



GEAR DRIVETRAIN BUILD GUIDE

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Revision History		
Revision	Date	Description
1	08/11/2017	Initial Release
2	09/10/2018	Updated to reflect changes in 2018/19 FTC Kit Contents

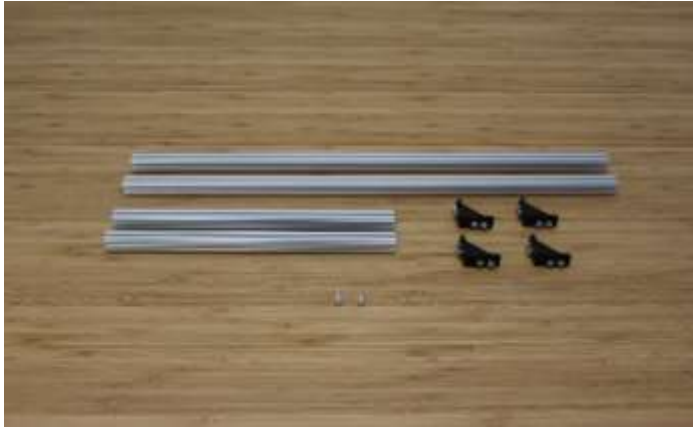
1 DESCRIPTION

This document outlines the steps required to build a six-wheel, gear-based drivetrain. This design should be treated as 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 centered on the middle Traction wheels to ensure the robot rotates about the axis at the midpoint between the middle Traction wheels.

1.1 BILL OF MATERIALS

PART NUMBER	DESCRIPTION	QTY.
REV-41-1432	420mm REV Extrusion	6
REV-41-1431	225mm REV Extrusion	4
REV-41-1321	15mm Plastic Lap Corner Bracket	16
REV-41-1360	M3 X 16MM HEX CAP SCREWS	4
REV-41-1359	M3 X 8mm Hex Cap Screws	126
REV-41-1361	Nyloc Nut	124
REV-41-1320	15mm Plastic Inside Corner Bracket	8
REV-41-1317	15mm Bearing Pillow Block	16
REV-41-1313	15MM PLASTIC INDEXABLE MOTION BRACKET	4
REV-41-1322	End Cap Bearing	18
REV-41-1347	5mm X 75mm Hex Shaft	9
REV-41-1301	HD Hex Motor, 40:1 Gearbox	2
REV-41-1349	5mm X 135mm Hex Shaft	2
REV-41-1354	90mm Traction Wheel	6
REV-41-1324	3mm Spacer	16
REV-41-1337	90 TOOTH GEAR	6
REV-41-1327	Shaft Collar	8
REV-41-1336	72 TOOTH GEAR	4
REV-41-1323	15mm Spacer	4
REV-41-1166	BATTERY HOLDER PLATE	2
REV-31-1153 or REV-31-1595	REV ROBOTICS EXPANSION HUB or REV ROBOTICS CONTROL HUB	1

1.2 BUILD INSTRUCTIONS



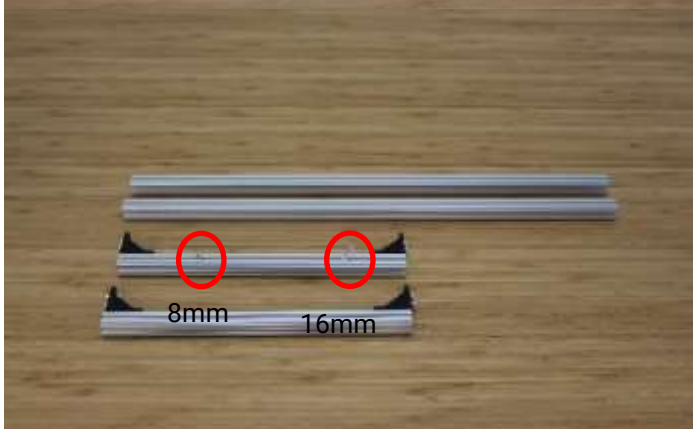
Collect Parts:

- 2x 420MM REV EXTRUSION
- 2x 225MM REV EXTRUSION
- 4x 15MM PLASTIC INSIDE CORNER BRACKET
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT
- 1x M3 X 8MM HEX CAP SCREWS
- 1x M3 X 16MM HEX CAP SCREWS



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

Tighten nuts.



Slide M3 X 8MM HEX CAP SCREWS and M3 X 16MM HEX CAP SCREWS on to the one of the 225MM REV EXTRUSION assemblies. Ensure M3 X 16MM HEX CAP SCREWS is to the right of M3 X 8MM HEX CAP SCREWS when the brackets are pointing away from the user.



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 BRACKET
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT



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



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



Make 420MM REV EXTRUSION flush with the 225MM REV EXTRUSION assembly.



Measure 82.5mm 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:

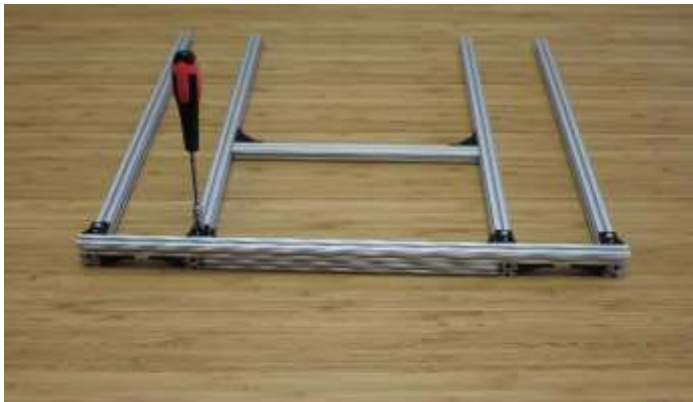
- 2x 420MM REV EXTRUSION
- 4x 15MM PLASTIC LAP CORNER BRACKET
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT



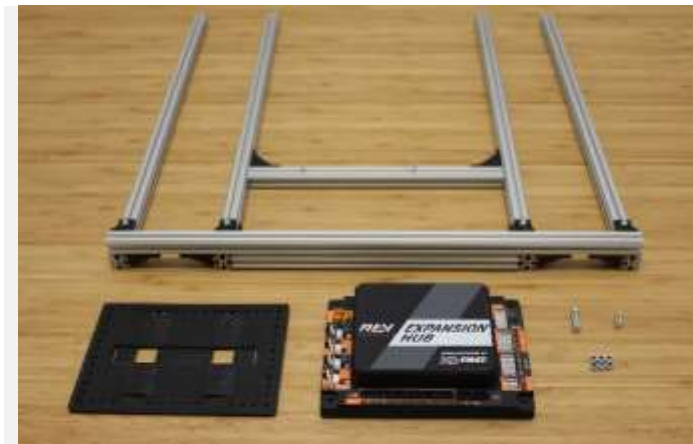
Place 15MM PLASTIC LAP CORNER BRACKET brackets as shown. Leave screw loose.



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

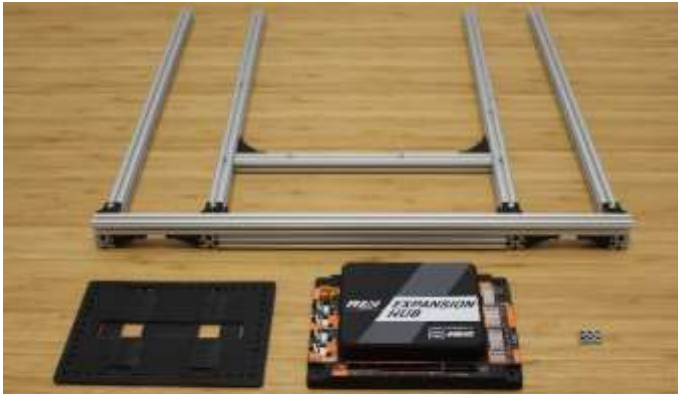


Tighten lap brackets.

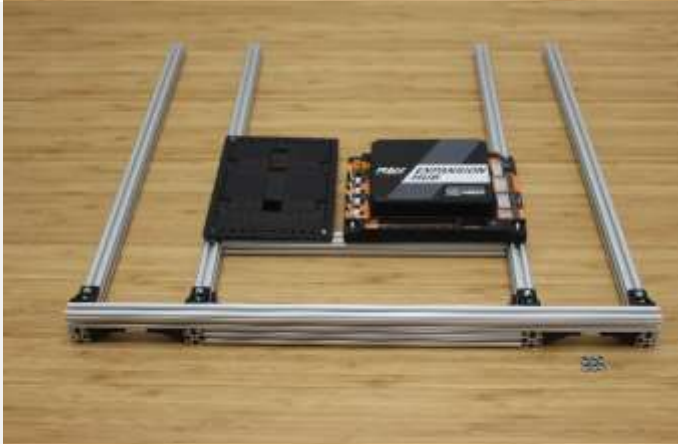


Collect Parts:

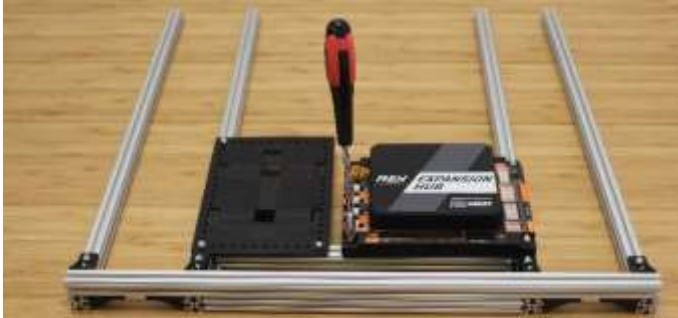
- 1x BATTERY HOLDER PLATE
- 1x REV ROBOTICS EXPANSION HUB or REV ROBOTICS CONTROL HUB
- 2x M3 X 8MM HEX CAP SCREWS
- 2x M3 X 16MM HEX CAP SCREWS
- 6x NYLOC NUT



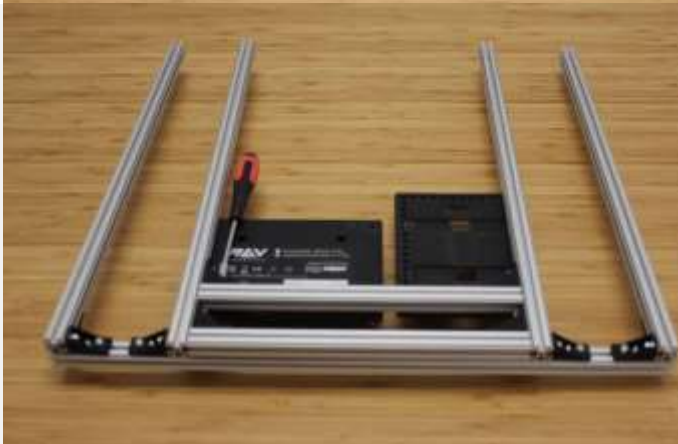
Slide M3 X 8MM HEX CAP SCREWS and M3 X 8MM HEX CAP SCREWS onto screws inside vertical 420MM REV EXTRUSION.



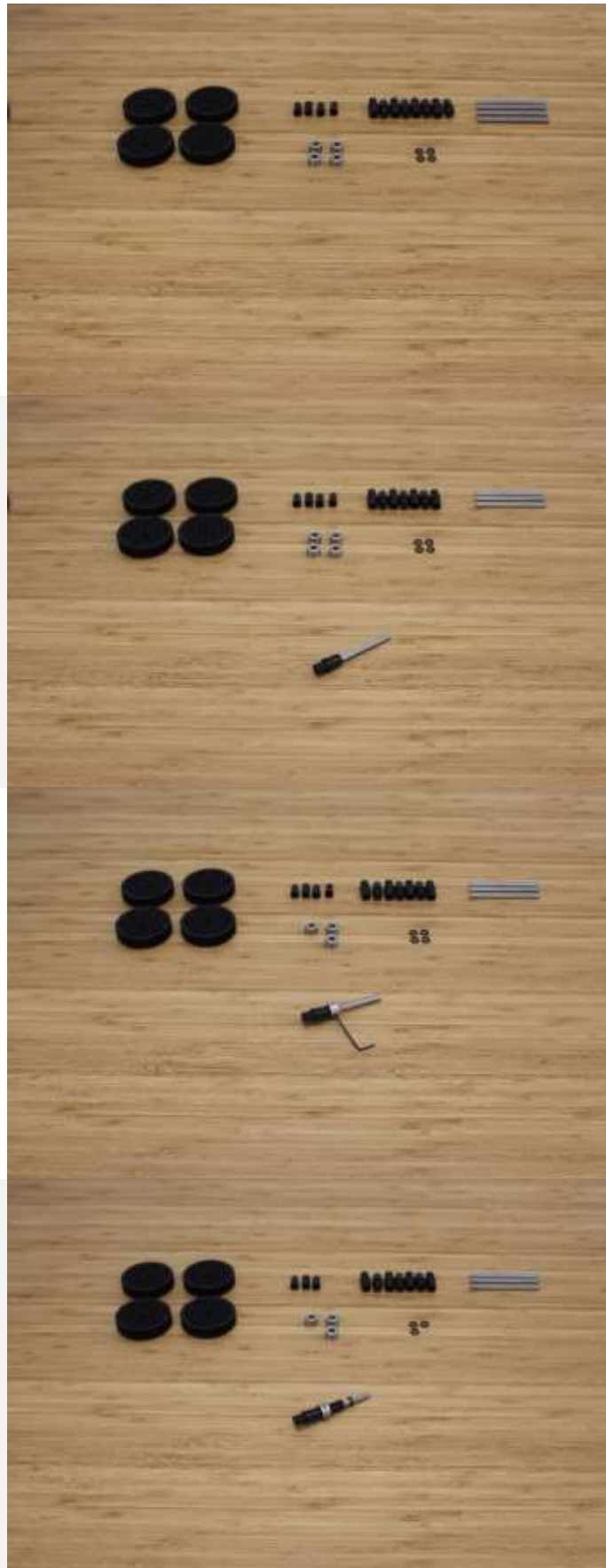
Place the REV ROBOTICS EXPANSION HUB or CONTROL HUB and BATTERY HOLDER PLATE on as shown.



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



Flip over and tighten 15MM PLASTIC INSIDE CORNER BRACKET.



Collect Parts:

- 4x 72 TOOTH GEAR
- 4x 15MM SPACER
- 4x SHAFT COLLAR
- 8x END CAP BEARING
- 4x 1.5MM Spacer
- 4x 5MM X 75MM HEX SHAFT

Place END CAP BEARING onto 5MM X 75MM HEX SHAFT.

Add the SHAFT COLLAR and tighten down.

Slide on 15MM SPACER and 1.5MM SPACER.



Slide on 72 TOOTH GEAR.



Place END CAP BEARING onto shaft.



Repeat 4 times to finish the gear shaft assemblies.



Collect Parts:

- 4x 90 TOOTH GEAR
- 4x 90MM TRACTION WHEEL
- 4x 3MM SPACER
- 8x END CAP BEARING
- 4x 5MM X 75MM HEX SHAFT



Place the END CAP BEARING onto the 5MM X 75MM HEX SHAFT.

Add 90 TOOTH GEAR to shaft.

Add 90MM TRACTION WHEEL to shaft.

Add two 3MM SPACER spacers to shaft.



Add END CAP BEARING to shaft.



Repeat 4 times to finish the wheel shaft assemblies.

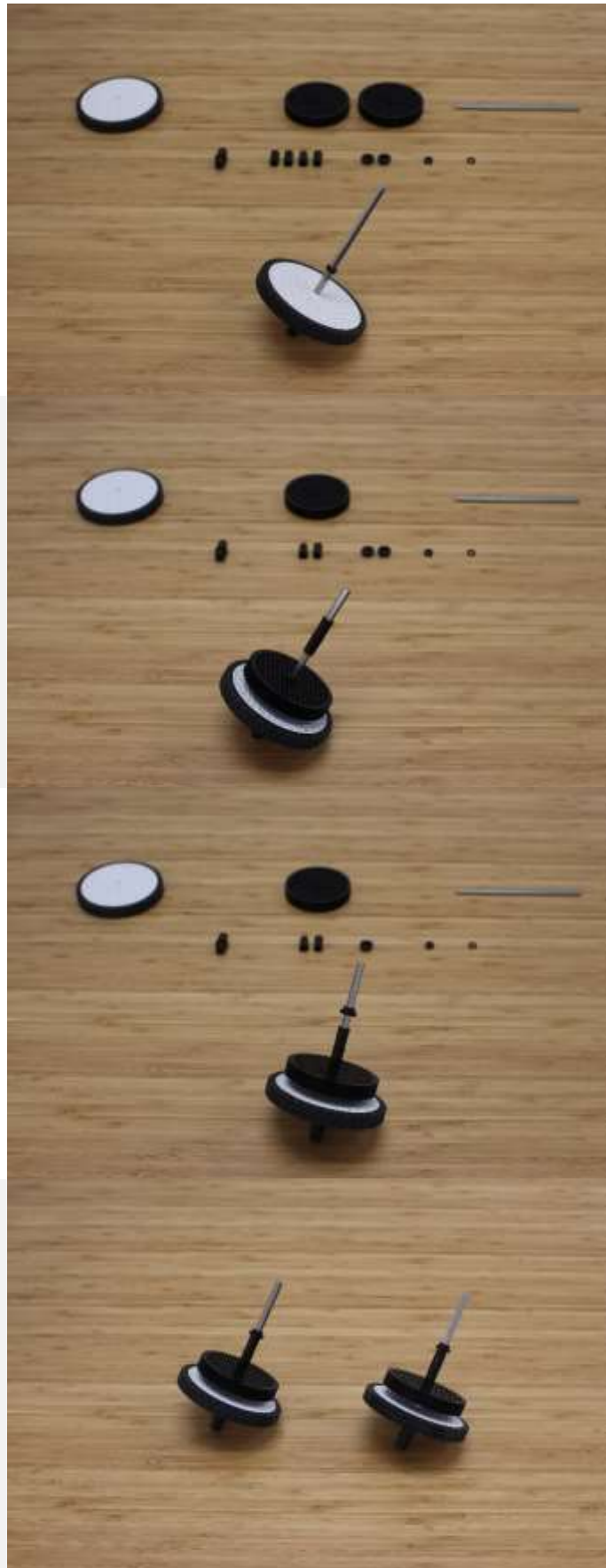


Collect Parts:

- 2x 90MM TRACTION WHEEL
- 2x 90 TOOTH GEAR
- 2x END CAP BEARING
- 4x 15MM SPACER
- 2x 15MM SPACER
- 2x 1.5MM SPACER
- 2x 5MM X 90MM HEX SHAFT



Place END CAP BEARING and 1.5MM SPACER onto 5MM X 90MM HEX shaft.

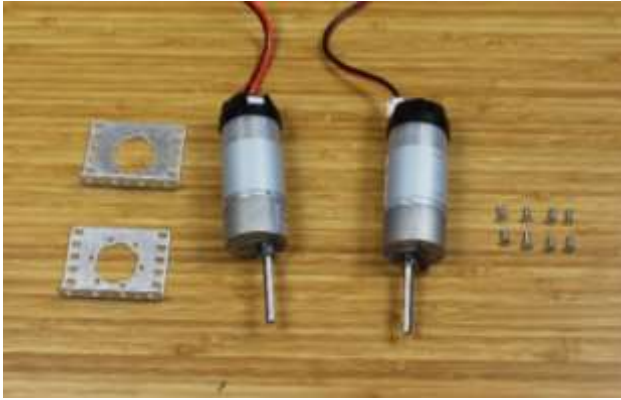


Add 90MM TRACTION WHEEL and 3MM SPACER onto 5MM X 90MM HEX shaft.

Place 90 TOOTH GEAR and two 15MM SPACER onto 5MM X 90MM HEX shaft.

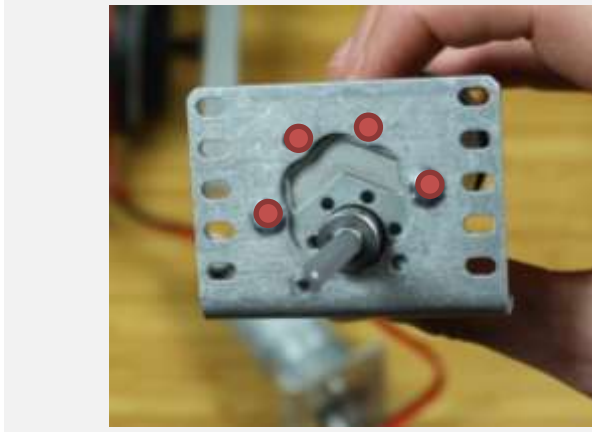
Place THROUGH BORE BEARING – SHORT onto 5MM X 90MM HEX shaft.

Repeat twice to finish the center wheel shaft assemblies.



Collect Parts:

- 2x 40:1 Spur Gearbox HD Hex Motor
- 2x Bent HD Hex Motor Bracket
- 8x 8mm fasteners



Place the HD Hex motor into the motor bracket with the drive shaft of the motor in the indent closest to the bent part of the motor mount. Insert and tighten 4 8mm hex bolts into the gearbox mounting holes (red dots in photo).

Repeat for other motor.



Collect Parts:

- 2x Motors attached to mounts
- 2x 72 tooth Gears
- 4x 1.5mm Spacers
- 2x Shaft Collars



Slide two 1.5mm spacers onto the motor output shaft.



Slide 1 72 tooth gear followed by one shaft collar onto the output shaft. Tighten set screw in shaft collar.

Repeat for other motor assembly.



Pre-load the bottom of the bracket with 8mm Hex Cap screws and Nyloc nuts with the nuts on top of the bracket (see photo).



Collect Parts:

- 4x 15MM BEARING PILLOW BLOCK
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT
- 2x Wheel shaft assemblies



Slide 15MM BEARING PILLOW BLOCK pillow brackets and Wheel shaft assemblies onto frame.

Collect Parts:

- 4x 15MM BEARING PILLOW BLOCK
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT
- 2x Gear shaft assemblies



Slide 15MM BEARING PILLOW BLOCK pillow brackets and Gear shaft assemblies onto frame.



Collect Parts:

- 4x 15MM PLASTIC INDEXABLE MOTION BRACKET
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT
- 2x Center Wheel shaft assemblies



Slide 15MM PLASTIC INDEXABLE MOTION BRACKET and center wheel shaft assemblies onto frame.

Make sure the axle is 210mm from the front and back of the frame. Tighten down nuts. Take care to ensure the axle is square to the frame and brackets.



Collect Parts:

- 4x 15MM BEARING PILLOW BLOCK
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT
- 2x Wheel shaft assemblies

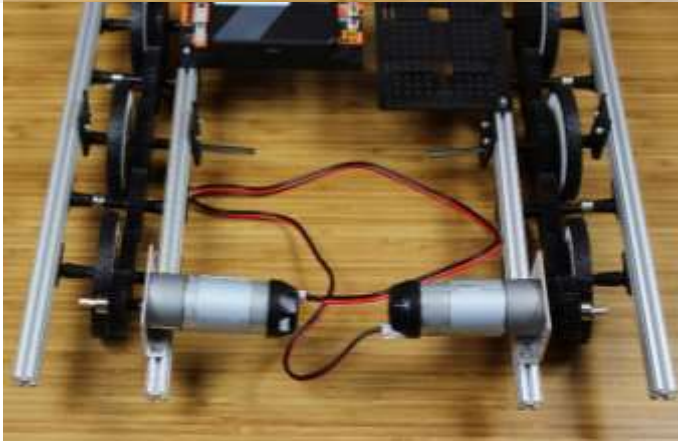


Slide 15MM BEARING PILLOW BLOCK pillow brackets and Wheel shaft assemblies onto frame.

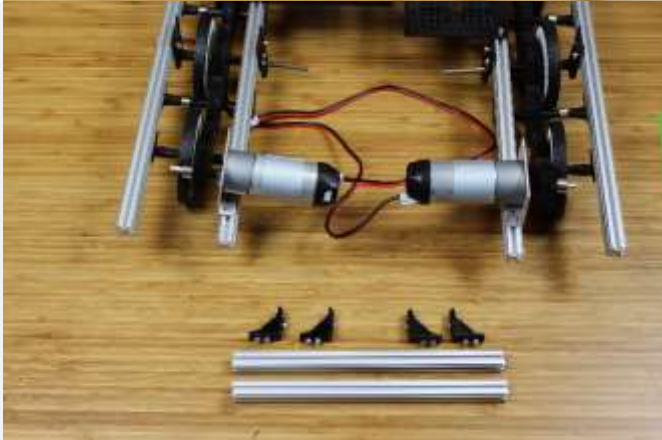


Collect Parts:

- 2x Motor Assemblies

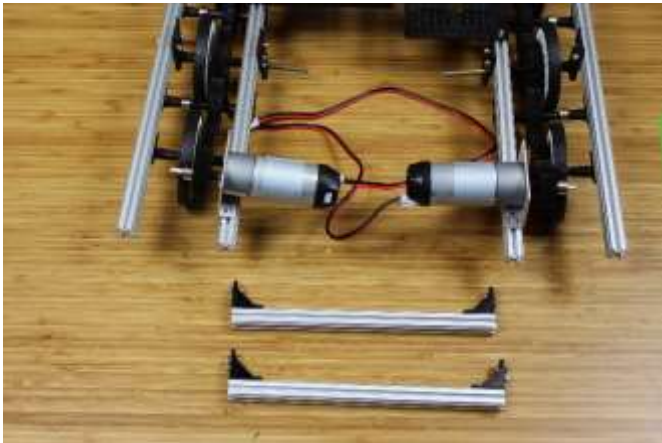


Slide motor assemblies onto frame.



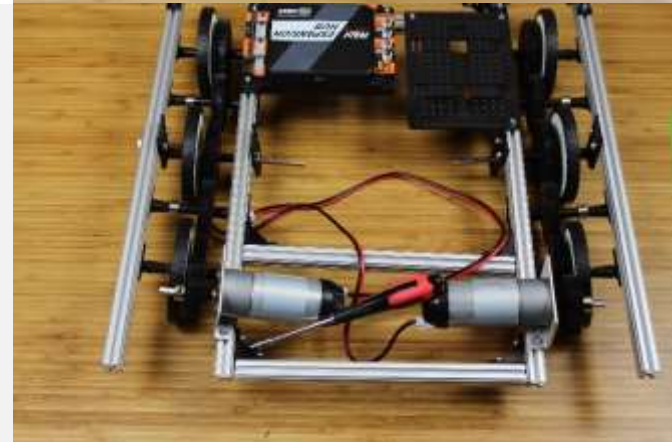
Collect Parts:

- 2x 225MM REV EXTRUSION
- 4x 15MM PLASTIC LAP CORNER BRACKET
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT

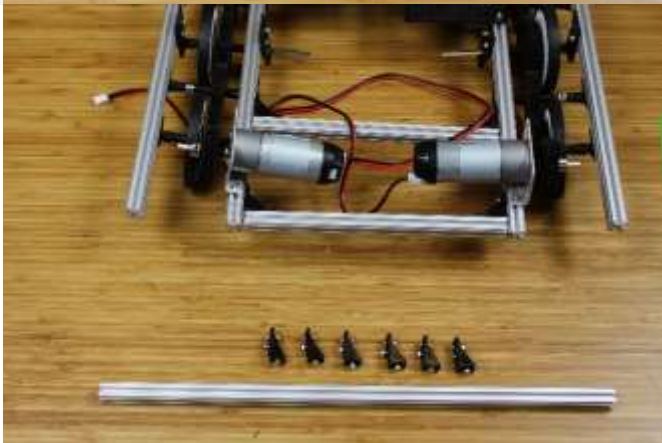


Slide the PLASTIC LAP CORNER BRACKETs on the Ends of the extrusion so the brackets and Extrusion are flush.

Tighten nuts.

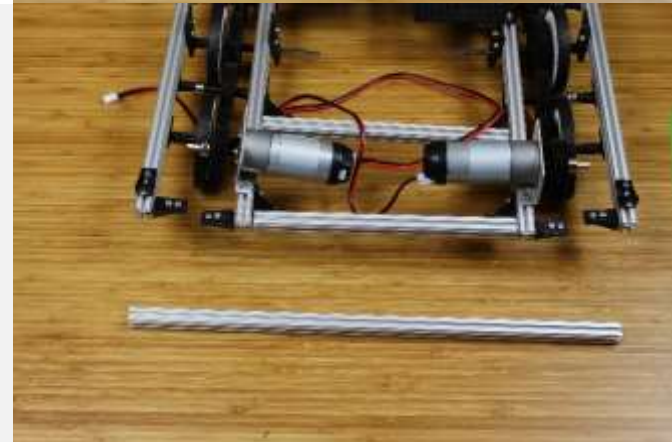


Slide on the Lap Corner Assemblies with the front set flush against the extrusion. Tighten the front set.

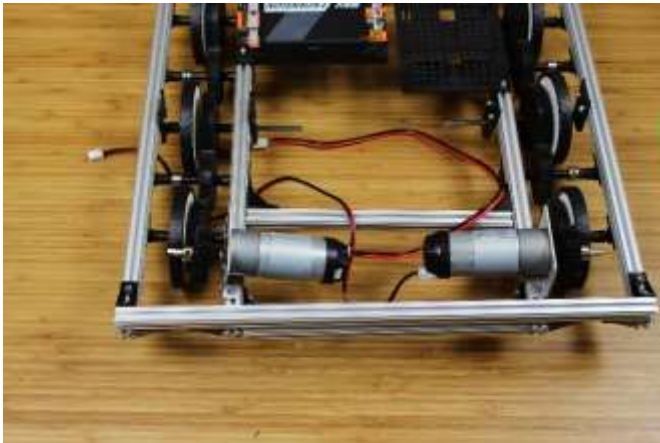


Collect Parts:

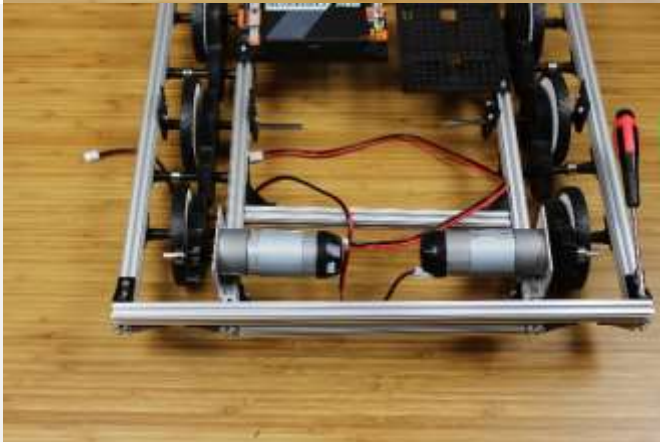
- 1x 420MM REV EXTRUSION
- 6x 15MM PLASTIC LAP CORNER BRACKET
 - Pre-load with M3 X 8MM HEX CAP SCREWS and NYLOC NUT



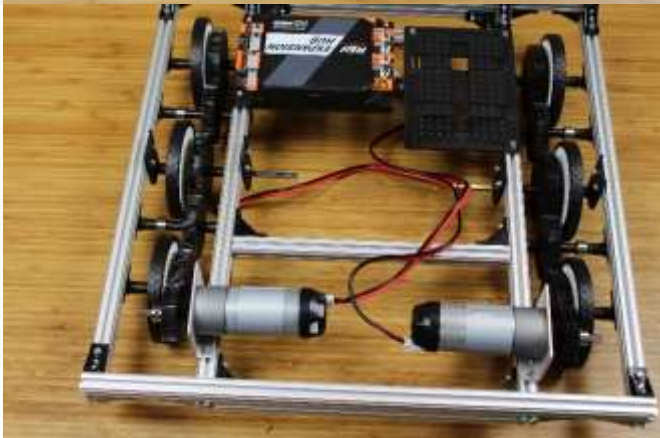
Place 15MM PLASTIC LAP CORNER BRACKET brackets as shown. Leave screw loose.



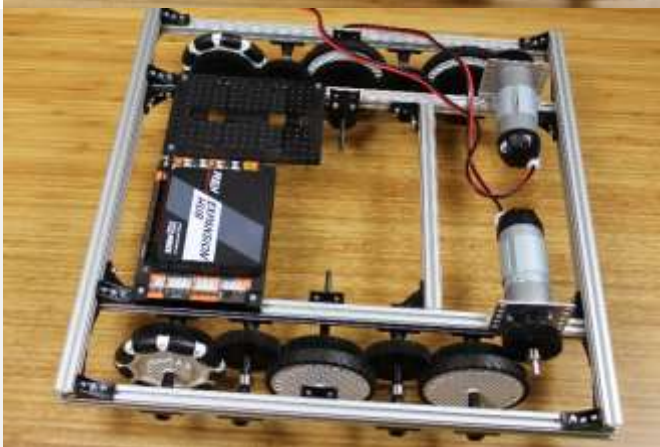
Slide 420MM REV EXTRUSION onto 15MM PLASTIC LAP CORNER BRACKET brackets. Make 420MM REV EXTRUSION flush with the 225MM REV EXTRUSION assembly.



Tighten 15MM PLASTIC LAP CORNER BRACKET nuts from the outside inwards. Be sure to keep the frame square while tightening nuts.



Move Motor Assembly so it is in full contact with the nearest Wheel Assembly.



Drivetrain is complete! Modify the frame as needed.