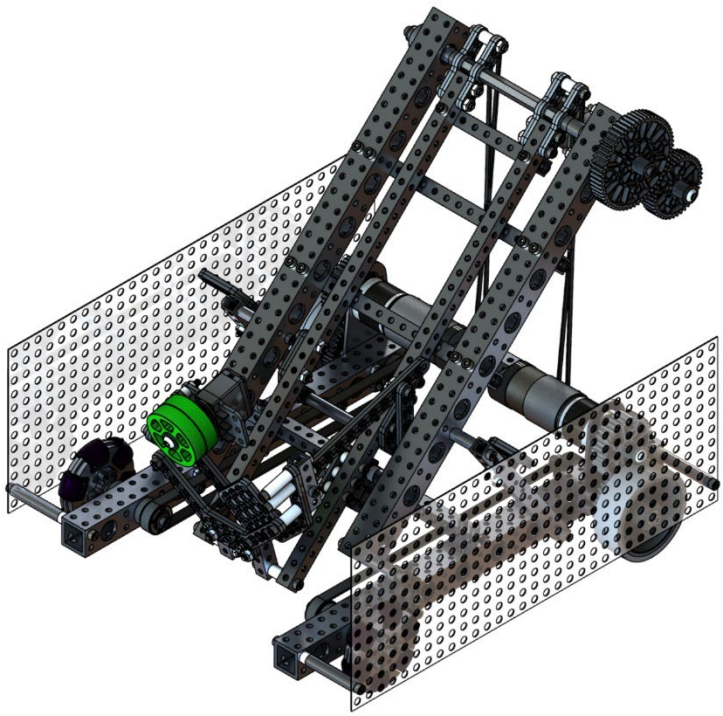
AndyMark®

Assembly Guide

ROBITS

CENTERSTAGE Robot



October 2023

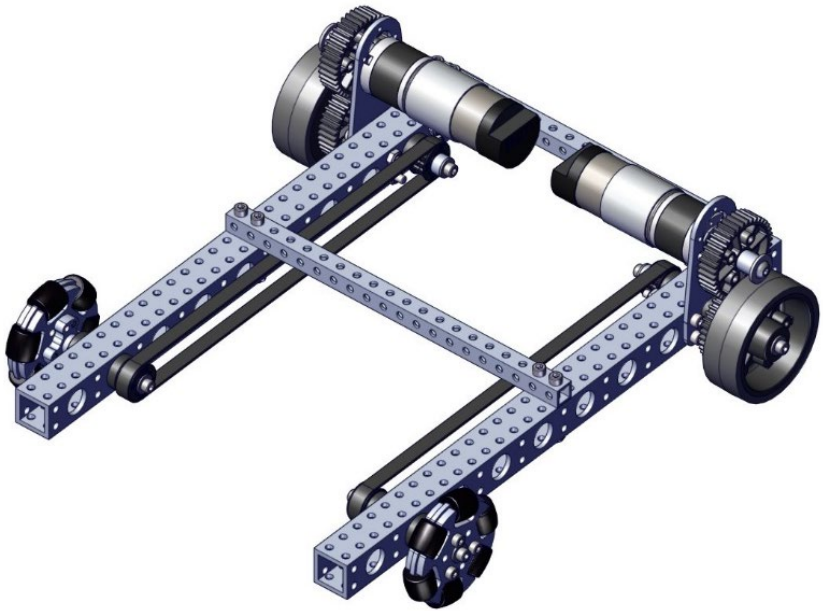
Required Tool List	
AM Part Name	**AM Part #**
Hex Driver, Ball End 2.5mm with Handle	am-3724
Hex Driver, Ball End 3/32" with Handle	am-3173
Hex Driver, Ball End 5/32" with Handle	am-2751
3/8 Combination Wrench	am-4961

CENTERSTAGE Robot		
AM Part Name	**AM Part #**	**Quantity**
Robits Starter Drive Base	See Separate Instructions	1
Robits 0.5×0.5×2.0 Tube	am-5001-0200	3
Robits 0.5×0.5×4.0 Tube	am-5001-0400	1
Robits 0.5×0.5×6.0 Tube	am-5001-0600	2
Robits 0.5×0.5×8.0 Tube	am-5001-0800	2
Robits 0.5×0.5×16.0 Tube	am-5001-1600	2
Robits 1.0×1.0×15.5 Tube	am-5002-1550	2
Robits Angle Gusset (135°)	am-5010_135	2
Robits 1×8 Beam	am-5011_1x8	1
Robits 1×12 Beam	am-5011_1x12	1
Robits 3×3 Corner Gusset	am-5005_3x3	4
Robits 5×5 Corner Gusset	am-5005_5x5	3
Robits 2×4 Plate	am-5006_2x4	1
Robits 4×4 Plate	am-5006_4x4	1
NeveRest Orbital - 50.9	am-4609b	1
Robits 80-100T Motor Mount	am-5017	1
6mm D to 375IN Hex-Shaft Adapter	am-3444	1
Programmable Servo Torque	am-4954	2
5mm Hex to 375IN Hex Shaft Adapter	am-4957	2
Robits Bushing for 0.375 Hex	am-5021	2

AM Part Name	AM Part #	Quantity
Robits Side Shaft Carrier	am-5015	1
Robits Double End Shaft Carrier	am-5016	4
40 Tooth 20DP 0.375 in. Hex Bore Plastic Gear	am-5020_40	1
60 Tooth 20DP 0.375 in. Hex Bore Plastic Gear	am-5020_60	1
Robits 0.375 in. Hex Shaft 10 in. Long	am-5003-1000	1
2 in. Compliant Wheels (Green)	am-3571_green	2
10-32 Nylock Jam Nut	am-1063	58
Spacer, 0.375 OD x 0.194 ID x 0.25 Long Nylon	am-1700	10
Spacer, 0.375 OD x 0.194 ID x 0.50 Long Nylon	am-1697	4
Spacer, 0.375 OD x 0.194 ID x 0.75 Long Nylon	am-4107	3
Spacer, 0.375 OD x 0.194 ID x 1.00 Long Nylon	am-1696	3
Screw, SHCS, 10-32 x 0500	am-1002	6
Screw, SHCS, 10-32 x 0750	am-1047	9
Screw, SHCS, 10-32 x 1000	am-1056	16
Screw, SHCS, 10-32 x 1250	am-1041	11
Screw, SHCS, 10-32 x 1500	am-1014	20
Screw, SHCS, 10-32 x 1750	am-1048	13
Screw, SHCS, 10-32 x 2000	am-1049	3
M3-0.5 x 8 mm Socket Head Cap Screw with Thread Patch	am-1500	3
#10 Steel Washer	am-1026	4
Spacer, 0.430 ID x 0.500 OD x 0.250 Long Aluminum	am-1698	5
Spacer, 0.430 ID x 0.500 OD x 0.500 Long Aluminum	am-1699	8
10-32 Female Threaded 1 in. Long 0.375 in. Round Standoff	am-1701	4
10-32 Female Threaded 2 in. Long 0.375 in. Round Standoff	am-1702	4
10-32 Female Threaded 4 in. Long 0.375 in. Round Standoff	am-1704	1
Rubber Bands #33, Black	am-5024_black	Varies
Cable Ties 4 in	am-1589_black	2
15.5×6×1/32 Perforated PC	am-4964	2

Chassis

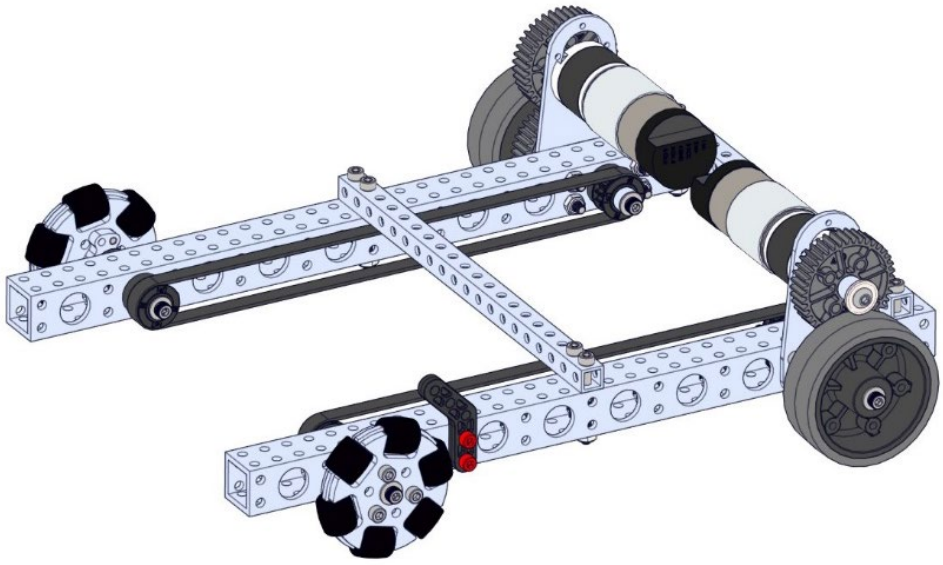
The AndyMark CENTERSTAGE Robot uses the **Robits Starter Drive Base**. Instructions for how to build the starter drive base can be found on the AndyMark website.



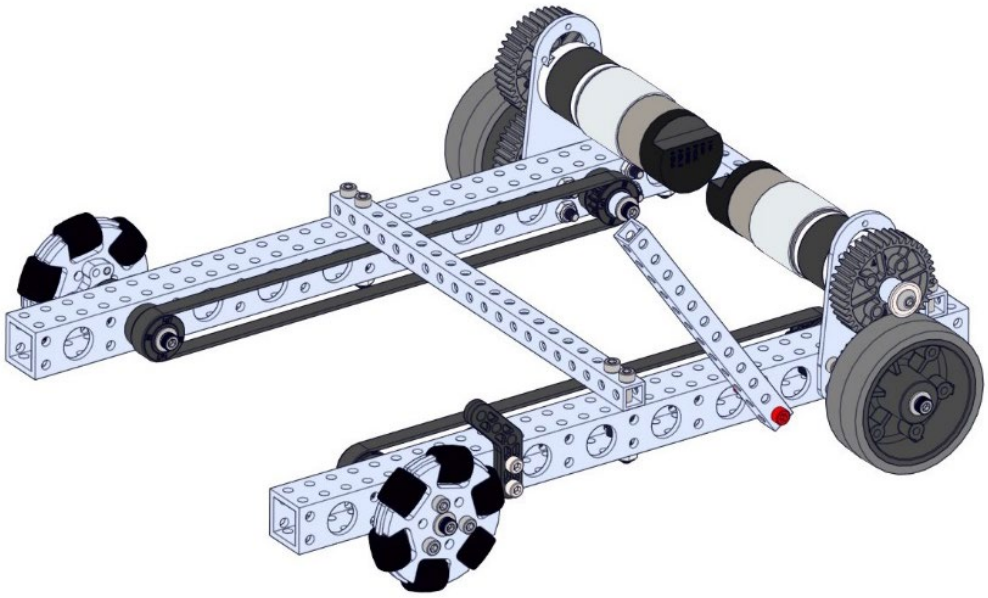
Part 1: Build the Tower

Use the following steps to build the right upright on the right drive module.

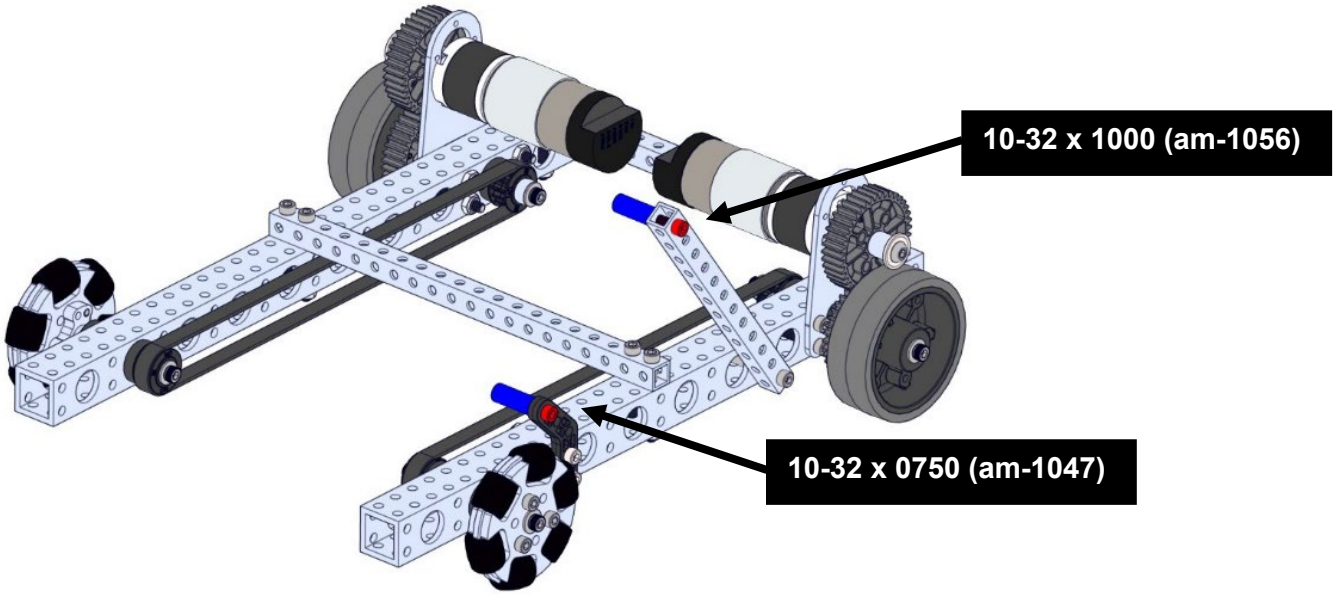
1. Place one 135° gusset (am-5010_135) on the right drive rail and secure with two 10-32 x 1500 inch screws (am-1014) and two 10-32 nylock jam nuts (am-1063).



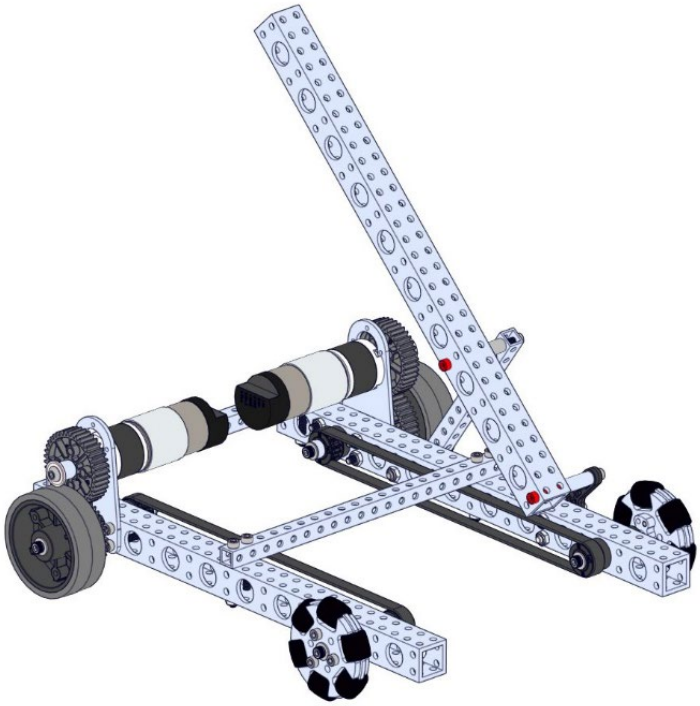
2. Locate one 0.5×0.5×6.0 Tube (am-5001-0600). Attach to the drive rail and secure with one 10-32 x 1750 inch screw (am-1048) and one 10-32 nylock jam nut (am-1063).

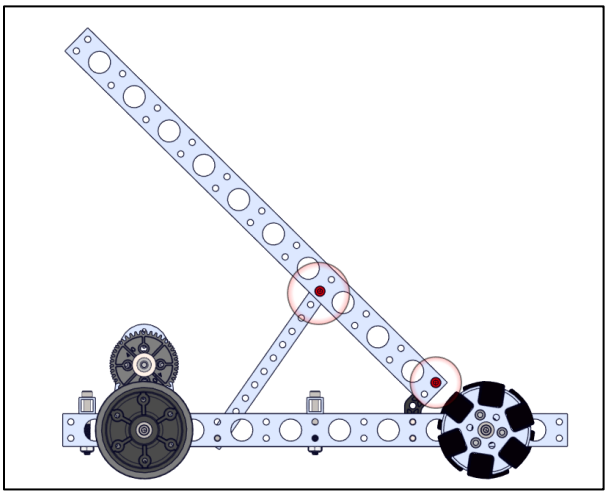


3. Install one 1 inch standoff (am-1701) to the top most hole of the 135° gusset with one 10-32 x 0750 screw (am-1047) and attach one 1 inch standoff (am-1701) to the top most hole of the 6 inch tube using one 10-32 x 1000 (am-1056) screw.



4. Install one 1.0×1.0×15.5 Tube (am-5002-1550) to the previously installed standoffs as shown using two 10-32 x 1500 screws (am-1014).

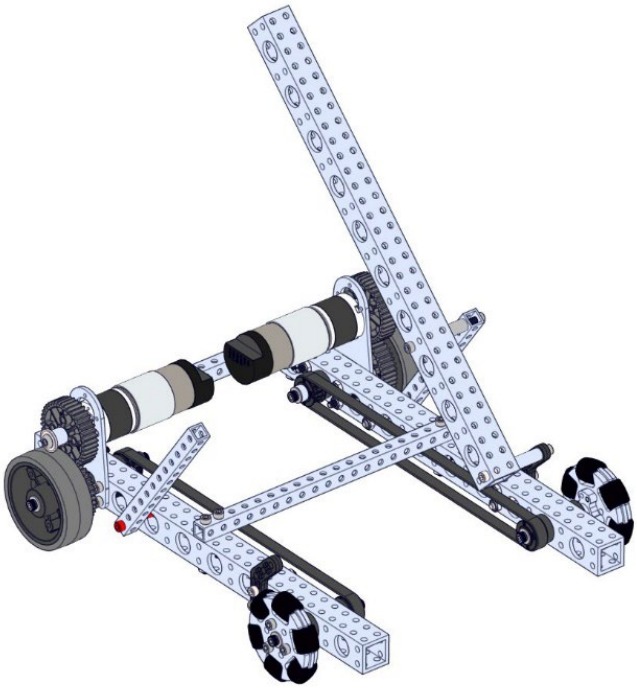




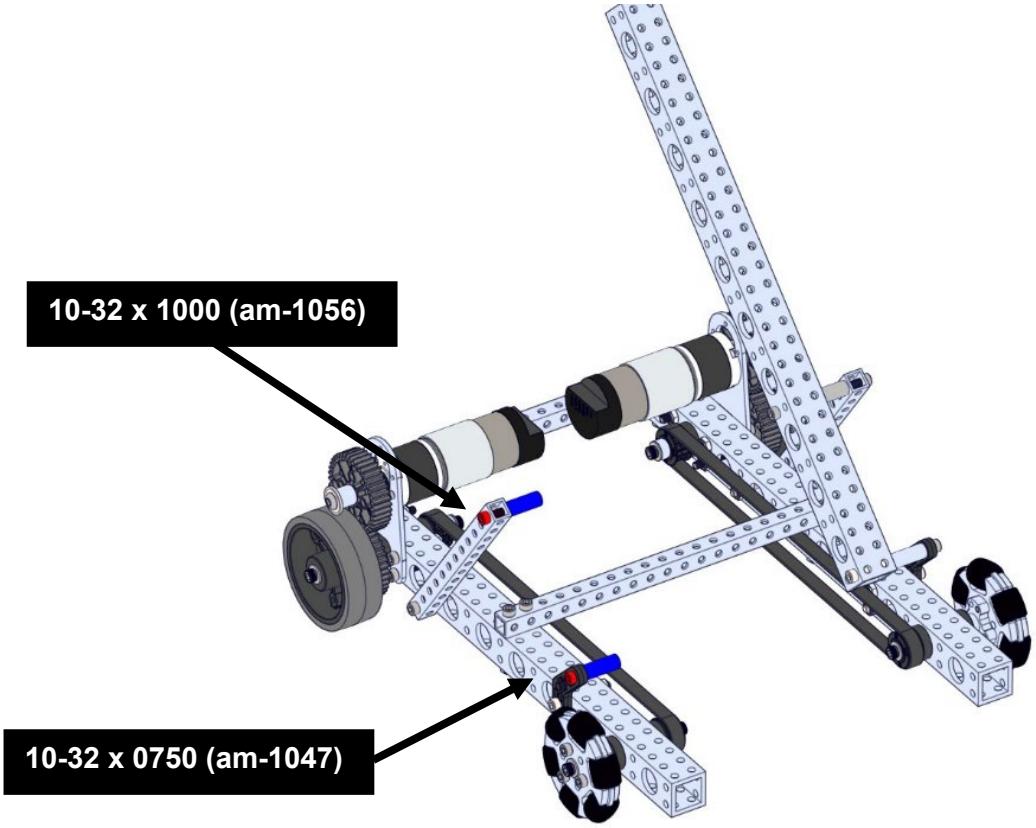
Use the following steps to repeat the process and build the left upright on the other drive module.

5. Place one 135° gusset (am-5010_135) on the left drive rail and secure with two 10-32 x 1500 (am-1014) inch screws and two 10-32 nylock jam nuts (am-1063).

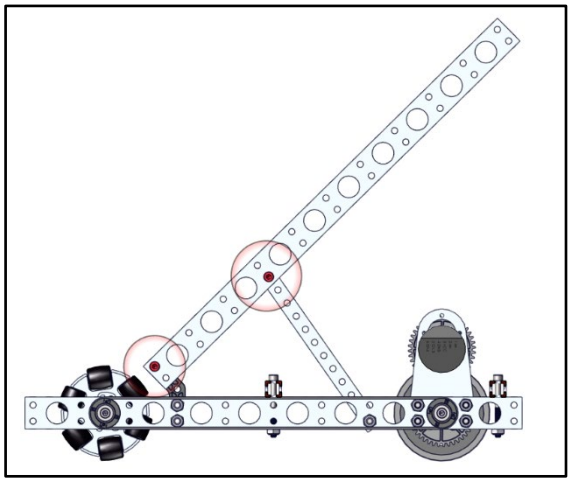
6. Locate one 0.5×0.5×6.0 Tube (am-5001-0600) to the drive rail and secure with one 10-32 x 1750 screw (am-1048) and one 10-32 nylock jam nut (am-1063).



7. Install one 1 inch standoff (am-1701) to the top most hole of the 135° gusset with one 10-32 x 0750 screw (am-1047) and attach one 1 inch standoff (am-1701) to the top most hole of the 6 inch tube using one 10-32 x 1000 (am-1056) screw.

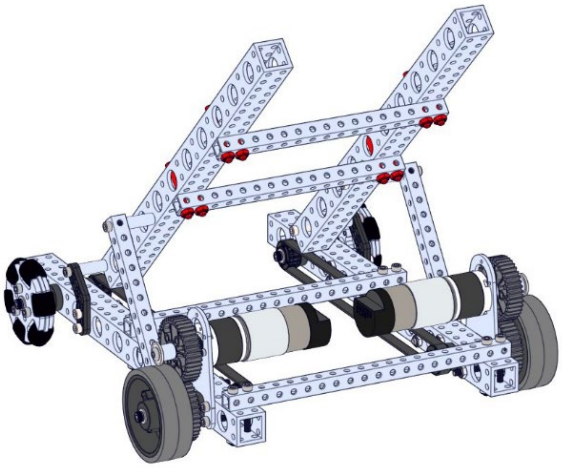


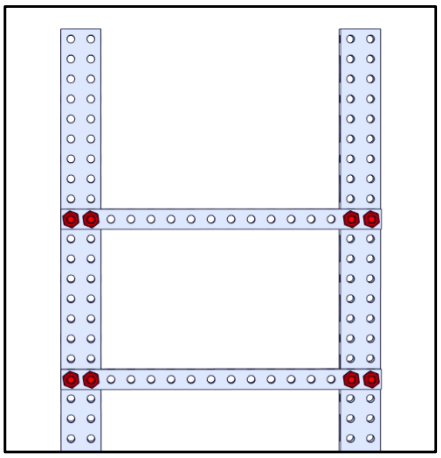
8. Install one 1.0×1.0×15.5 Tube (am-5002-1550) to the previously installed standoffs using two 10-32 x 1500 screws (am-1014).



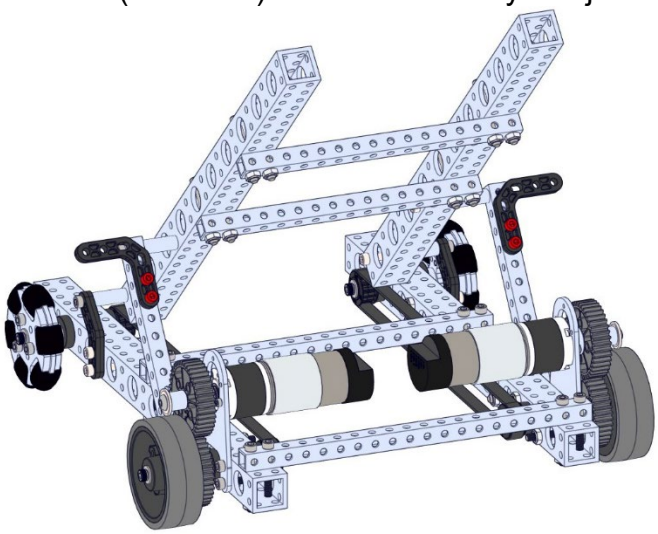
Install Cross Connects and Corner Gussets

9. Locate two 0.5×0.5×8.0 Tubes (am-5001-0800) to the uprights and secure with four 10-32 x 1750 screws (am-1048) and four 10-32 nylock jam nuts (am-1063) each.





10. Install two 3x3 Corner Gussets (am-5005_3x3) to each 6 inch tube using two 10-32 x 1000 screws (am-1056) and two 10-32 nylock jam nuts (am-1063) each



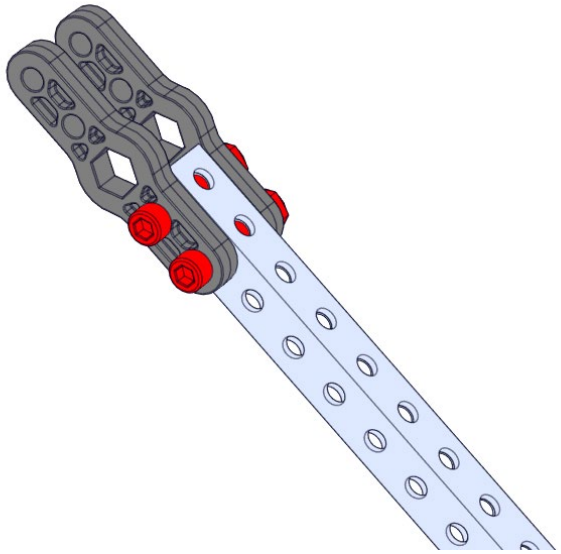
The tower assembly is complete.

Part 2: Build the Arm

Assemble Arm

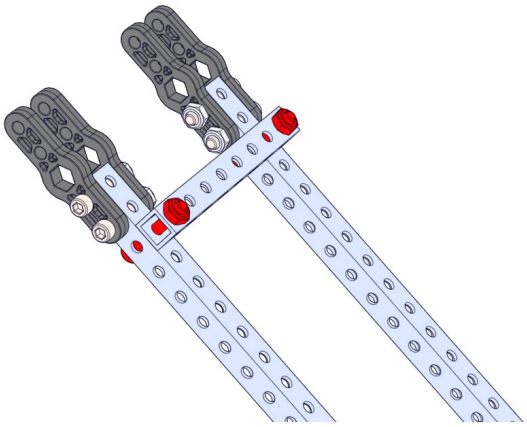
1. Fasten two Double End Shaft Carriers (am-5016) to the ends of one 0.5×0.5×16.0 Tube (am-5001-1600) using two 10-32 x 1250 screws (am-1041) and two 10-32 nylock jam nuts (am-1063).

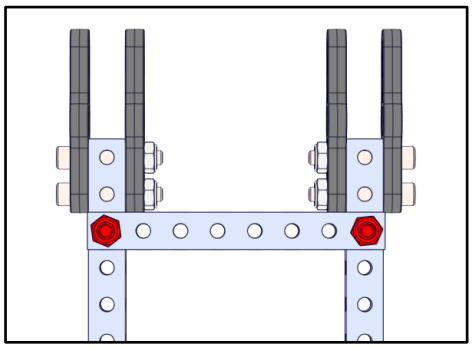
Repeat this step to create two arm segments.



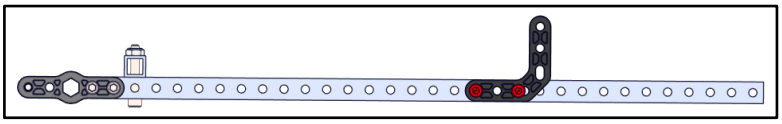
x2

2. Connect the arm segments using one 0.5×0.5×4.0 Tube (am-5001-0400) and fasten with two 10-32 x 1250 inch screws and two 10-32 nylock jam nuts (am-1063).

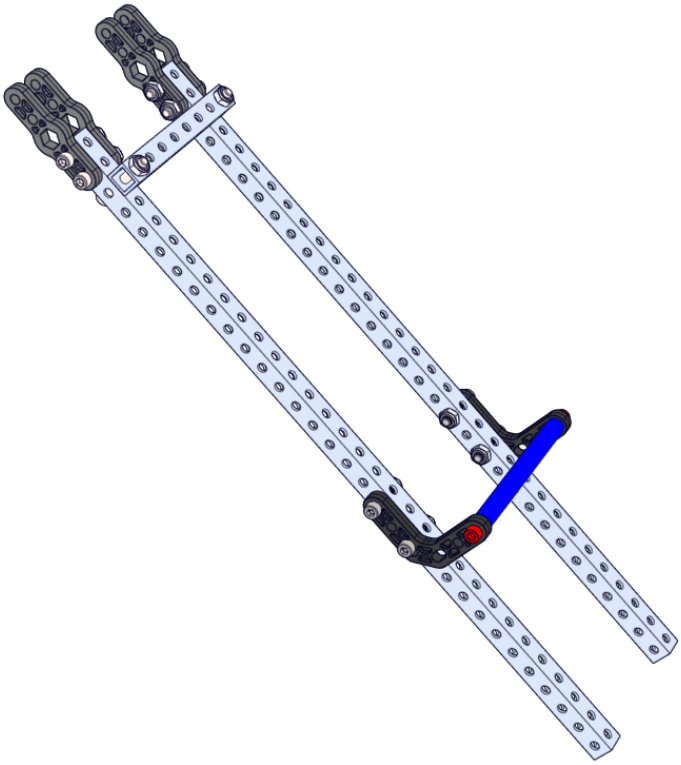




3. Install two 3x3 corner gussets (am-5005_3x3) to the side of the arm using two 10-32 x 1000 inch screws (am-1056) and two 10-32 nylock nuts (am-1063) each.

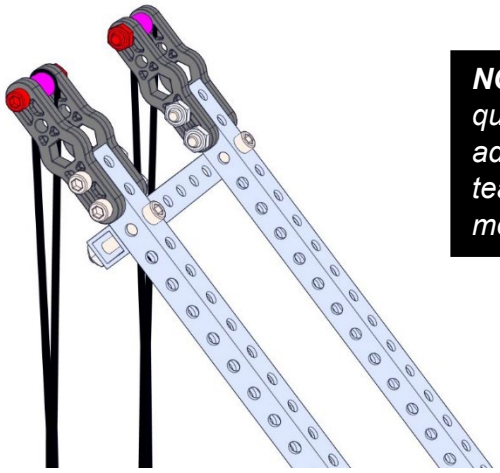


4. Connect the corner gussets using one 4 inch standoff (am-1704) using two 10-32 x 0750 screws (am-1047).



5. On the backside of the double end gusset, install one ½ inch long spacer (am-1697) with a few rubber bands (am-5024_black) and one 10-32 x 1250 screw (am-1041) and one 10-32 nylock jam nut (am-1063).

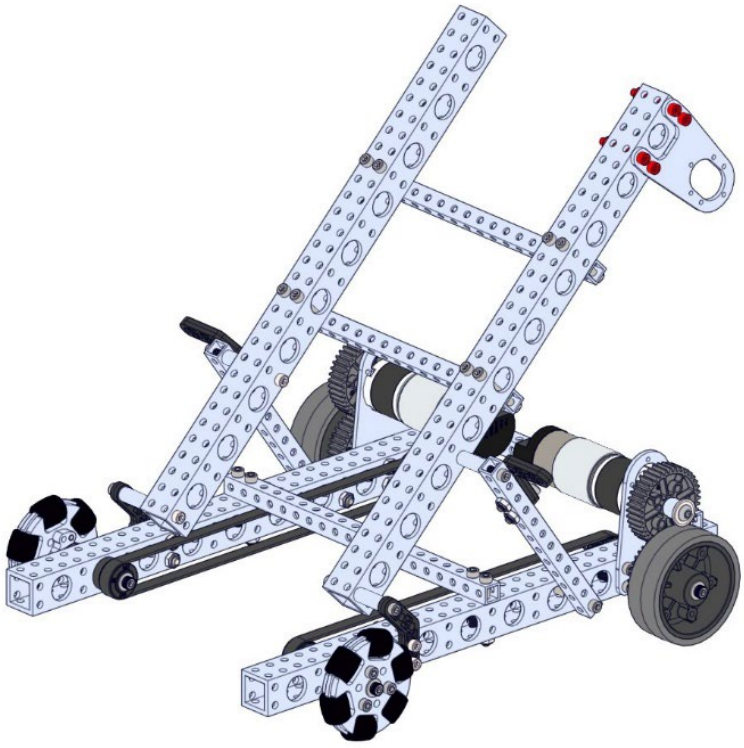
   Repeat this step for a total of two counter balance assemblies.

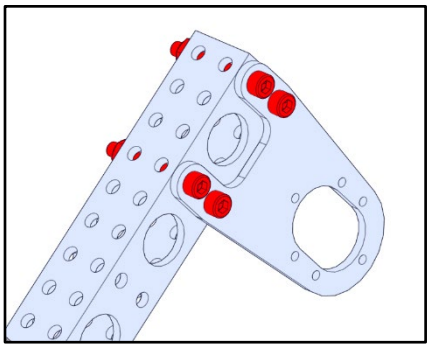


NOTE: *Rubber band quantity may need to be adjusted depending on team preference for arm motion*

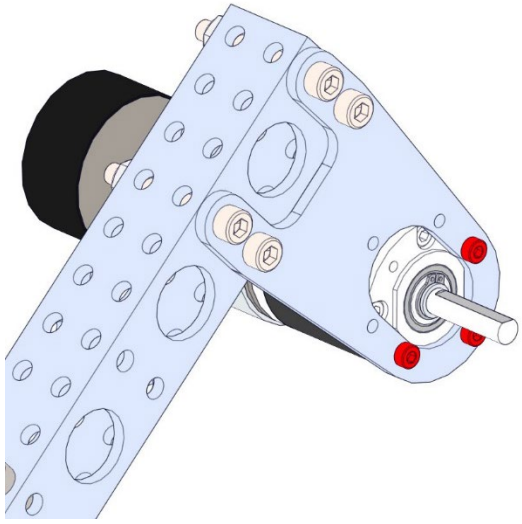
Install Motor

6. Install one 80-100T motor mount plate (am-5017) to the outside of the 1.0×1.0×15.5 Tube using four 10-32 x 1500 screws (am-1014) and four 10-32 nylock nuts (am-1063).

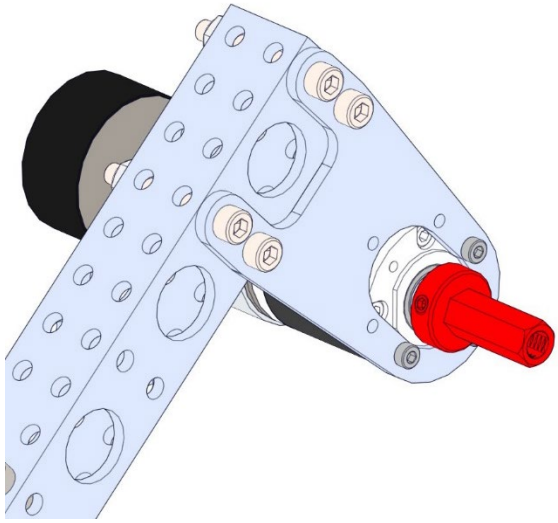




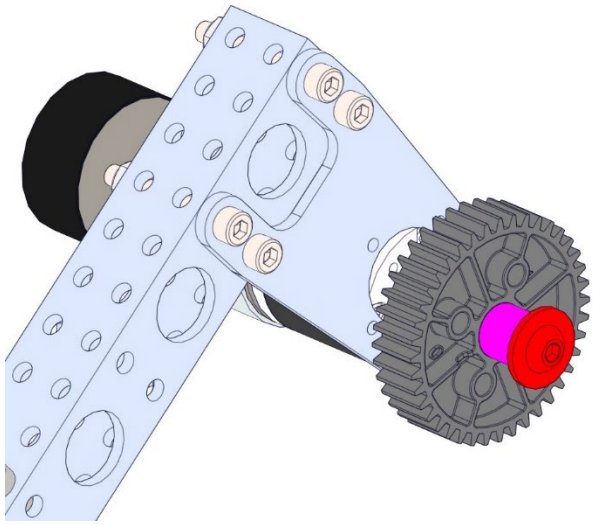
7. Install one NeveRest Orbital 50.9 gearmotor (am-4609b) to the motor mount plate using three M3-8mm patched screws (am-1500) in the three outermost mounting holes.



8. Place one 6mm to 375 Hex adapter (am-3444) on the motor shaft. Make sure to secure by tightening the provided 10-32 set screw.

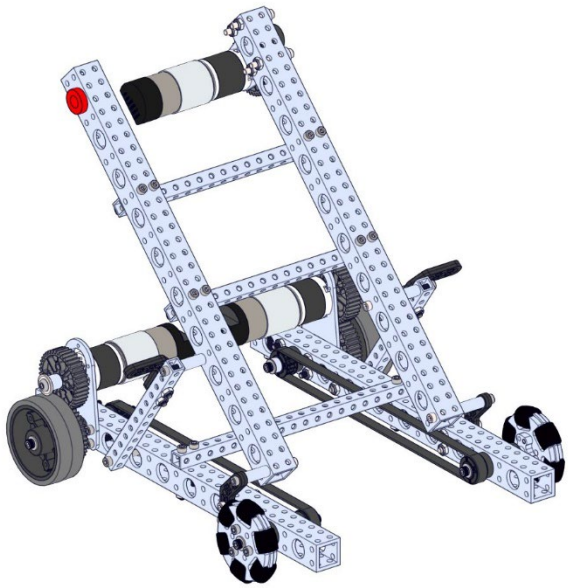


9. Slide one 40T gear (am-5020_40) and one ½ inch shaft spacer (am-1699). Retain the assembly with the ¼ inch washer and screw provided with the adapter.

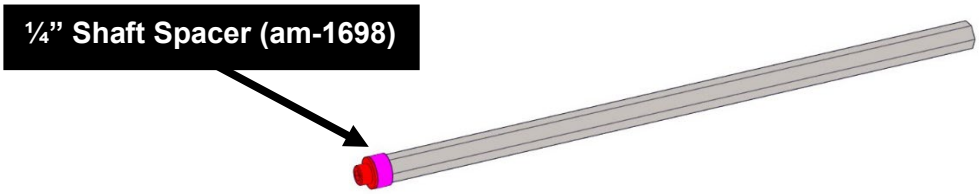


Install Arm

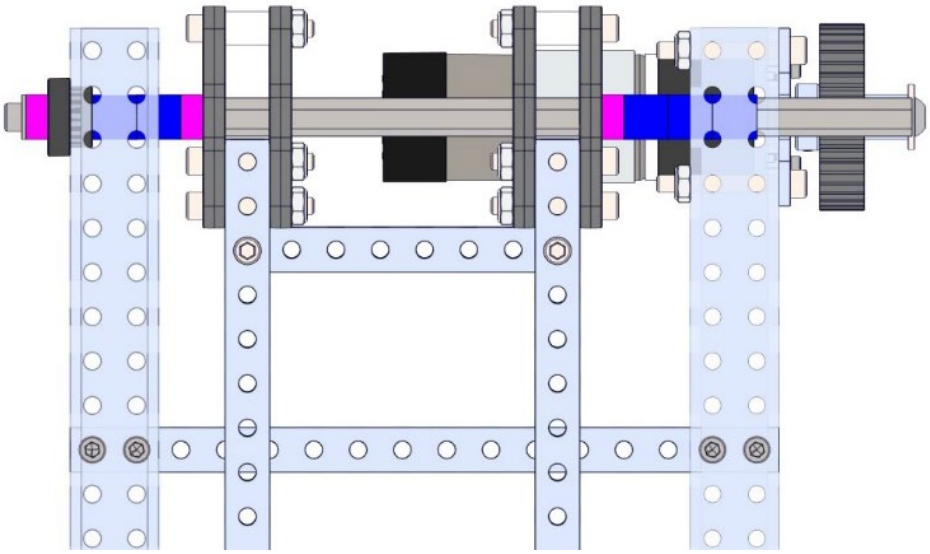
10. Insert one bushing (am-5021) into the top most hole in the tower upright.



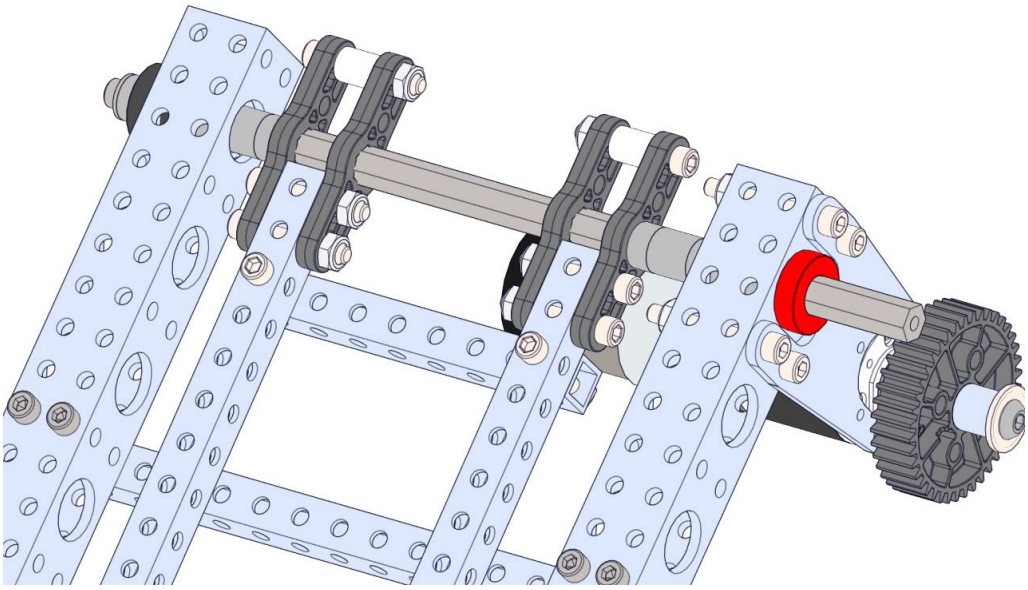
11. Prepare one 10 inch long shaft (am-5003-1000) by fastening the end with one 10-32 x 0500 screw (am-1002) and one #10 washer (am-1026). Slide one ¼ inch shaft spacer (am-1698) onto the shaft.



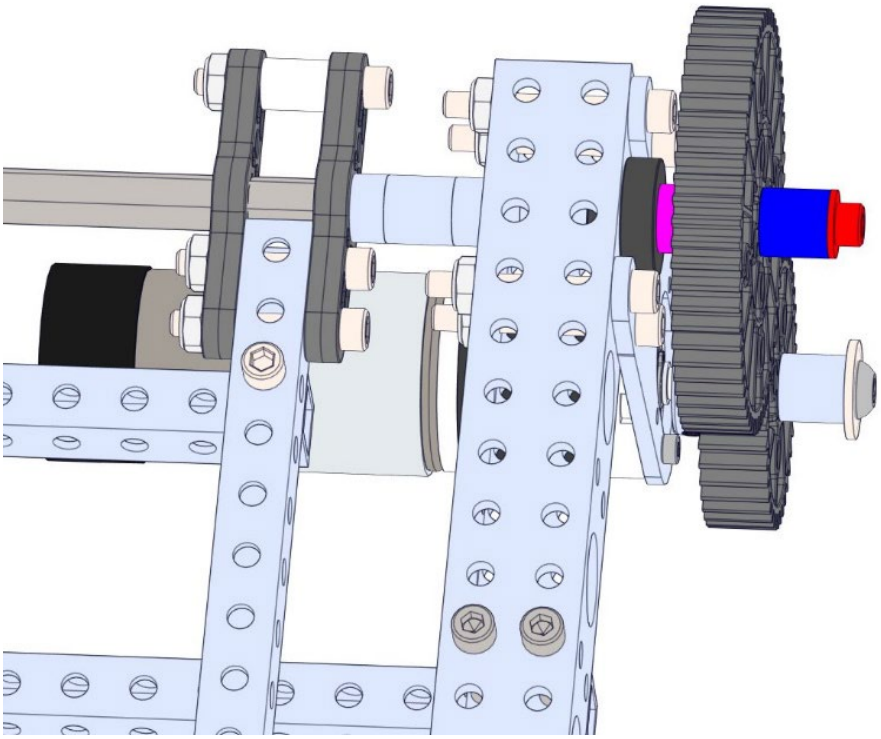
12. Move the arm into position and carefully insert the shaft assembly into the bushing on the tower upright. The shaft will slide through spacers and the arm assembly. To get the arm centered in the robot there will be two ½" shaft spacers (am-1699) and one ¼" (am-1698) shaft spacer on the non-motor side of the arm and there will be three ½" shaft spacers (am-1699) and one ¼" (am-1698) shaft spacer on the motor side of the arm.



13. Slide a bushing (am-5021) onto the shaft and into the other upright.



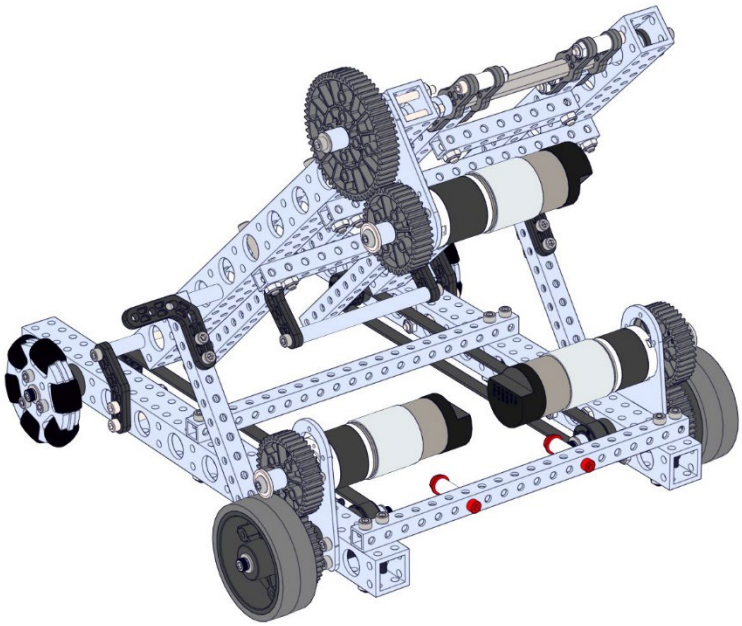
14. Slide one ¼ inch shaft spacer (am-1698) and one 60T gear (am-5020_60). Retain the gear using one ½ inch shaft spacer (am-1699) and one 10-32 x 0500 screw (am-1002) and one #10 washer (am-1026).



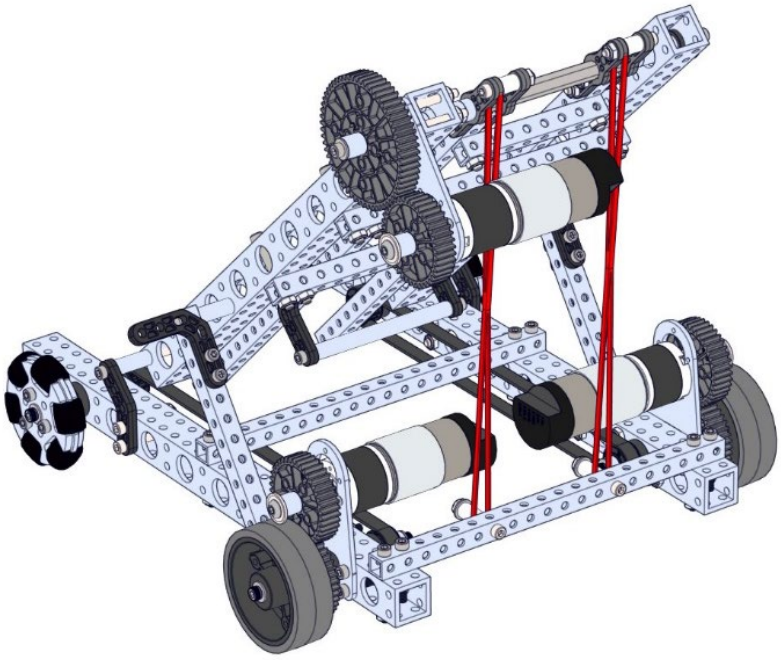
Install Counterbalance

15. In the rear frame cross tube, install one 10-32 x 1500 screw (am-1014) with one ¾" screw spacer (am-4107) spacer, one #10 washer (am-1026), and one 10-32 nylock jam nut (am-1063).

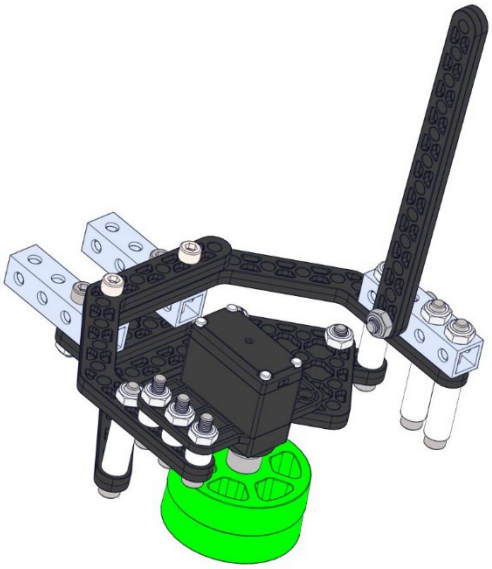
    Repeat this to make two counterbalance mounts.



16. Connect the rubber bands from the back of the arm to the counterbalance mounts on the chassis cross tube.

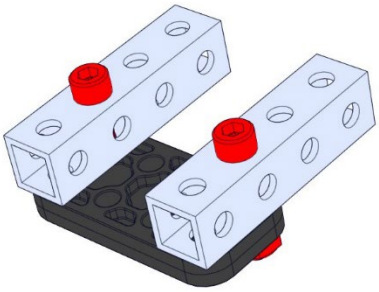


Part 3: Build the claw

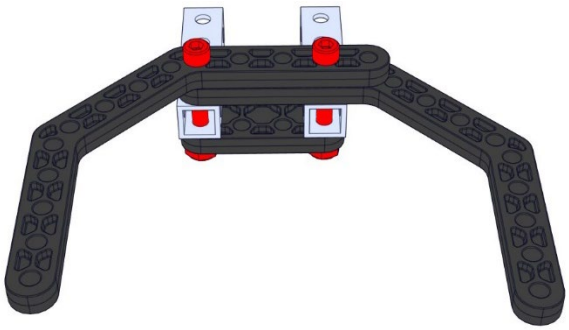


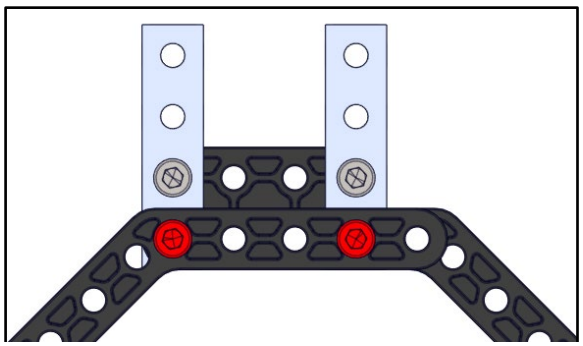
Assemble Claw

1. Install two 0.5×0.5×2.0 Tube (am-5001-0200) to one 2x4 plate (am-5006_2x4) using two 10-32 x 1000 screws (am-1056) and two 10-32 nylock jam nuts (am-1063)

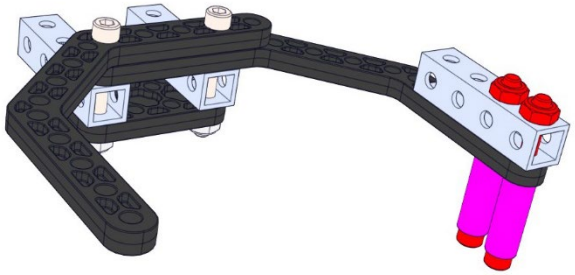


2. Fasten two 5x5 corner gussets (am-5005_5x5) to the assembly using two 10-32 x 1500 screws (am-1014) and two 10-32 nylock jam nuts (am-1063).

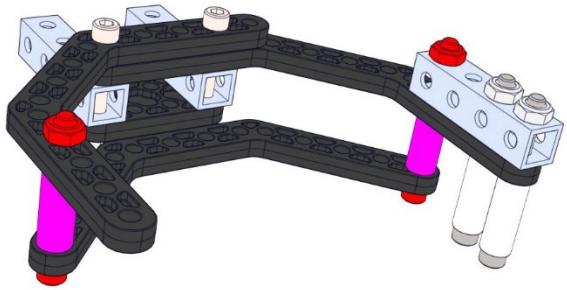




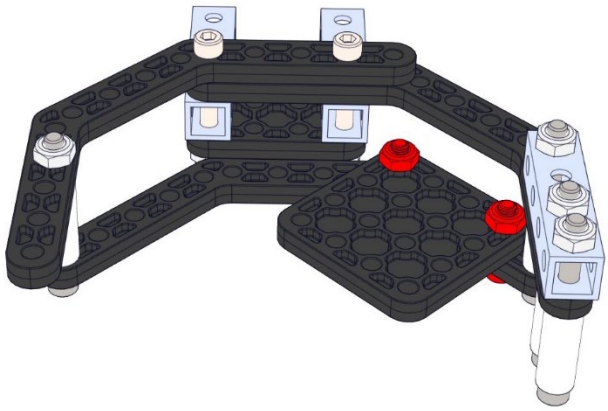
3. Fasten one 0.5×0.5×2.0 Tube (am-5001-0200) to the 5x5 corner gusset using two 10-32 x 2000 screws (am-1049), two 1 inch screw spacers (am-1696), and two 10-32 nylock jam nuts (am-1063).



4. Install one 5x5 corner gusset (am-5005_5x5) to the assembly using the following hardware:
   - **On the tube side,** use one 10-32 x 2000 screw (am-1049), one ¾ inch screw spacer (am-4107), and one 10-32 nylock jam nut (am-1063) to connect the edge hole of the bracket through the tube and assembly.
   - **On the non-tube side:** use one 10-32 x 1750 inch screw (am-1048), one 1 inch screw spacer (am-1696), and one 10-32 nylock jam nut (am-1063).



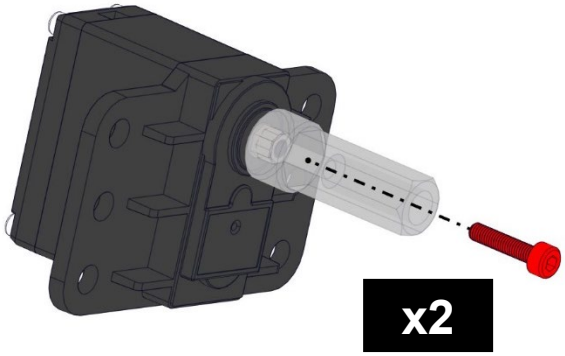
5. Fasten one 4x4 plate (am-5006_4x4) to the top side of the lower 5x5 corner gusset using two 10-32 x 0750 screws (am-1047) and two 10-32 nylock jam nuts (am-1063)



Assemble Servos and Adapters

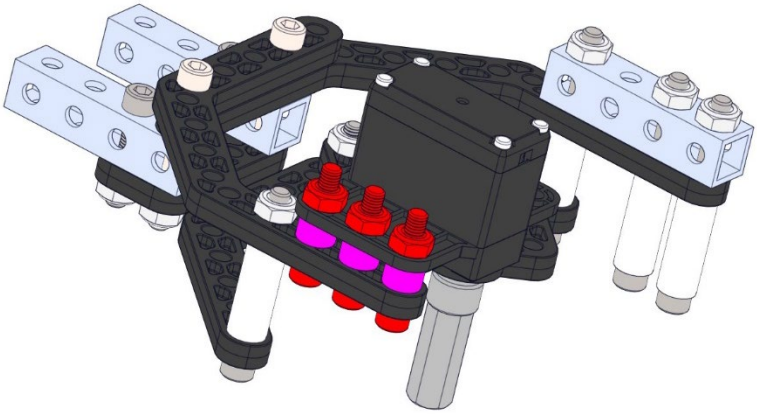
6. Install one 5mm to 375 Hex adapter (am-4957) to the end of the servo using the provided M3 x 14mm screw.

Repeat this process to make two servo assemblies.



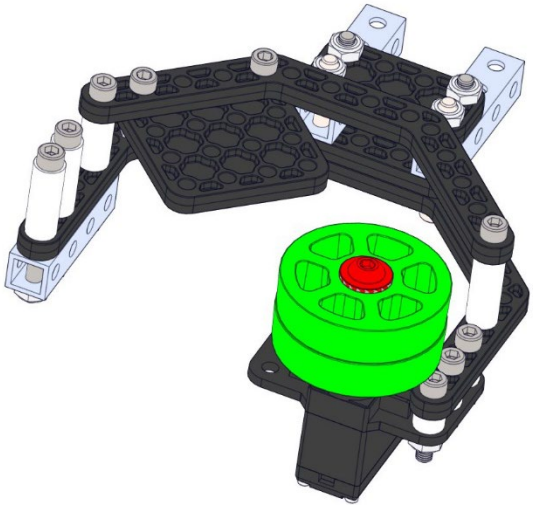
Install roller servo and linkage

7. Fasten one servo to the assembly using three 10-32 x 1000 screws (am-1056) with three ¼ inch screw spacers (am-1700) and three 10-32 nylock jam nuts (am-1063). The servo should be mounted to the 5x5 corner gusset opposite the tube and standoffs with the servo shaft facing the direction as the standoffs.

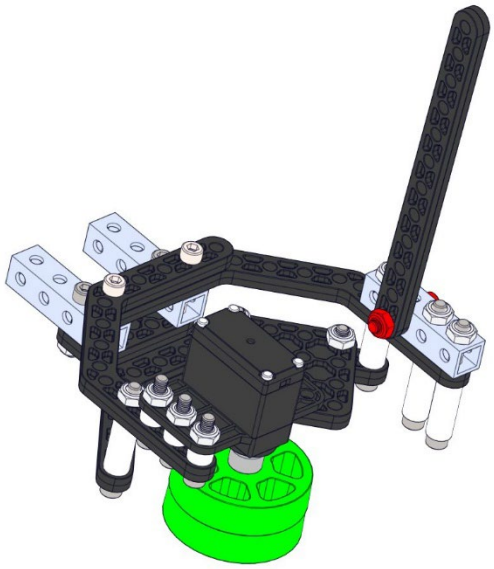


NOTE: *The roller servo will need to be set for continuous rotation mode.*

8. Turn the assembly over and slide two 2 in. Compliant Wheels (am-3571_green) onto the servo shaft. Retain the assembly with the ¼ inch washer and screw provided with the adapter.



9. Loosely fasten one 1x12 beam (am-5011_1x12) to the claw using one 10-32 x 1000 screw (am-1056) and one 10-32 nylock jam nut (am-1063).

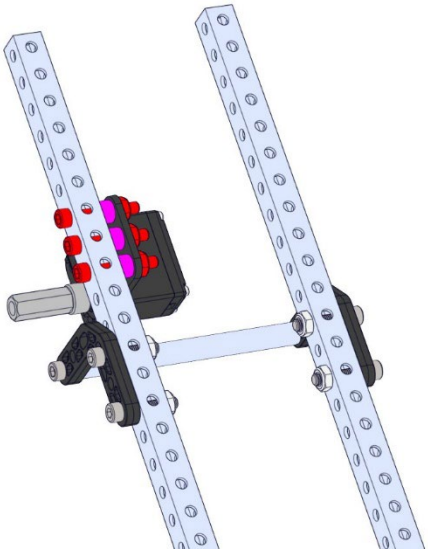


NOTE: *The screw should be tight enough to minimize side to side movement but still be loose enough to rotate.*

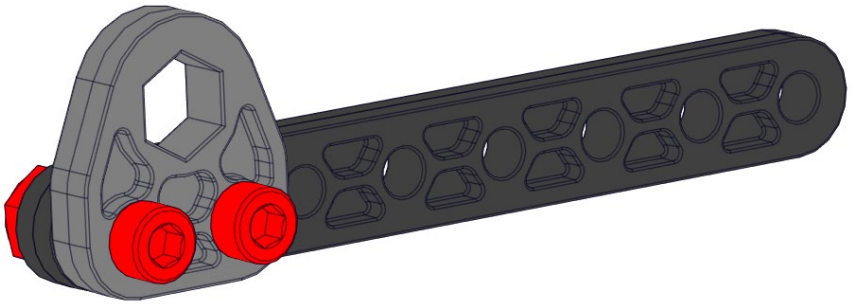
Install Wrist Servo

Raise the arm up for access.

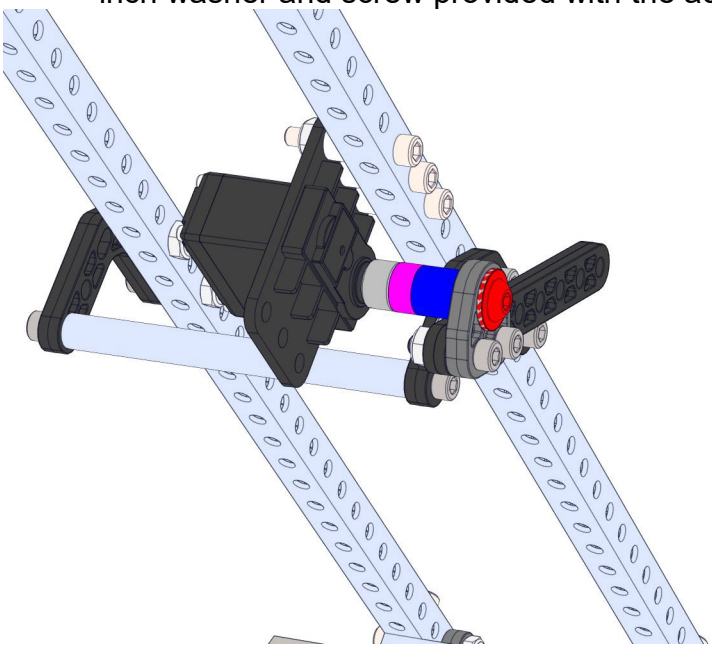
10. Fasten one servo assembly to the arm as shown using three 10-32 x 1250 screws (am-1041) with three ¼ inch screw spacers (am-1700) and three 10-32 nylock jam nuts (am-1063).



11. Install one side shaft carrier (am-5015) to the outside of one 1x8 beam (am-5011_1x8) using two 10-32 x 0750 screws (am-1047) and two 10-32 nylock jam nuts (am-1063).

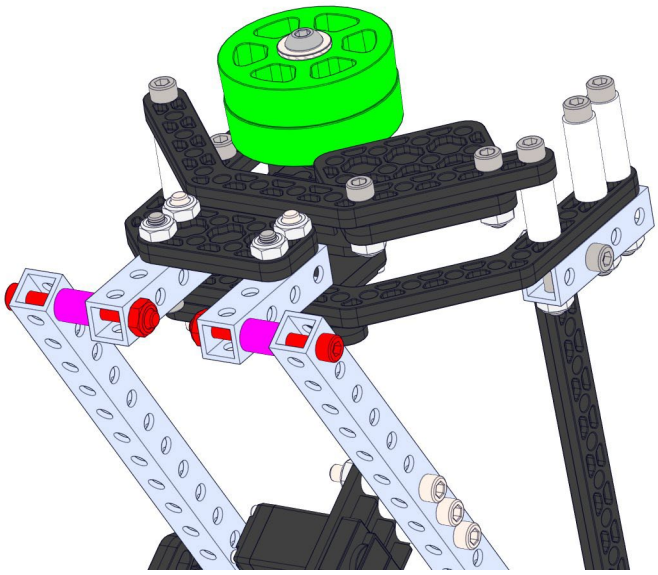


12. Slide the shaft carrier assembly onto the wrist servo with one ¼ inch shaft spacer (am-1698), one ½ inch shaft spacer (am-1699) between the servo and the assembly. Retain with the ¼ inch washer and screw provided with the adapter.



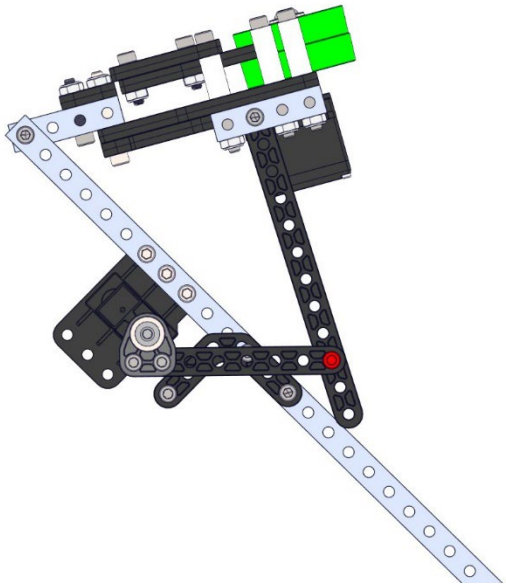
Install Claw

13. Move the claw into position and loosely install two 10-32 x 1750 screws (am-1048) with two 10-32 nylock jam nuts (am-1063). A ½ inch screw spacer (am-1697) should be placed on either side of the claw.



NOTE: *The screws should be tight enough to minimize side to side movement but still be loose enough to rotate.*

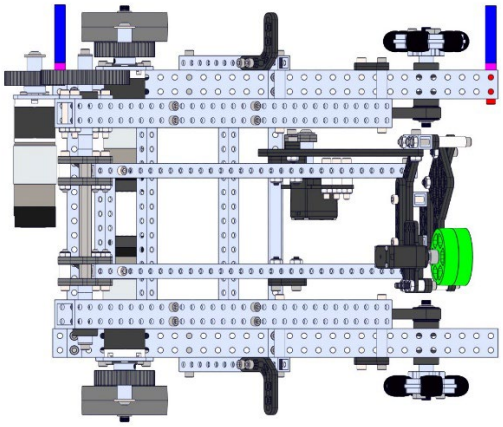
14. Pin the two linkage assemblies together as shown using one 10-32 x 0750 screw (am-1047) with one 10-32 nylock jam nuts (am-1063). The end of the linkage from the servo should align and attach to the third hole in the link from the claw.

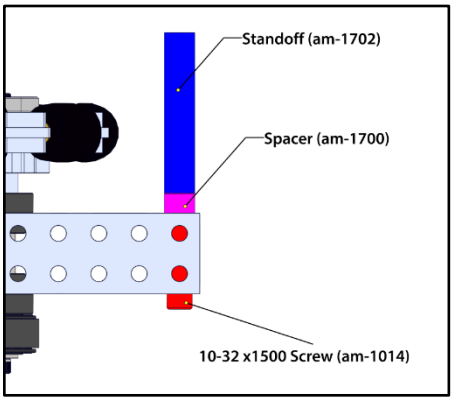


NOTE: *The screws should be tight enough to minimize side to side movement but still be loose enough to rotate.*

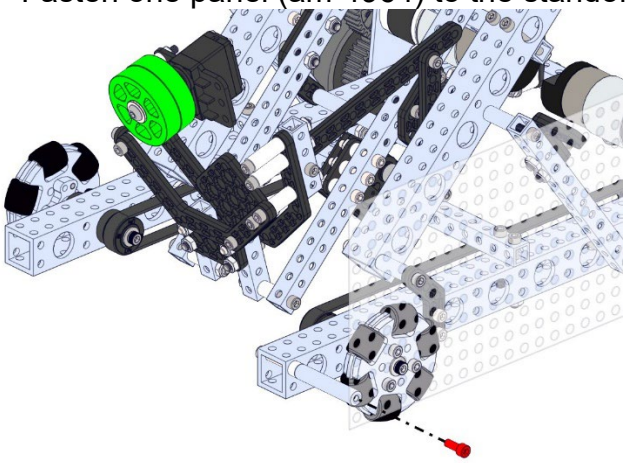
Part 4: Add Panels

1. Insert two 10-32 x 1500 screws (am-1014) in the right drive tube and secure with two ¼" screw spacers (am-1700) and two 2 inch standoffs (am-1702).

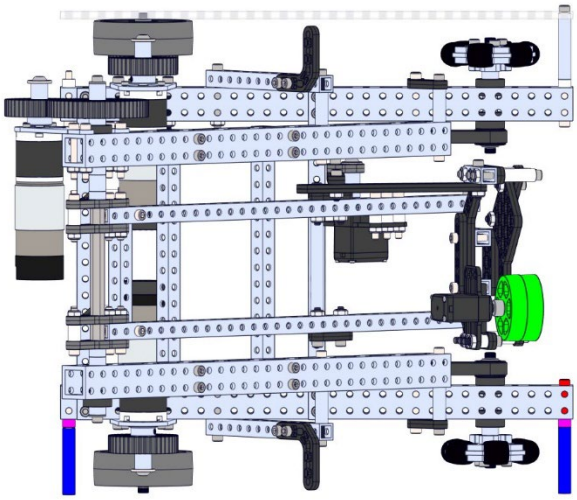


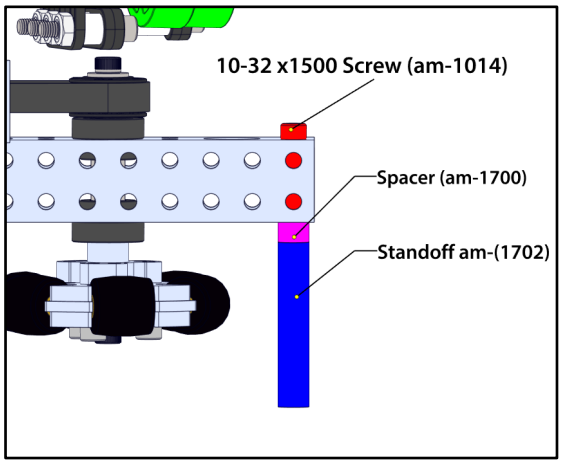


2. Fasten one panel (am-4964) to the standoffs using two 10-32 x 0500 screws (am-1002).

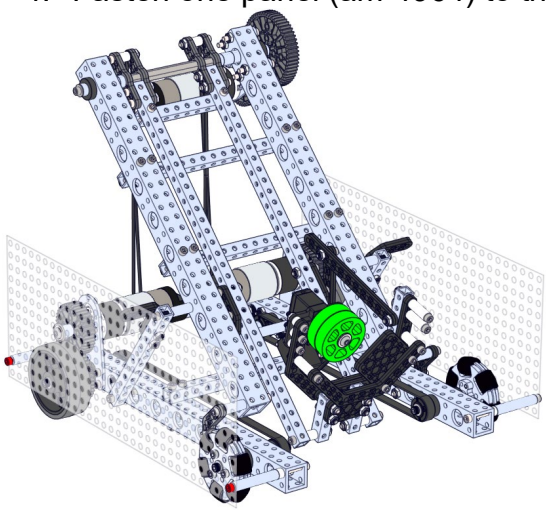


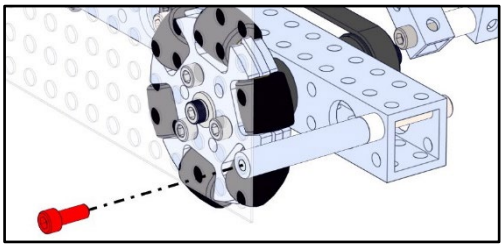
3. Insert two 10-32 x 1500 screws (am-1014) in the other drive tube and secure with two ¼ inch screw spacers (am-1700) and two 2 inch standoffs (am-1702).



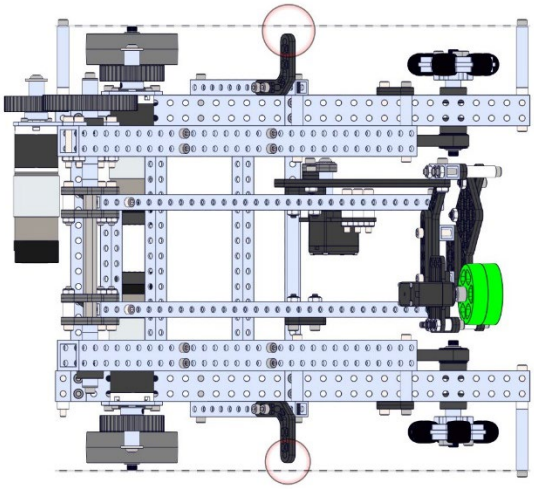


4. Fasten one panel (am-4964) to the standoffs using two 10-32 x 0500 screws (am-1002).





5. Fasten each panel to the 3x3 corner gussets on the tower using one cable tie (am-1589_black) on each side.



The Robits CENTERSTAGE Robot is complete!