b>	<b>QTY.</b>
REV-41-1432	15mm REV Extrusion, 420mm length	6
REV-41-1431	15mm REV Extrusion, 225mm length	4
REV-41-1321	15mm Plastic Lap Corner Bracket	16
REV-41-1360	M3 x 16mm Hex Cap Screws	3
REV-41-1359	M3 x 8mm Hex Cap Screws	132
REV-41-1361	M3 Nyloc Nut	124
REV-41-1320	15mm Plastic Inside Corner Bracket	8
REV-41-1301	HD Hex Motor, 40:1 Gearbox	2
REV-41-1317	15mm Bearing Pillow Block	8
REV-41-1347	5mm Hex Shaft, 75mm length	4
REV-41-1487	Bent Metal Bracket, HD Hex Motor	2
REV-41-1340	20 Tooth Sprocket	4
REV-41-1323	15mm Spacer	2
REV-41-1354	90mm Traction Wheel	2
REV-41-1327	Shaft Collar	6
REV-41-1190	90mm Omni Wheel	2
REV-41-1339	15 Tooth Sprocket	4
REV-41-1322	End Cap Bearing	4
REV-41-1329	Through Bore Bearing - Long	4
REV-41-1166	Battery Holder Plate	1
REV-31-1153 or REV-31-1595	REV Expansion Hub or REV Control Hub	1
REV-41-1365	#25 Chain, 10ft length	1
REV-41-1366	#25 Chain Master Link	1

# 2 BUILD INSTRUCTIONS

	<p>Collect Parts:</p> <ul style="list-style-type: none"><li>• 2x 420MM REV EXTRUSION</li><li>• 2x 225MM REV EXTRUSION</li><li>• 4x 15MM PLASTIC INSIDE CORNER<ul style="list-style-type: none"><li>◦ Pre-load with 8MM HEX CAP SCREWS and NYLOC NUT</li></ul></li><li>• 1x 8MM HEX CAP SCREWS</li><li>• 1x 16MM HEX CAP SCREWS</li></ul>
	<p>Slide 15MM PLASTIC INSIDE CORNER on the ends of 225MM REV EXTRUSION such that the brackets and Extrusion are flush.</p> <p>Tighten nuts.</p>
	<p>Slide 8MM HEX CAP SCREWS and 16MM HEX CAP SCREWS on to the one of the 225MM REV EXTRUSION assemblies. Ensure 16MM HEX CAP SCREWS is to the right of 8MM HEX CAP SCREWS when the brackets are pointing away from the user.</p>



Slide the 420MM REV EXTRUSION pieces onto the 225MM REV EXTRUSION assemblies.



Make the ends of 420MM REV EXTRUSION flush with the lower 225MM REV EXTRUSION assembly. Tighten only the bottom corners.



Collect Parts:

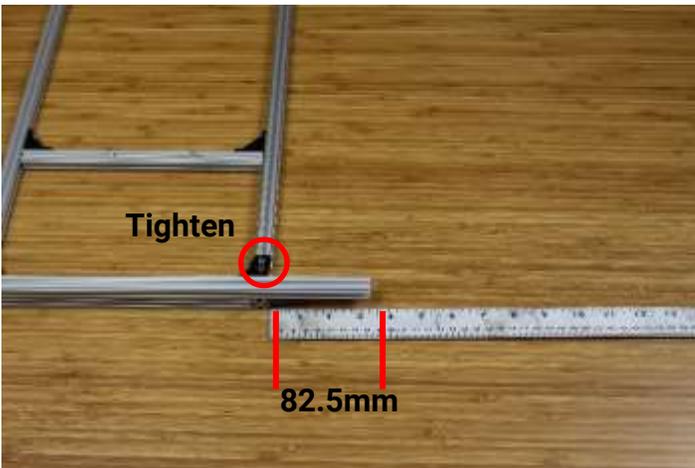
- 1x 420MM REV EXTRUSION
- 4x 15MM PLASTIC LAP CORNER
  - Pre-load with 8MM HEX CAP SCREWS and NYLOC NUT



Place 15MM PLASTIC LAP CORNER brackets as shown. Leave screw loose.

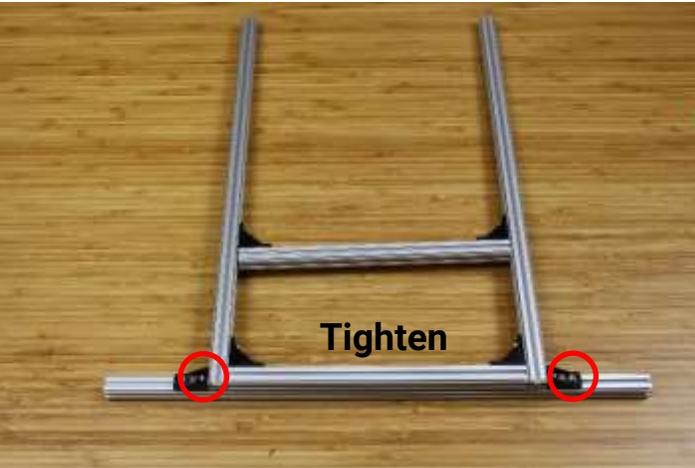


Slide 420MM REV EXTRUSION onto 15MM PLASTIC LAP CORNER brackets.



Measure 82.5mm(3.248in) from the outside edge of top 420MM REV EXTRUSION to the vertical 420MM REV EXTRUSION. This will center the top 420MM REV EXTRUSION to frame.

Tighten 15MM PLASTIC LAP CORNER bracket nuts.



Flip and tighten 15MM PLASTIC LAP CORNER bracket nuts.



Collect Parts:

- 2x 420MM REV EXTRUSION
- 4x 15MM PLASTIC LAP CORNER
  - Pre-load with 8MM HEX CAP SCREWS and NYLOC NUT
  - Don't load a NYLOC NUT in the center hole, but still put in a screw.



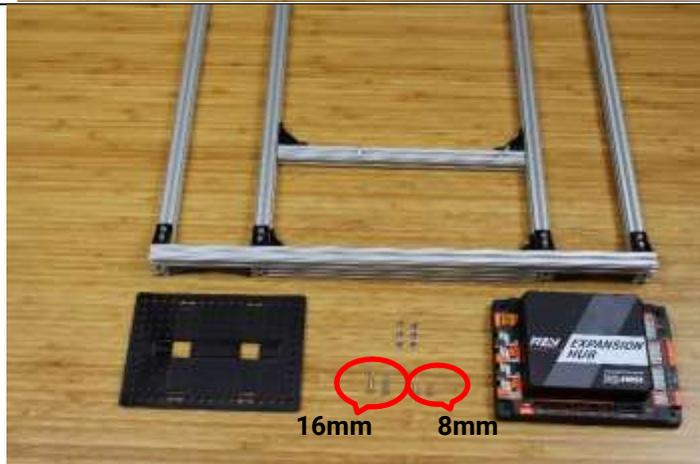
Place 15MM PLASTIC LAP CORNER brackets as shown. Leave screw loose.



Slide 420MM REV EXTRUSION onto 15MM PLASTIC LAP CORNER brackets so that corners are flush.

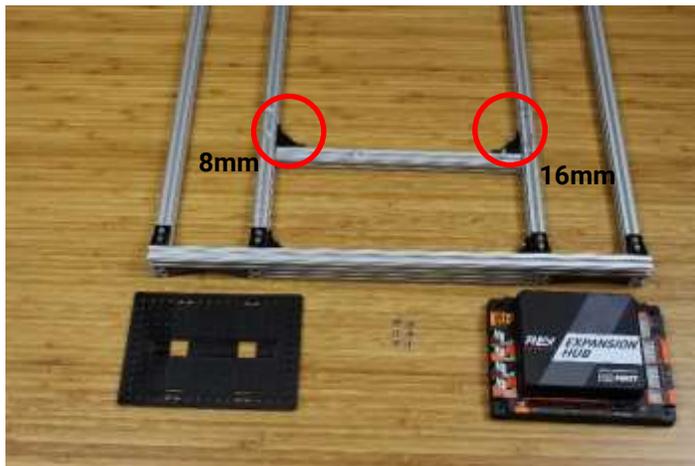


Flip over and tighten nuts.

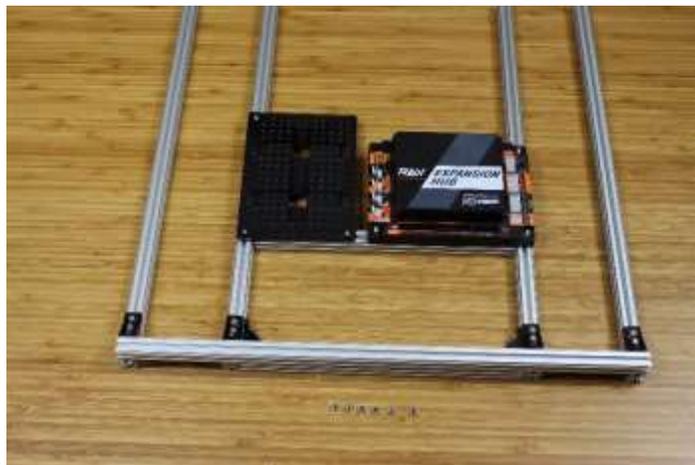


Collect Parts:

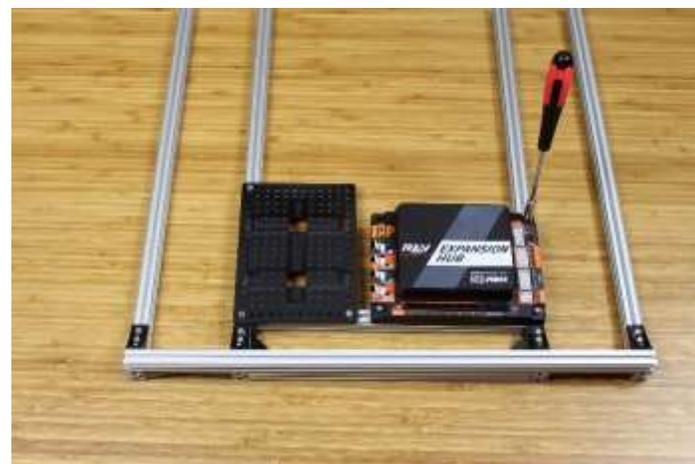
- 1x BATTERY HOLDER PLATE
- 1x REV ROBOTICS EXPANSION HUB or REV ROBOTICS CONTROL HUB
- 2x 8MM HEX CAP SCREWS
- 2x 16MM HEX CAP SCREWS
- 6x NYLOC NUT



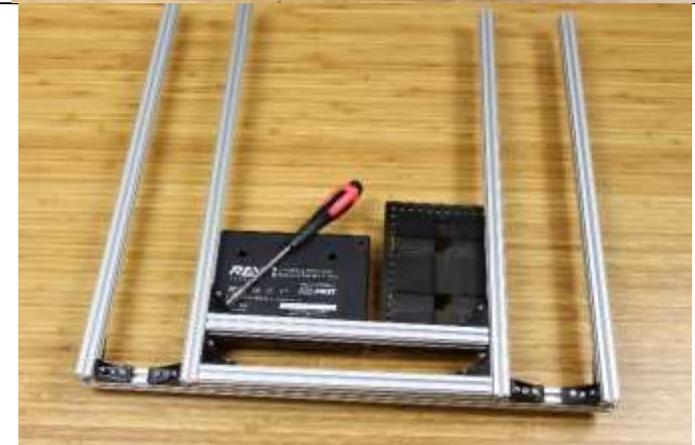
Slide 8MM HEX CAP SCREWS and 16MM HEX CAP SCREWS onto the side with their same size screw.



Place the REV ROBOTICS EXPANSION HUB or REV ROBOTICS CONTROL HUB and BATTERY HOLDER PLATE on as shown.



Add NYLOC NUT and tighten down the REV EXPANSION HUB or CONTROL HUB and BATTERY HOLDER PLATE so they are touching the 15MM PLASTIC LAP CORNER brackets.

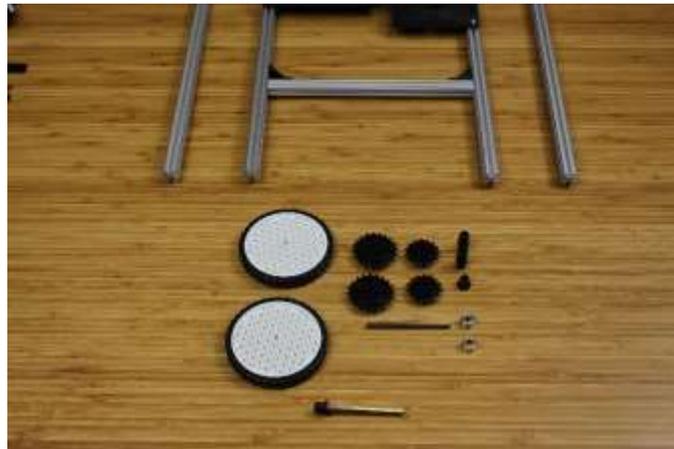


Flip over and tighten 15MM PLASTIC INSIDE CORNER brackets.

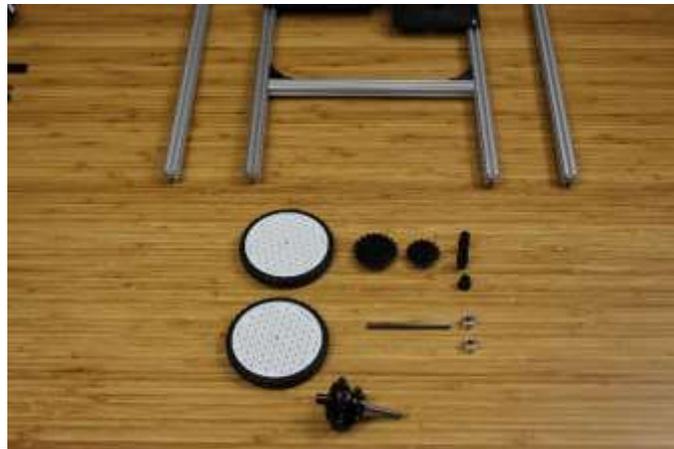


Collect Parts:

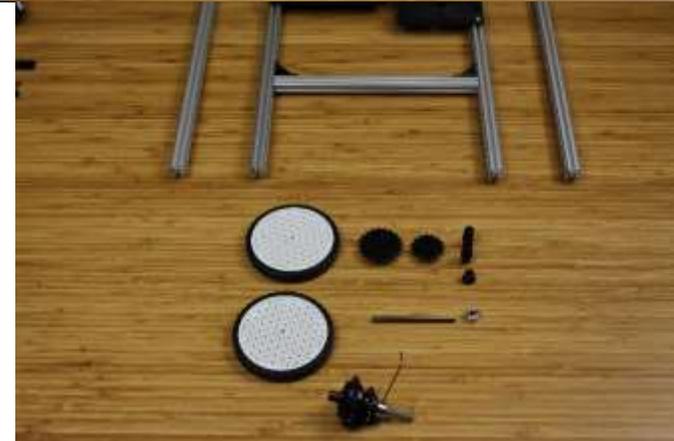
- 2x 90MM TRACTION WHEEL
- 2x 20 TOOTH SPROCKET
- 2x 15 TOOTH SPROCKET
- 2x END CAP BEARING
- 2x THROUGH BORE BEARING - LONG
- 2x 75MM HEX SHAFT
- 2x SHAFT COLLAR



Slide THROUGH BORE BEARING - LONG so that it is flush with the end of 75MM HEX SHAFT.



Add the 20 TOOTH SPROCKET and 15 TOOTH SPROCKET to the axle.



Add Shaft Collar and tighten.



Add 90MM TRACTION WHEEL traction wheel and END CAP BEARING end cap bearing to the end of shaft, completing one traction wheel assembly.

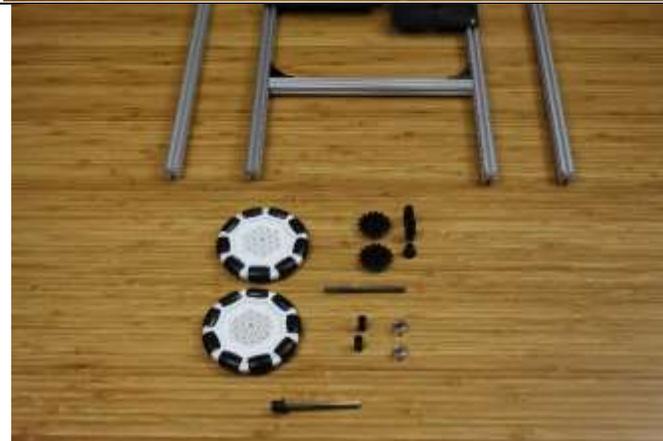


Repeat previous steps to make one additional traction wheel assembly and set aside.

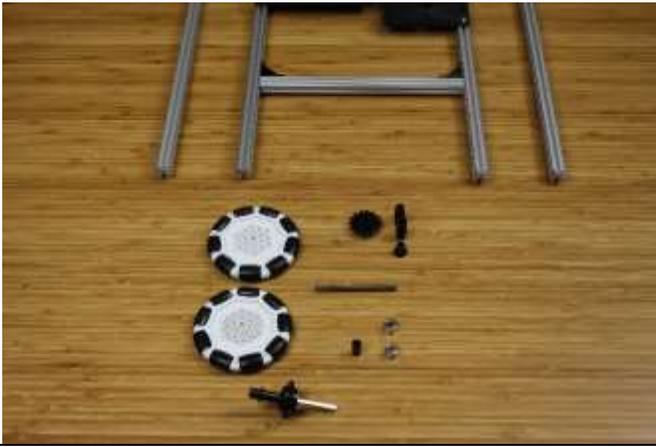


Collect Parts:

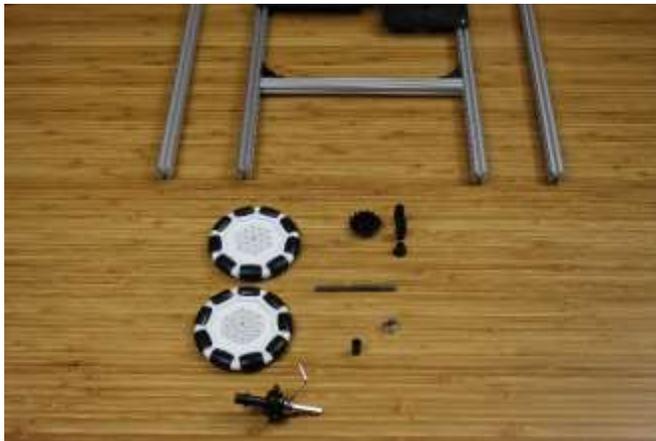
- 2x 90MM OMNI WHEEL
- 2x 15 TOOTH SPROCKET
- 2x END CAP BEARING
- 2x THROUGH BORE BEARING - LONG
- 2x 75MM HEX SHAFT
- 2x SHAFT COLLAR
- 2x 15MM SPACER



Slide THROUGH BORE BEARING - LONG so that it is flush with the end of 75MM HEX SHAFT.



Add 15MM SPACER and a 15 TOOTH SPROCKET.



Add Shaft Collar and tighten.



Add 90MM OMNI WHEEL Omni-wheel and END CAP BEARING to the end of shaft. Completing one omni wheel assembly.



Repeat previous steps to make two omni wheel assemblies and then set aside.

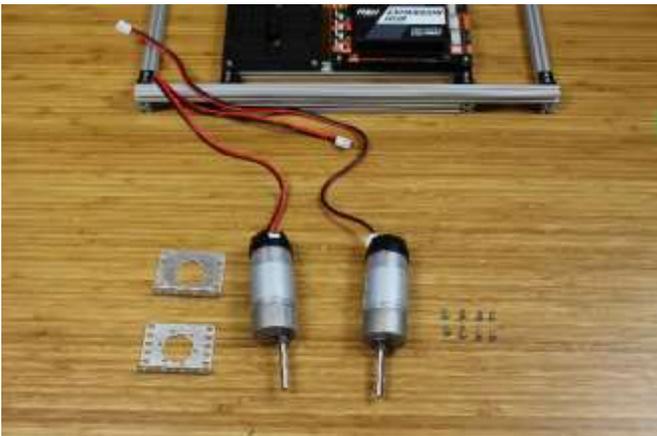


**Collect Parts:**

- 2x Traction Wheel assemblies
- 4x 15MM BEARING PILLOW BLOCK
  - Pre-load with 8MM HEX CAP SCREWS and NYLOC NUT



Slide Traction Wheel assemblies with 15MM BEARING PILLOW BLOCK onto frame.

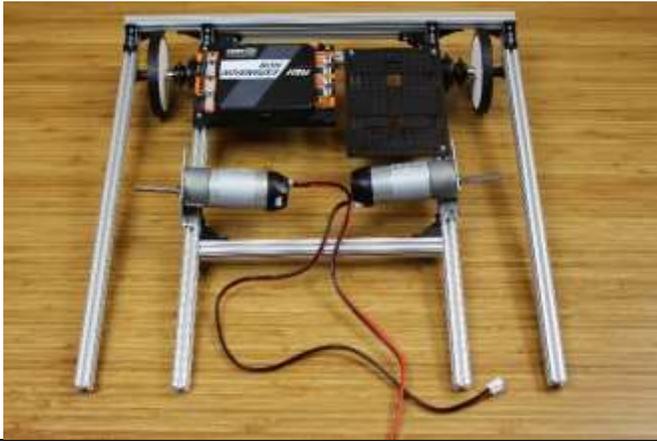


**Collect Parts:**

- 2x HD Hex Motor, 40:1 Gearbox
- 2x Metal Bracket, HD Hex Motor
  - Pre-load with 8MM HEX CAP SCREWS and NYLOC NUT
- 8x 8MM HEX CAP SCREWS



Use 8MM HEX CAP SCREWS to mount HD Hex Motor, 40:1 Gearbox to Bent HD Hex Motor Metal Bracket as shown.



Slide Bent HD Motor Metal Brackets onto the frame.



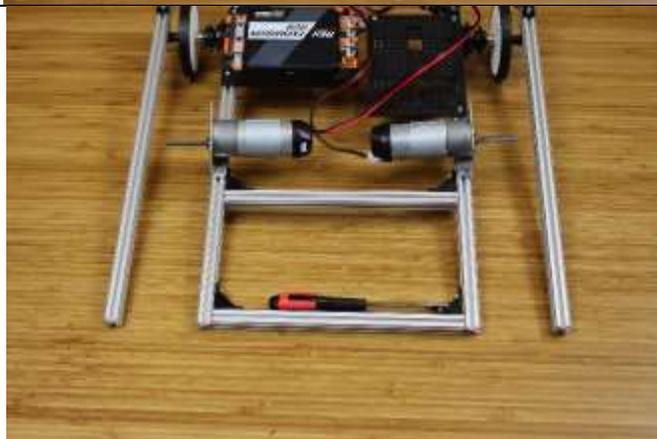
Collect Parts:

- 2x 225MM REV EXTRUSION
- 4x 15MM PLASTIC INSIDE CORNER
  - Pre-load with 8MM HEX CAP SCREWS and NYLOC NUT
- 1x 8MM HEX CAP SCREWS

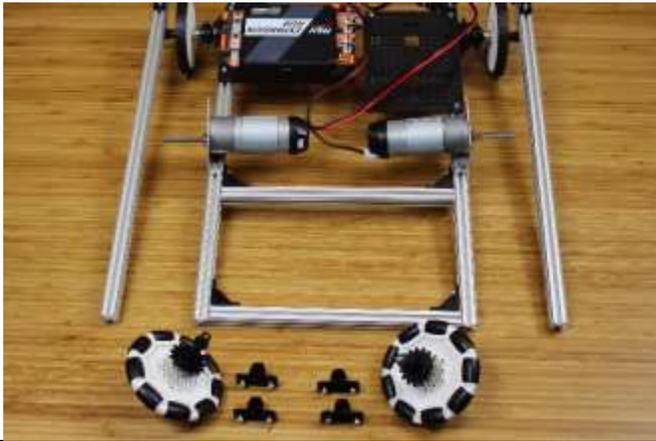


Slide 15MM PLASTIC INSIDE CORNER on the ends of 225MM REV EXTRUSION such that the brackets and Extrusion are flush.

Tighten nuts.



Slide 8MM HEX CAP SCREWS onto the one of the 225MM REV EXTRUSION assemblies and tighten.

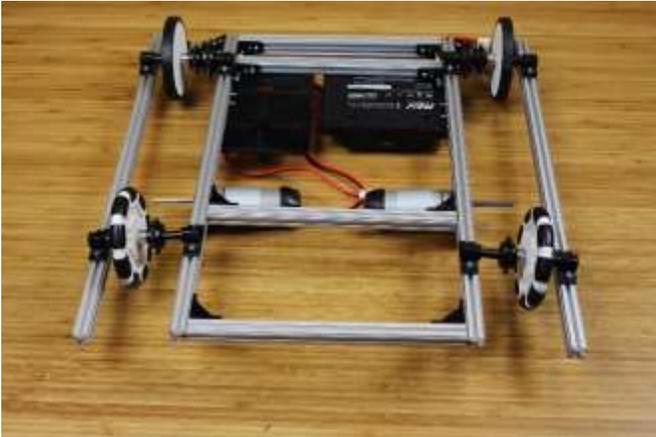


Slide on 225MM REV EXTRUSION assemblies such that front set is flush. Tighten only the front set of 15MM PLASTIC INSIDE CORNER brackets.

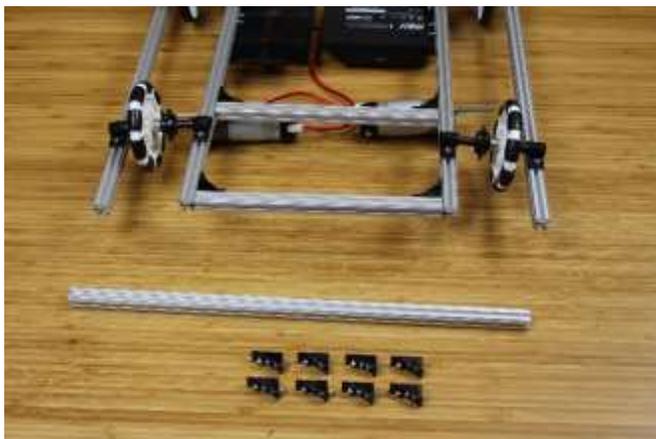
Collect Parts:

2x Omni wheel assemblies

4x 15mm Bearing Pillow Block and preload with 8MM HEX CAP SCREWS and NYLOC NUTS



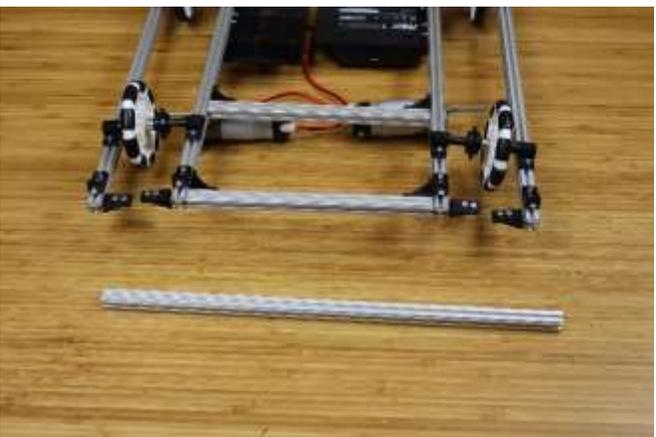
Turn robot over and slide omni wheel assemblies onto robot frame loosely.



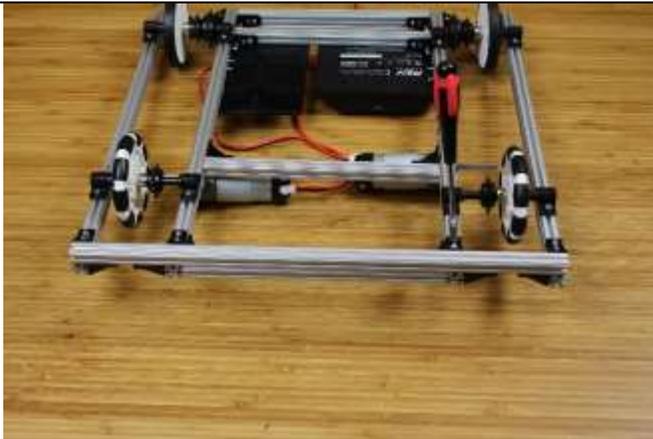
Collect Parts:

1x 420mm REV Extrusion

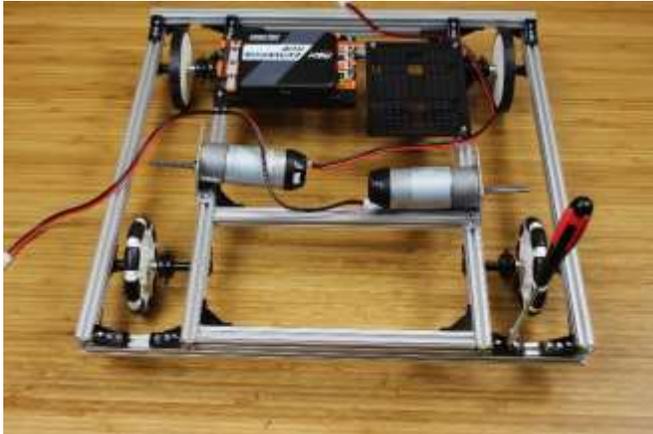
8x 15MM PLASTIC LAP CORNER BRACKET and preload with 8MM HEX CAP SCREWS and NYLOC NUTS



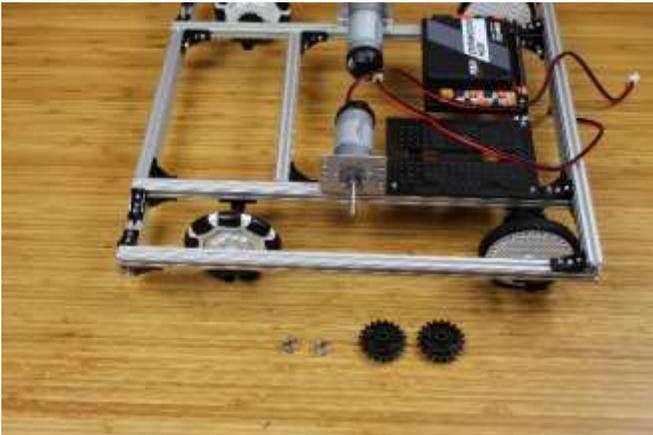
Slide 15MM PLASTIC LAP CORNER BRACKETS into extrusion as shown.



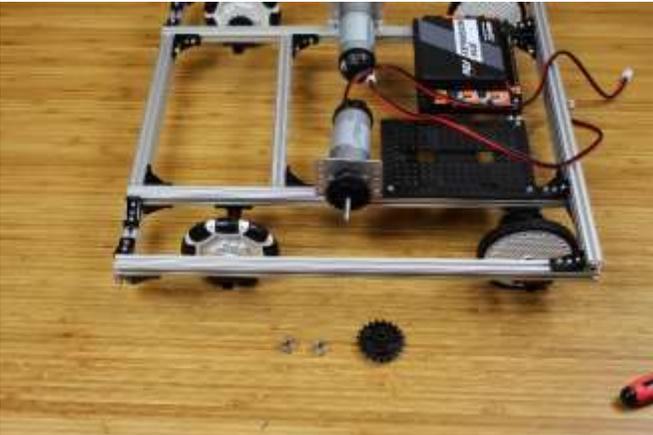
Slide 420MM REV EXTRUSION on 15MM PLASTIC LAP CORNER BRACKETS and make extrusion flush with the end as shown and then tighten the brackets.



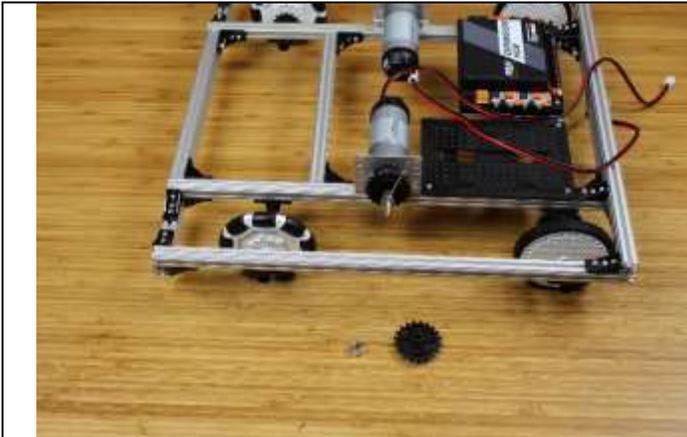
Flip robot over and tighten brackets.



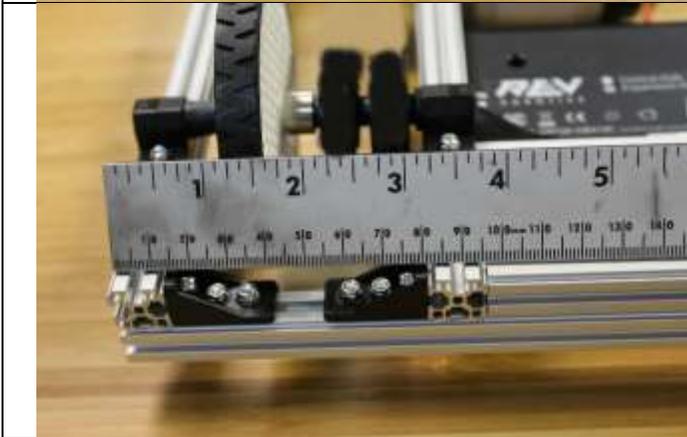
Collect Parts:  
2x 20 TOOTH SPROCKETS  
2X SHAFT COLLARS



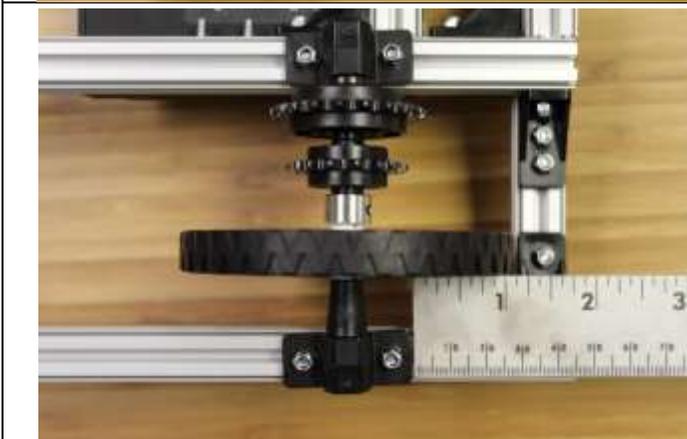
Place 20 TOOTH SPROCKET onto motor assembly.



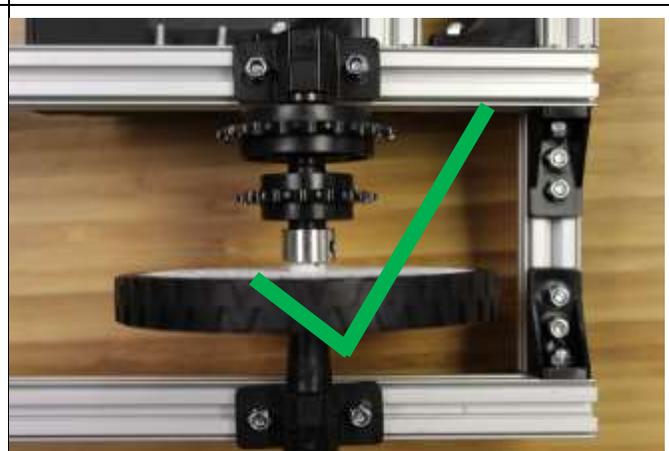
Slide SHAFT COLLAR onto shaft and tighten as shown. Next, turn robot around and repeat for other side.

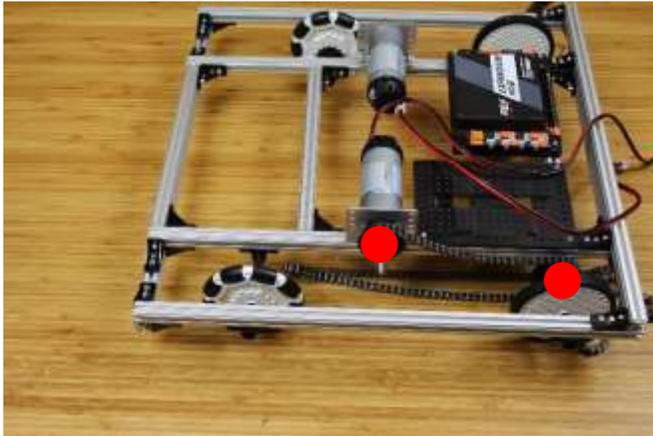


Before measuring correct chain length, make sure drivetrain is square and 95mm apart on all 4 sides.

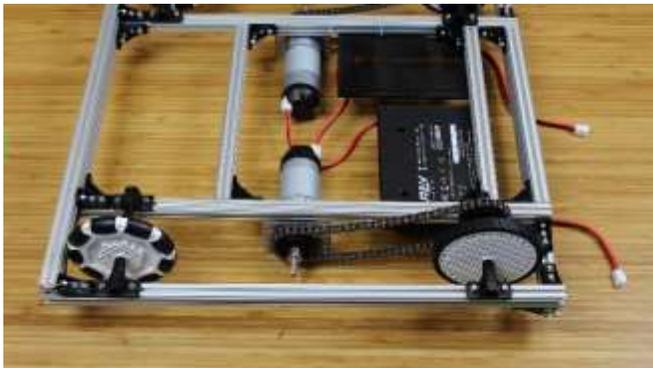


Slide Traction Wheel until it is 45mm from the end  
Make sure wheel is straight (See Photos Below)

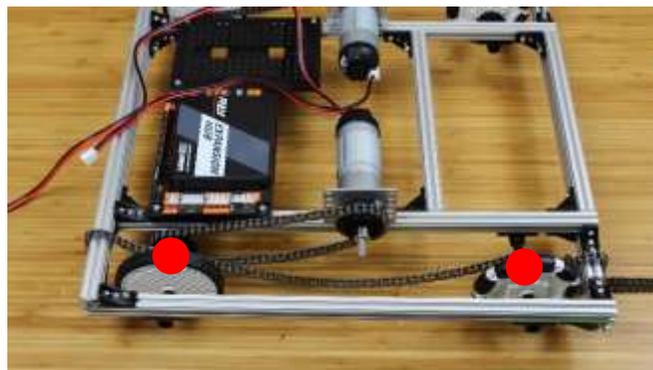




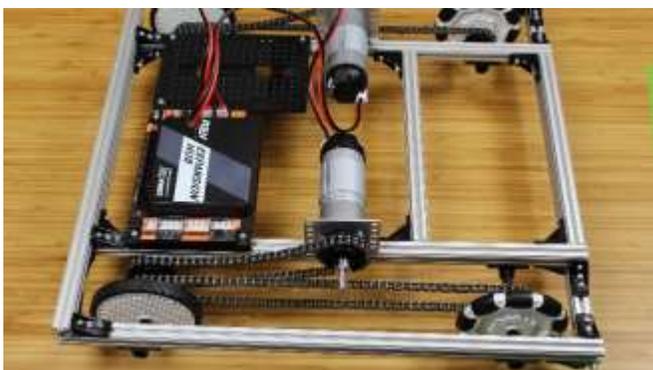
Collect Parts:  
#25 CHAIN  
Measure chain length from motor drive sprocket to traction wheel sprocket (red dots).



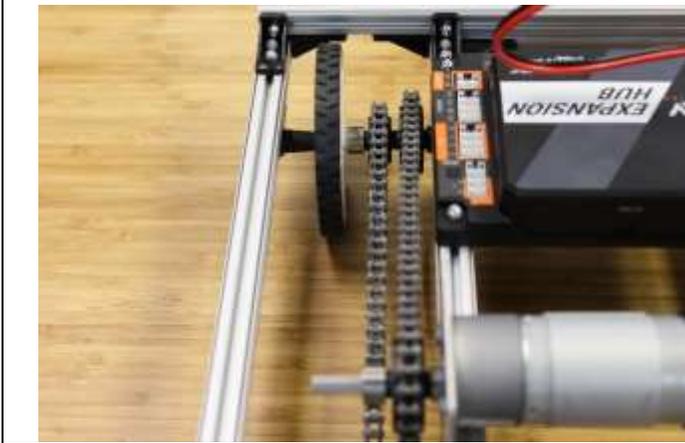
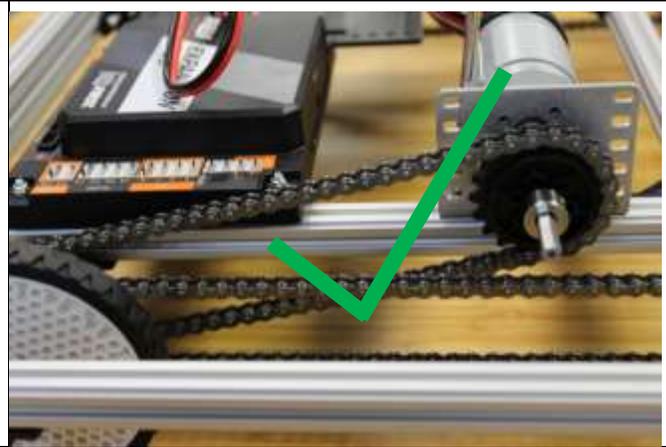
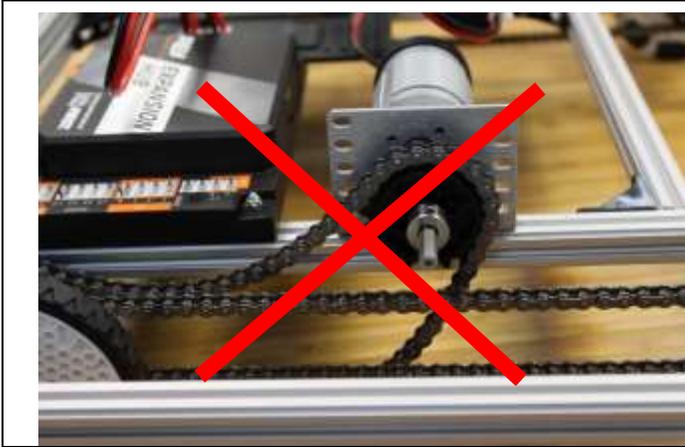
Connect chain using a #25 MASTER LINK.  
\*See Chain Guide for specifics on connecting a #25 master link\*



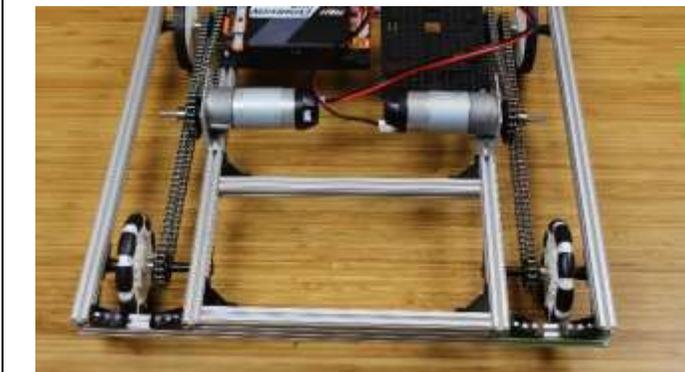
Measure chain length from TRACTION WHEEL sprocket to OMNI WHEEL sprocket (red dots).



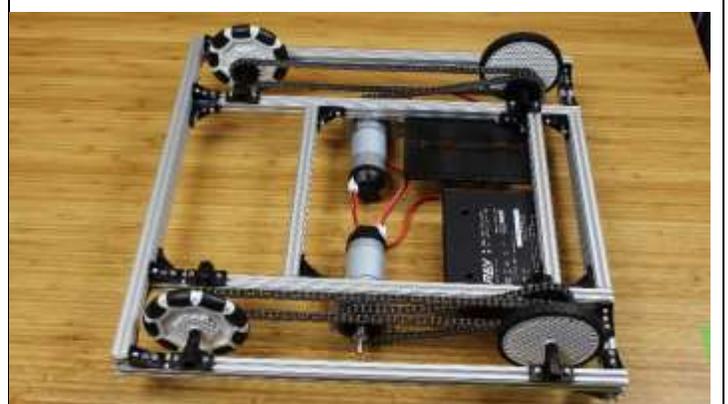
Connect chain using #25 MASTER LINKS  
According to pictures below, tighten chain by moving the motor. Do not over tension the chain – make sure the chain is tight, but not overly tight that the motor will have trouble running. Leave the traction wheel in its measured location.

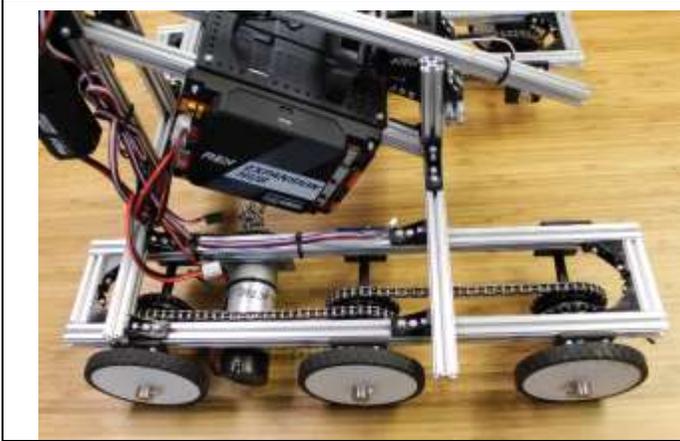


Make sure the sprockets are in line with each other



Slide OMNI WHEEL forward until chain is tight. Leave the traction wheel in its measured location. Tighten OMNI WHEEL assembly into place.





You have built the chain drive base. Although this drive base is functional, it's not the best for all situations. Modify the drive train as needed.