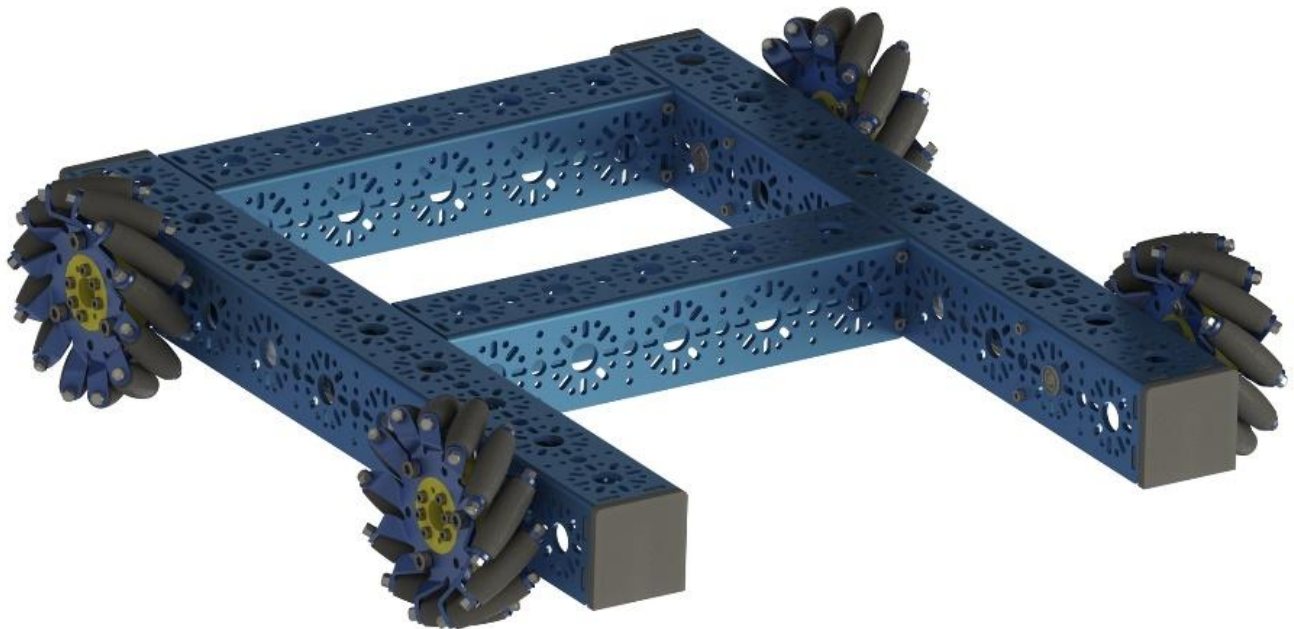




Assembly Instructions for **FTC Drivebase Kit – v2 (D-Shaft)**



MFR Part #: 70400-v2



Introduction

Introducing the **FTC Drivebase Kit - v2** from Studica, a comprehensive solution for building a high-performance mecanum drivebase for your FIRST Tech Challenge (FTC) robot. This kit is designed with precision and functionality in mind, providing all the essential components needed to create a robust, versatile, and reliable drive system.

The drivebase frame is constructed using **Studica's anodized 6061-T6 Aluminum U-Channels**, offering superior strength, durability, and a lightweight design that can withstand the rigors of competitive robotics. Included in the kit are four slim **mecanum wheels**, enabling omni-directional movement for precise control in all directions. You'll also receive four **Neverest Orbital Motors** with encoder cables, ensuring optimal power and efficiency for your drivebase while providing the feedback necessary for accurate motor control. To enhance performance and longevity, we've incorporated our **new 36 Tooth Helical Bevel Gears**, which deliver smooth, efficient power transmission.

Whether you're building your first robot or upgrading your current system, the **FTC Drivebase Kit - v2** provides everything you need to create a competitive mecanum drivebase, engineered for success in FTC competitions.



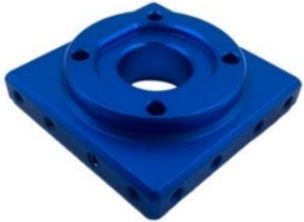
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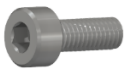


Parts List

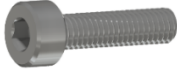
Name	Part #	Quantity	
Structure			
432 mm U-Channel	76010	2	
240 mm U-Channel	76014	2	
End Piece Plate (2 pack)	76143-2	2	
U-Channel Bumper (4 Pack)	76505-4	1	

Rubber Grommet (10 pack)	76504-10	1	
Motion			
NeveRest Orbital Gearmotor JST-VH-2	am-3637b	4	
NeveRest Motor REV Hub Encoder Cable	am-3926a	4	
Orbital Mount Plate	76138	4	

6mm x 70mm D-Shaft (6 pack)	76160-6	1	
36 Tooth D-Shaft Helical Bevel Gear 1 to 1 Set	77224D	4	
Clamping Shaft Hub	76280	4	
14mm Flange Bearing (12 pack)	76302-12	1	

6mm D-Shape Collar Clamp	76320	4	
100mm Slim Mecanum Wheel Set (Bearing Rollers, 2 left, 2 right)	76246	1	
Hardware			
M3 x 6mm Socket Head Cap Screw (50 pack)	76213-50	1	
M3 x 10mm Socket Head Cap Screw (100 pack)	76201-100	1	
M3 x 12mm Socket Head Cap Screw (100 pack)	76202-100	1	

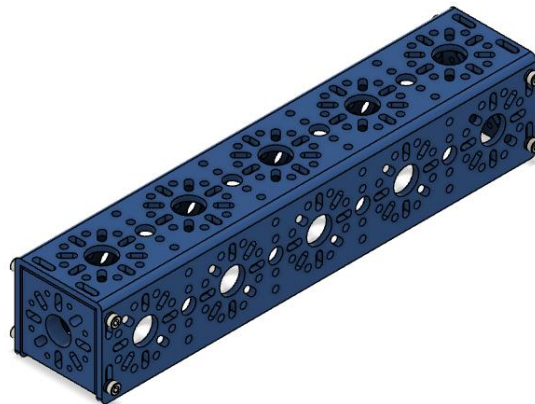
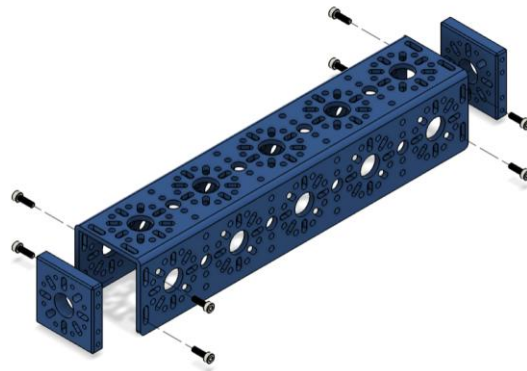


M3 x 25mm Socket Head Cap Screw (50 pack)	76214-50	1	
M3 Stainless Steel Split Washer (100 pack)	76216-100	1	
Shaft Spacer Plastic 6mm ID x 10mm OD x 1mm L (24 pack)	76305-24	1	
6mm D-Shaft Nylon Spacer 5mm (12 pack)	76307-12	2	
2.5mm Hex Ball End Screwdriver	70142	1	

Step 1

Parts & Tools Required:

- 1 x 240mm U-Channel
- 2 x End Piece Plate
- 8 x M3 x 10mm Socket Head Cap Screws
- 2.5mm Hex Ball End Screwdriver

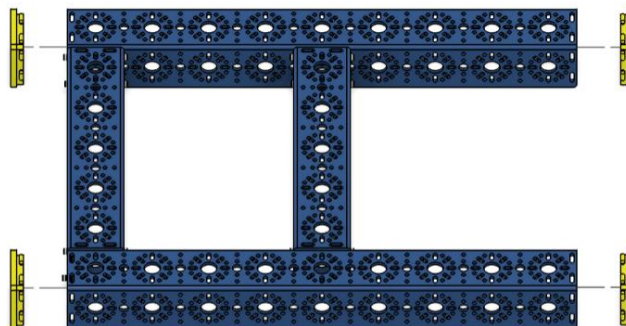
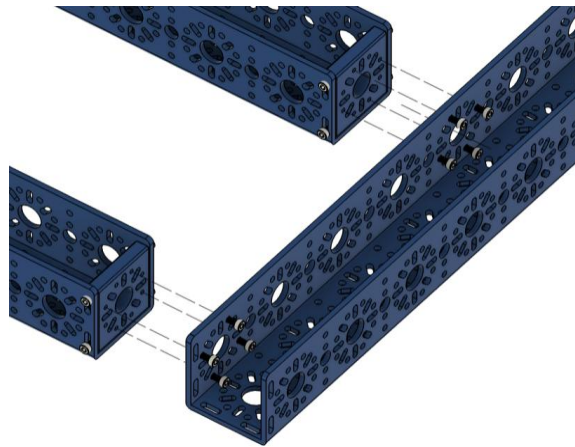


Screw the 2 End Piece Plates to each of the 240mm U-Channels using the M3 x 10mm SHCS. The End Piece Plate must be flush with ends of the 240mm U-Channel. Repeat this step with the other 240mm U-Channel.

Step 2

Parts & Tools Required:

- 2 x Step 1 Assembly
- 1 x 432mm U-Channel
- 8 x M3 x 12mm Socket Head Cap Screws
- 4 x U-Channel Bumpers
- 2.5mm Hex Ball End Screwdriver

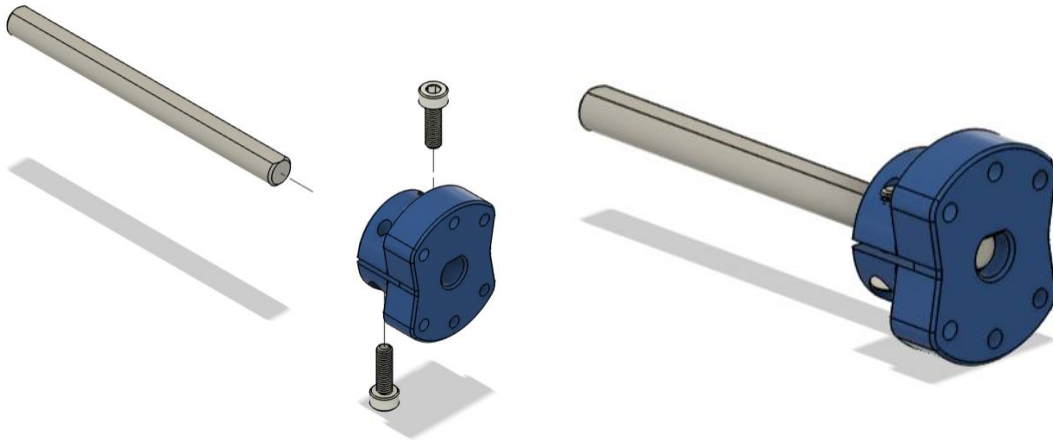


Screw the M3 x 12mm SHCS through the 432mm U-Channel into the tapped holes of the End Piece Plates from the assemblies from Step 1. Repeat for the other 432mm U-Channel.

Step 3

Parts & Tools Required:

- 1 x 6mm x 70mm D-Shaft
- 1 x Clamping Shaft Hub-v2
- 2.5mm Hex Ball End Screwdriver

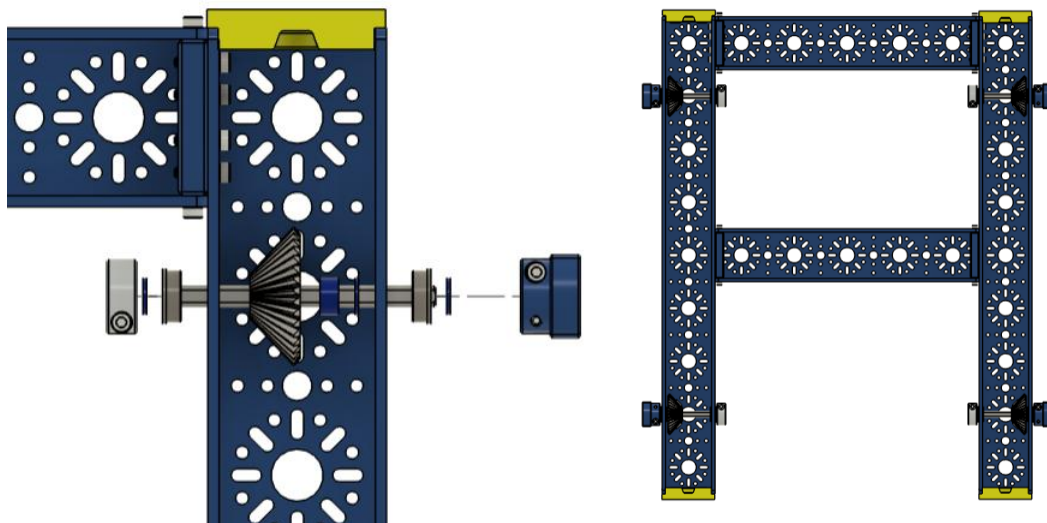


Attach the 70mm D-Shaft to the Clamping Shaft Hub by tightening the set screws that come with the hub. Note the face of the D-shaft should not be flush

Step 4

Parts & Tools Required:

- 1 x Assembly from Step 2
- 1 x Assembly from Step 3
- 2 x 14mm Flange Bearing
- 1 x 36 Tooth D-Shaft Helical Bevel Gear
- 1 x D-Shaft Collar Clamp
- 1 x 6mm D-Shaft Nylon Spacer 5mm
- 3 x 6mm D-Shaft Nylon Spacer 1mm
- 2.5mm Hex Ball End Screwdriver

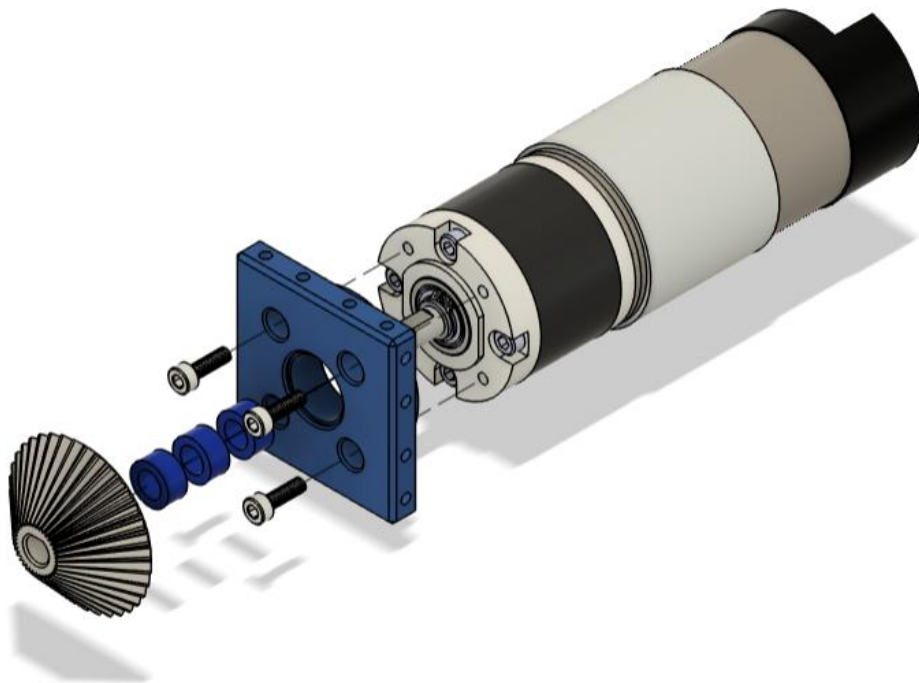


Slide a 1mm Shaft Spacer onto the 70mm D-Shaft from the Step 3 Assembly, then a 6mm ID Flange Bearing so that the 1mm spacer is flat between the hub and bearing. Then slide one 1mm and one 5mm Thick D-Shaft Spacer down the D-Shaft following the bearing. Begin inserting this assembly so that the bearing is loaded onto the 14mm hole on the outside of the drivebase frame shown above. Before inserting all the way through, slide the 36 Tooth D-Shaft Bevel Gear so it is making contact with the 5mm Shaft spacer. Slide another Flange Bearing onto the D-Shaft so that it fits into the other 14mm hole on the side of the drivebase frame. Slide one 1mm spacer onto the D-Shaft followed by a Collar Clamp and tighten with the set screw. Repeat this step for the three more times and mount them as shown in the images above.

Step 5

Parts & Tools Required:

- 1 x Neverest Orbital Gearmotor
- 1 x Orbital Motor Mount
- 4 x M3 x 10mm Socket Head Cap Screws
- 3 x 6mm D-Shaft Nylon Spacer 5mm
- 1 36 Tooth D-Shaft Helical Bevel Gear
- 2.5mm Hex Ball End Screwdriver



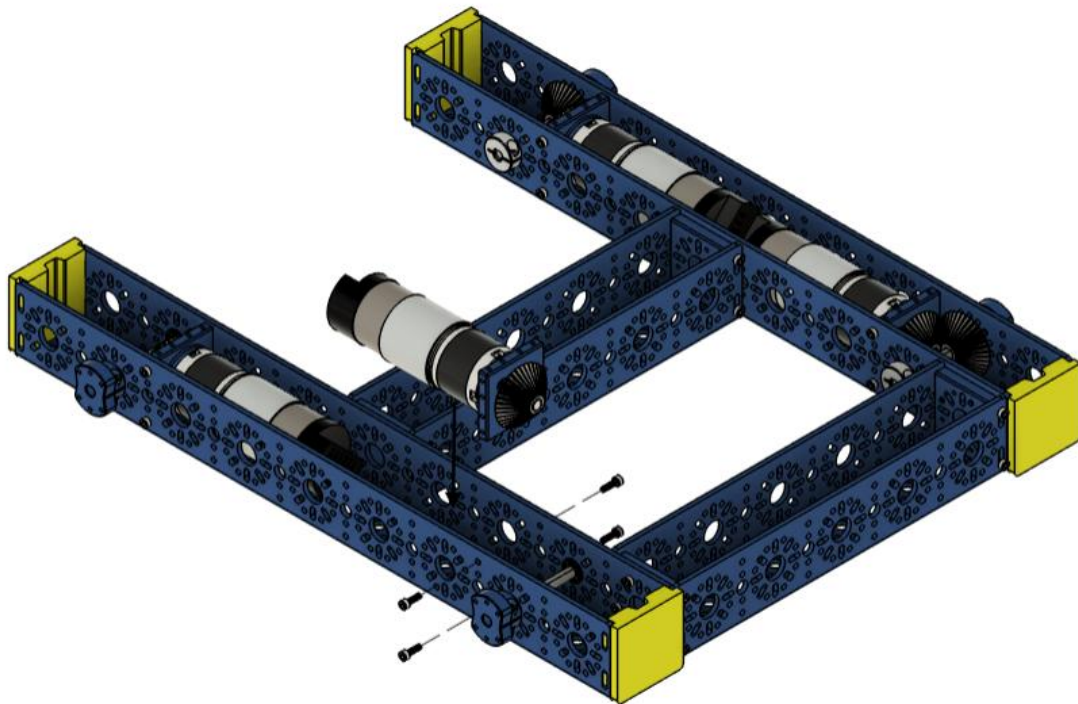
Attach the Encoder Cable to the end of the motor. Attach the Orbital Motor Mount Plate to the motor with the M3 x 10mm SHCS. Slide three 5mm Nylon Shaft Spacers onto the motor shaft with the 36 Tooth Helical Bevel Gear on top. Note the spacers and bevel gear will be loose.

Repeat this step for the other three motors.

Step 6

Parts & Tools Required:

- 1 x Assembly from Step 5
- 4 x M3 x 10mm Socket Head Cap Screws
- 2.5mm Hex Ball End Screwdriver



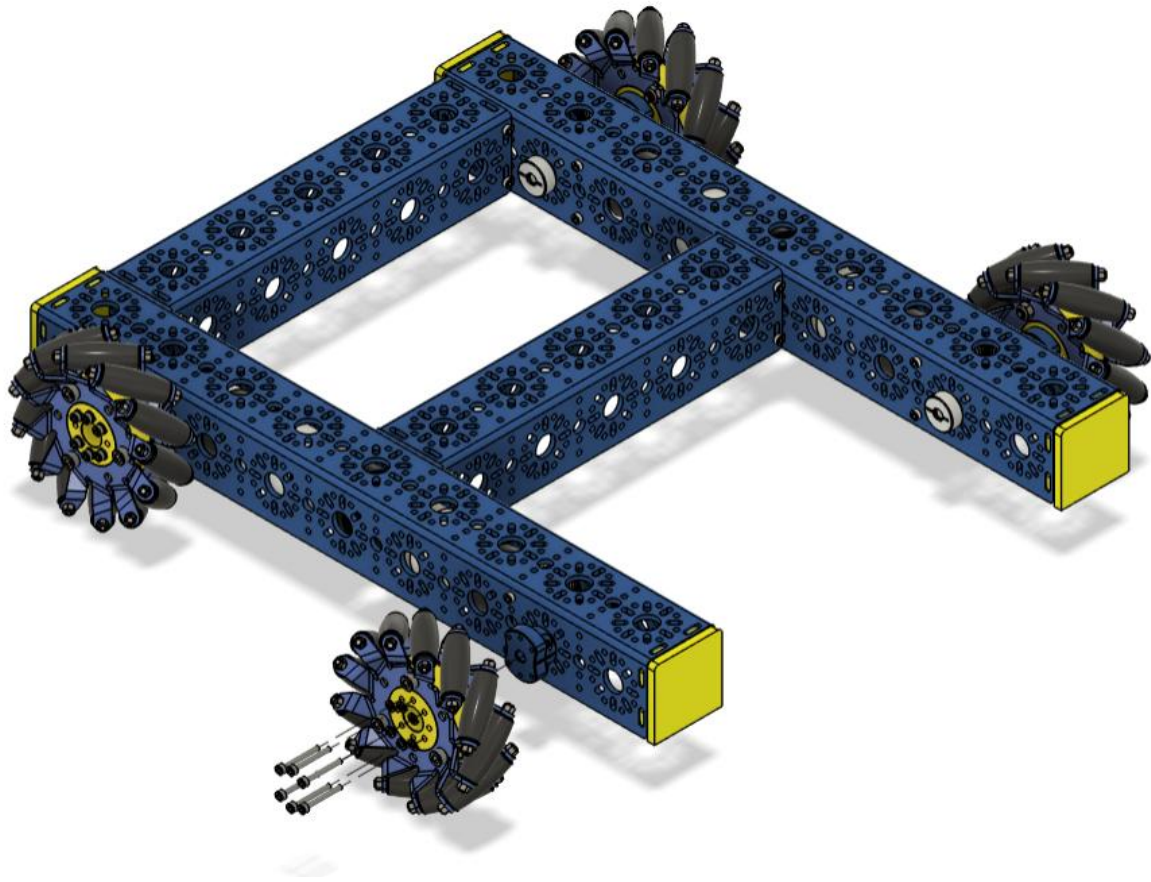
Insert the motor built from the Step 5 Assembly to the drivebase frame as shown above. Make sure the bevel gears mesh well together then attach the assembly to the drivebase frame with four M3 x 10mm SHCS. Note: The encoder cap should be open and facing out to have access to the encoder cables.

Repeat this step for the other three motors.

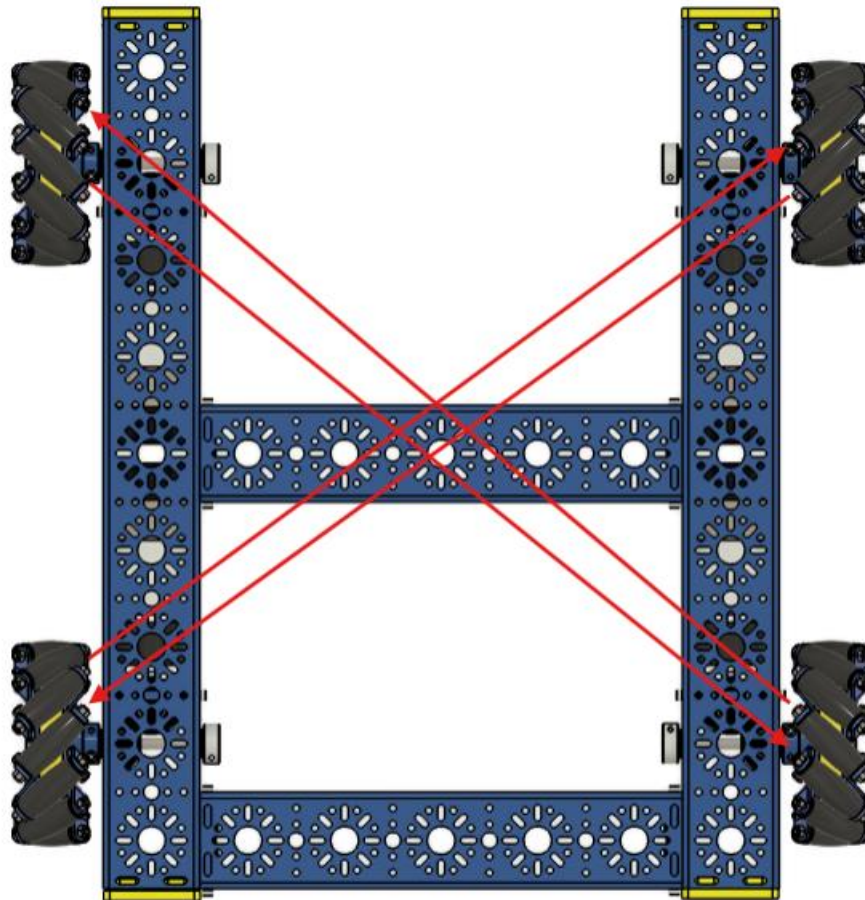
Step 7

Parts & Tools Required:

- 1 x 100mm Slim Mecanum Wheel Set (Bearing Rollers, 2 left, 2 right)
- 24 x M3 x 25mm Socket Head Cap Screws
- 24 x M3 Stainless Steel Split Washers
- 2.5mm Hex Ball End Screwdriver

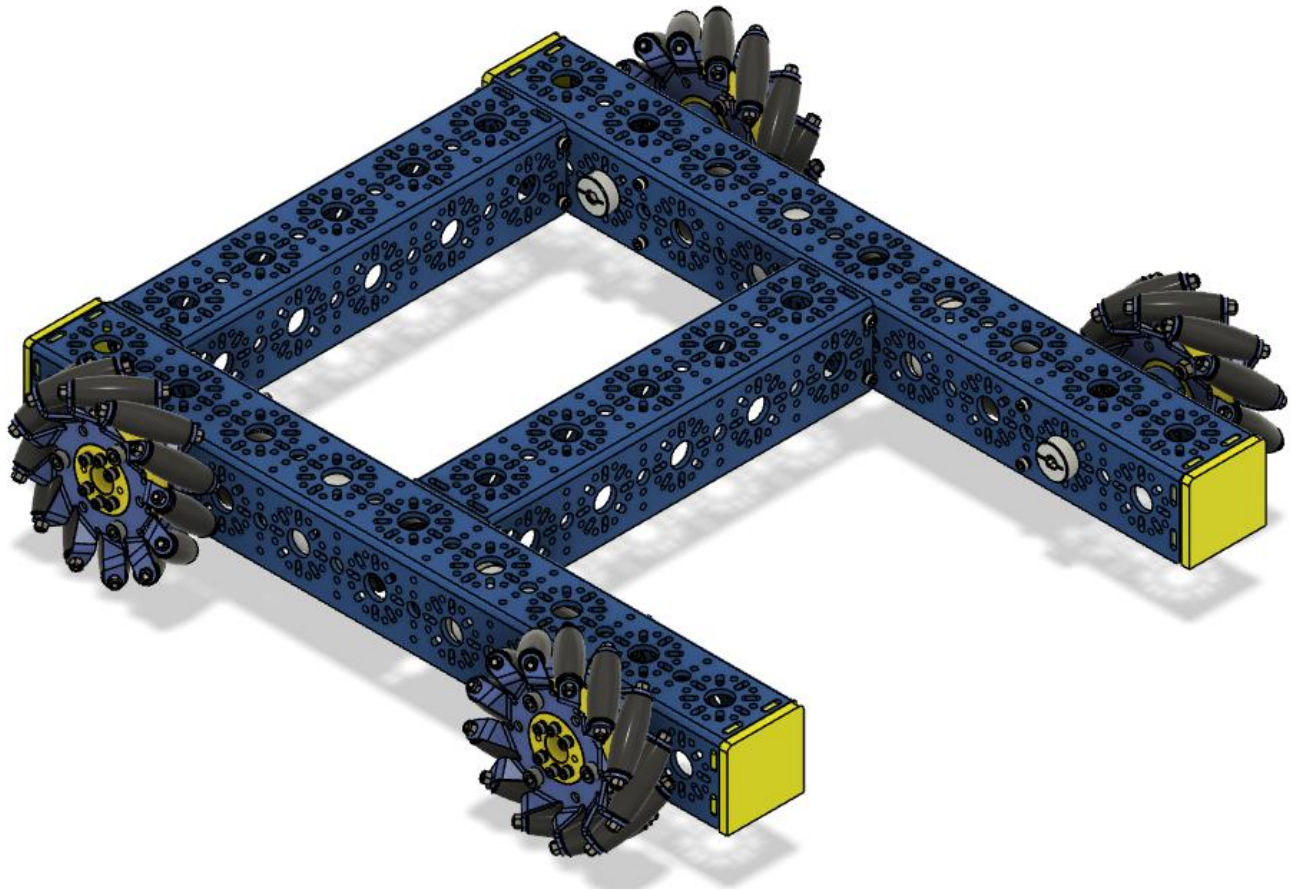


Attach the Mecanum Wheels to the clamping shaft hubs using 6 x M3 x 25mm SHCS. The wheels of the drivebase should be oriented like the image below. The rollers should be angled towards the center of the robot in an “X” pattern. Place 1 x M3 Split Washer between each screw and screw hole the mecanum wheel to the clamping shaft hub. This will help prevent the screws from getting loose during operation.



IMPORTANT NOTE: "X" Shaped pattern referred to in Step 7. The rollers of each wheel should be pointed inward towards the wheel diagonal to it. (Back Left Wheel Rollers pointing towards the Front Right Wheel Rollers , and Back Right Wheel Rollers pointing towards the Front Left Wheel Rollers)

Completed Assembly:





Resources

Code for the FTC Drivebase v2: <https://github.com/Studica-Robotics/FTC-Code/blob/main/Drivebase%20Kit%20V2/DriveBaseV2.java>

Parts List & Step Files: <https://www.studica.com/studica-robotics-brand/ftc-drive-base-kit-v2>