EV Challenge Kart Assembly Instructions



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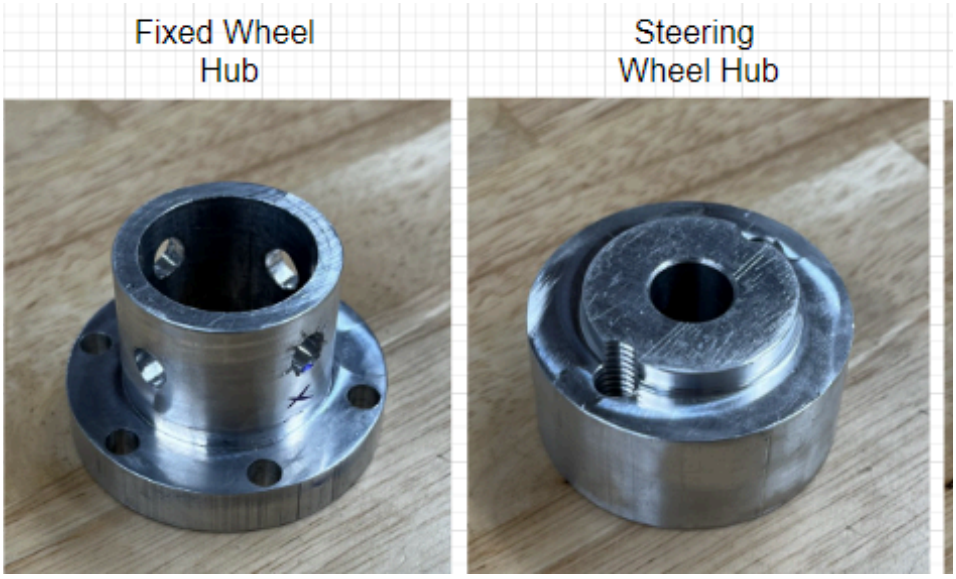
Introduction

These are the assembly directions for a kart compatible with the 2026 Electric Vehicle Challenge. The kit contains a welded chassis, a set of custom parts, and a fastener kit. It does not include the wheels, motor, sprockets, chain, brakes, electronics, bumper, or body. The Parts to be Purchased lists these parts to facilitate building a complete kart.

The kart design is a starting point in the EV challenge. Teams are encouraged to build the base kart first and then drive it to test performance. I recommend that teams adjust the wheels and steering to optimize kart performance. This will significantly improve the performance, has no monetary cost, requires moderate effort, and teaches the value of the test/improve feedback cycle. Teams can consider additional modifications once the steering adjustments have been implemented and tested. I recommend considering each modification in terms of expected improvement, monetary cost, and effort cost. These are some items to consider: reducing weight (hint: driver weight is the most significant single item), optimal batteries (weight), freewheeling (included), optimal tires and tire pressure, optimal gear ratio based on race course, rolling resistance, drive friction, gearbox or shifting, speed controller (electrical efficiency), and lastly, aerodynamics.

Custom Parts:





Fastener Kit



Parts to be Purchased

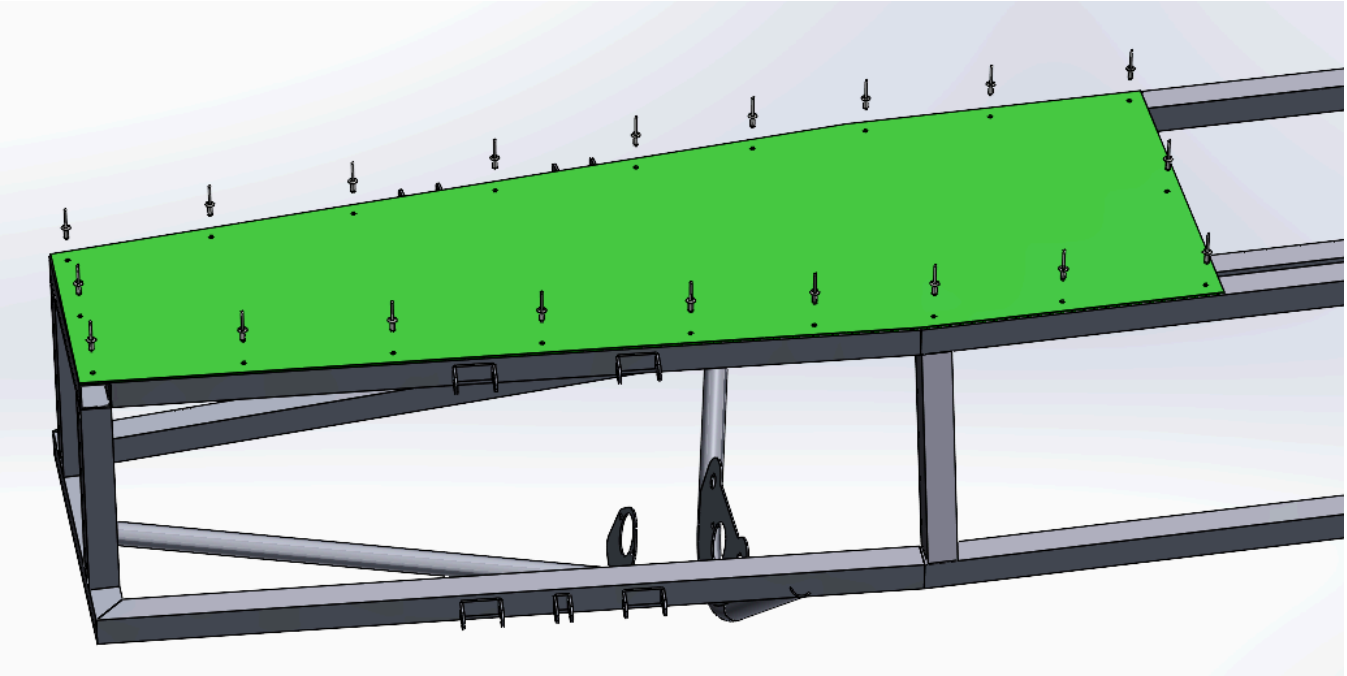
This is a list of the parts to complete a 2026 EV Challenge rules-compliant kart. The kart chassis has hole patterns compatible with the disk brake calipers, wheel hubs, sprockets, and the motor specified below.

Item	QTY	System	Supplier	Notes
Steering Wheel	1	Steering	Amazon	
Hydraulic Brakes	1	Brakes	Amazon	160mm compatible. Set of two.
Hydraulic Brake Bracket	1	Brakes	Amazon	This replaces one of the brackets that comes with the Hydraulic Brakes
8mm Chain	1	Drive	Electric Scooter Parts	
Motor Sprocket 9t - 15t	1	Drive	Electric Scooter parts	Recommend 11t with 10t for testing
Motor	1	Drive	Electric Scooter parts	MY1020, 24v, 500w, 250RPM Item # MOT-24500X2500B
Freewheel Clutch	1	Drive	Electric Scooter parts	Item # FWM-175
Freewheel Clutch Adaptor	1	Drive	Electric Scooter parts	Item # FWM-ADAPTER1
Cycle Analyst	1	Electronics	Grin/e-bike	EV Challenge Rules require this exact part
Accelerator Button	1	Electronics	Amazon	
Horn Button	1	Electronics	Amazon	
Horn	1	Electronics	Amazon	
24V negative block	1	Electronics	Amazon	

12v Positive and Negative Block	1	Electronics	Amazon	
5A Fuse	1	Electronics	Amazon	Choose the 5A fuse on Amazon.
5A Fuse Holder	1	Electronics	Amazon	
100A Circuit Breaker	1	Electronics	Amazon	
Emergency Shut Off	2	Electronics	Amazon	
24V to 12V Converter	1	Electronics	Amazon	
Relay	1	Electronics	Amazon	
Brake Light	1	Electronics	Amazon	
Anderson SB50 Connectors	2	Electronics	Amazon	1 for each battery
Anderson SB50 Connectors	2	Electronics	Amazon	Rules require Gray on the motor
10AWG Wire	1	Electronics	Amazon	Wire for 24v electronics
18AWG Wire	1	Electronics	Amazon	Wire for 12v electronics
10AWG Connectors	1	Electronics	Amazon	
18AWG Connectors	1	Electronics	Amazon	
Battery (12AH)	1	Electronics	Amazon	
Tubes	4	Wheels		20" tube

Tires	4	Wheels		20" tire, skinnier and higher-pressure tires have a lower rolling resistance
Hubs	4	Wheels	Amazon	Kart was designed based on this hub. 110mm length, 20mm axle. Buy or build wheels based on hub.
Rim	4	Wheels		36 hole 20" rim.
Five-point harness	1	Safety	Amazon	Requires fasteners not included in the kit. Holes are 5/16"
Loctite Blue 242	1	Tools	Amazon	Use on all scews thatt don't have a nyloc nut

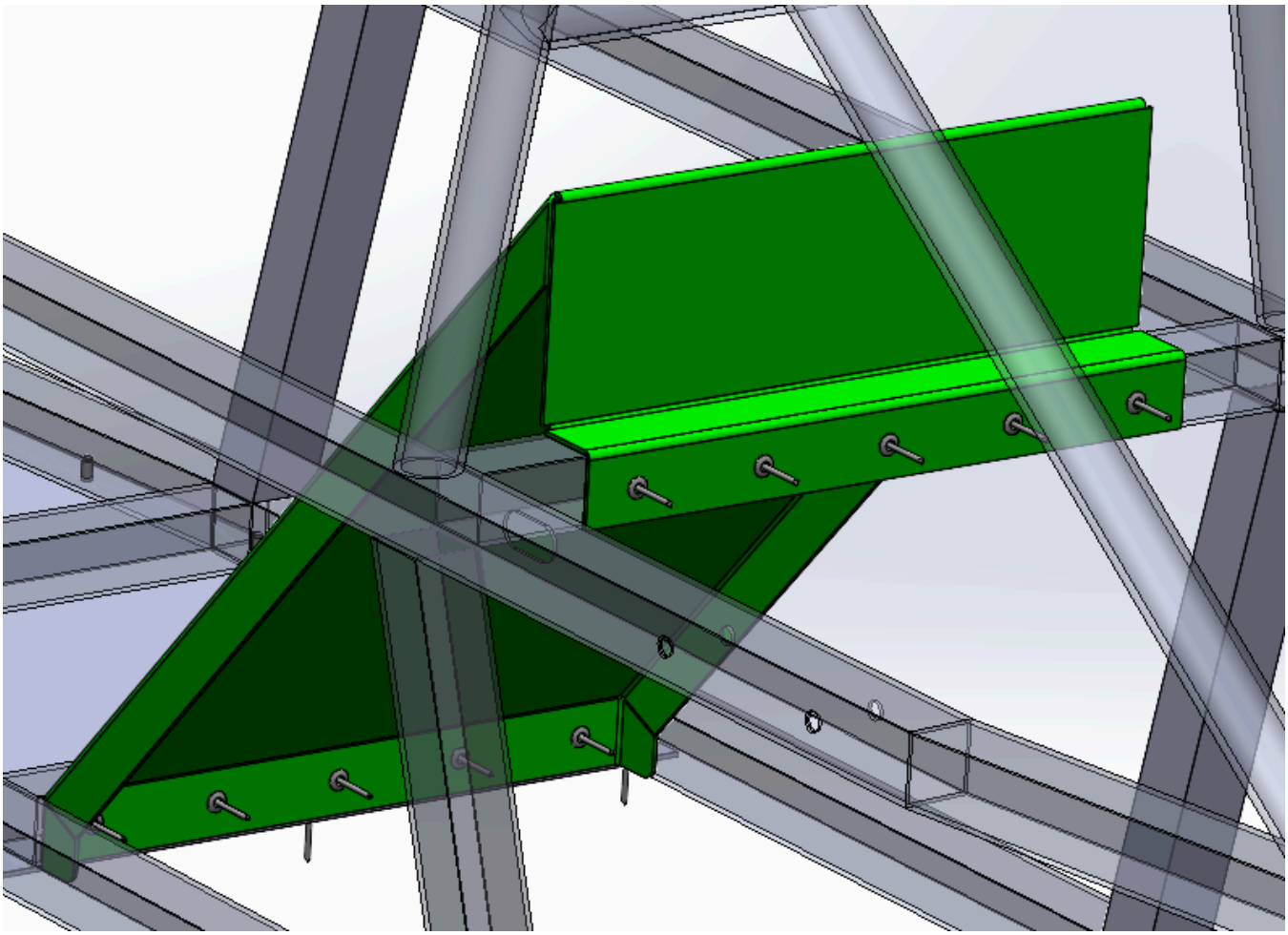
Belly Pan



20x 3/16” Rivets
1x Belly Pan

Align the belly pan with the bottom of the chassis. Match drill 3/16” holes into the bottom of the chassis. Rivet the belly pan to the chassis using 3/16” rivets.

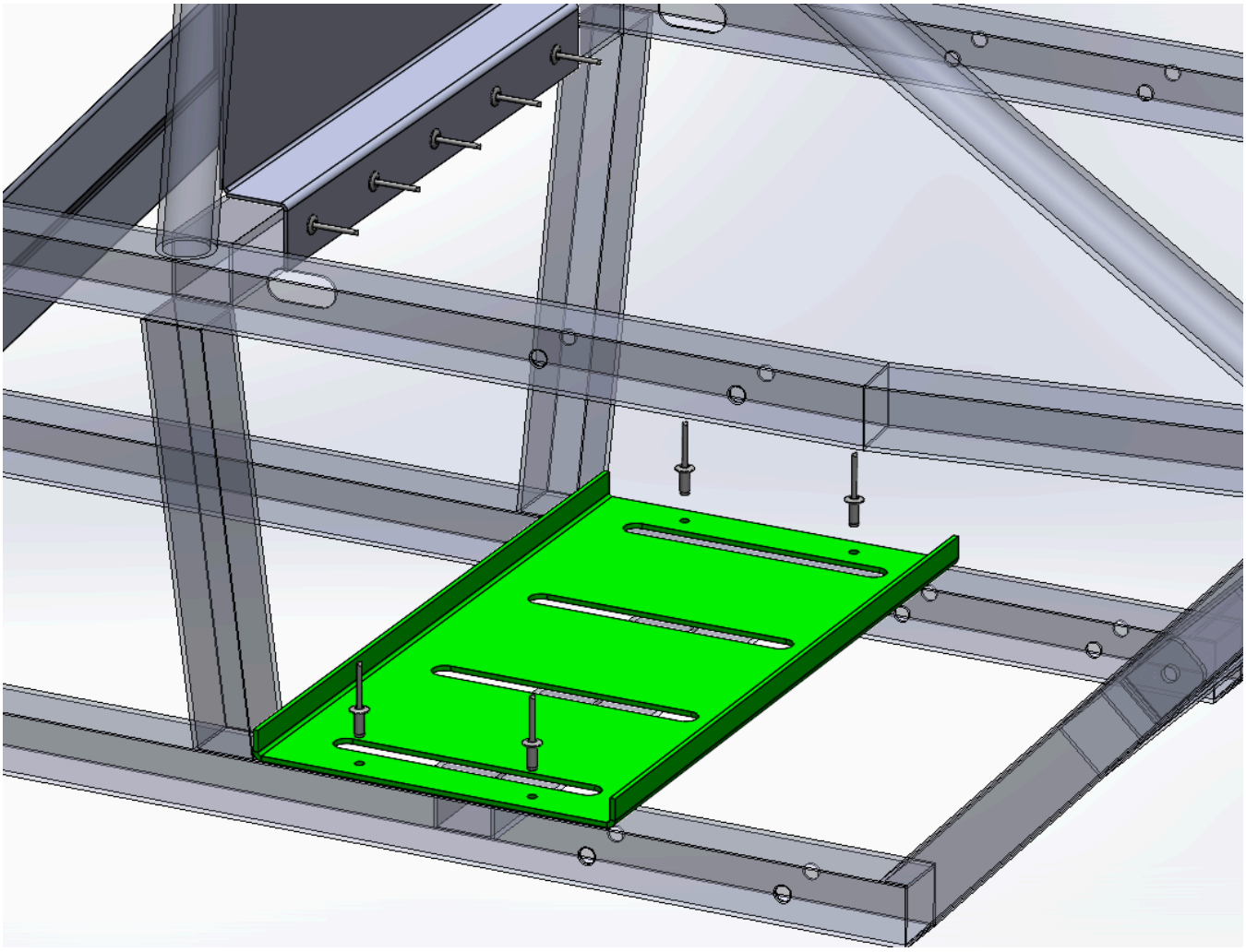
Seat



10x 3/16” Rivets
1x Seat

Align seat.
Match drill 3/16” Holes into frame.
Consider how you plan to mount your electronics board before riveting the seat.
Rivet the seat into the chassis using 3/16” rivets.

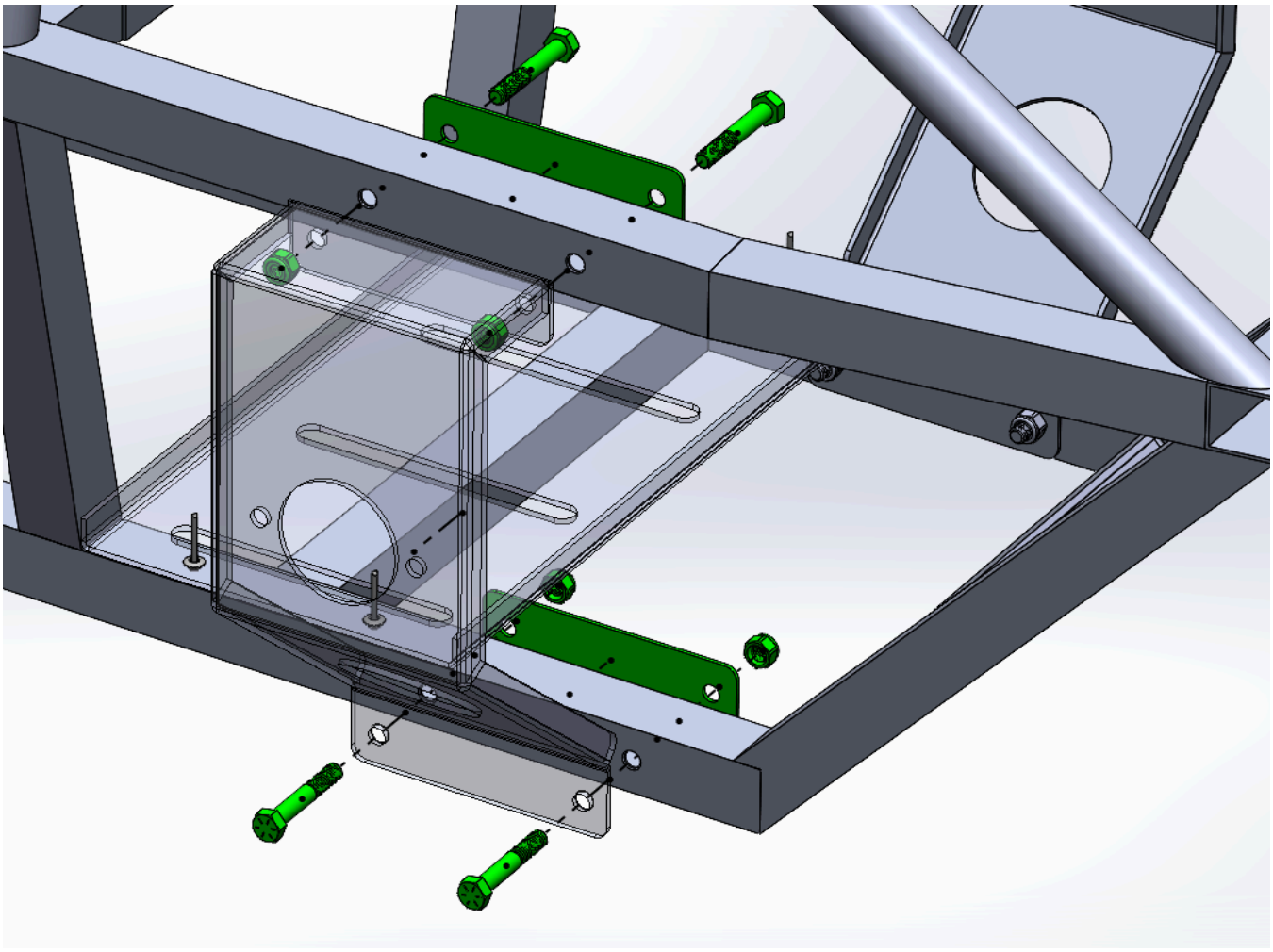
Battery Plate



4x 3/16” Rivets
1x Battery Plate

Align Battery Plate. Match drill 3/16” Holes into frame. Rivet the battery plate into the chassis using 3/16” rivets.

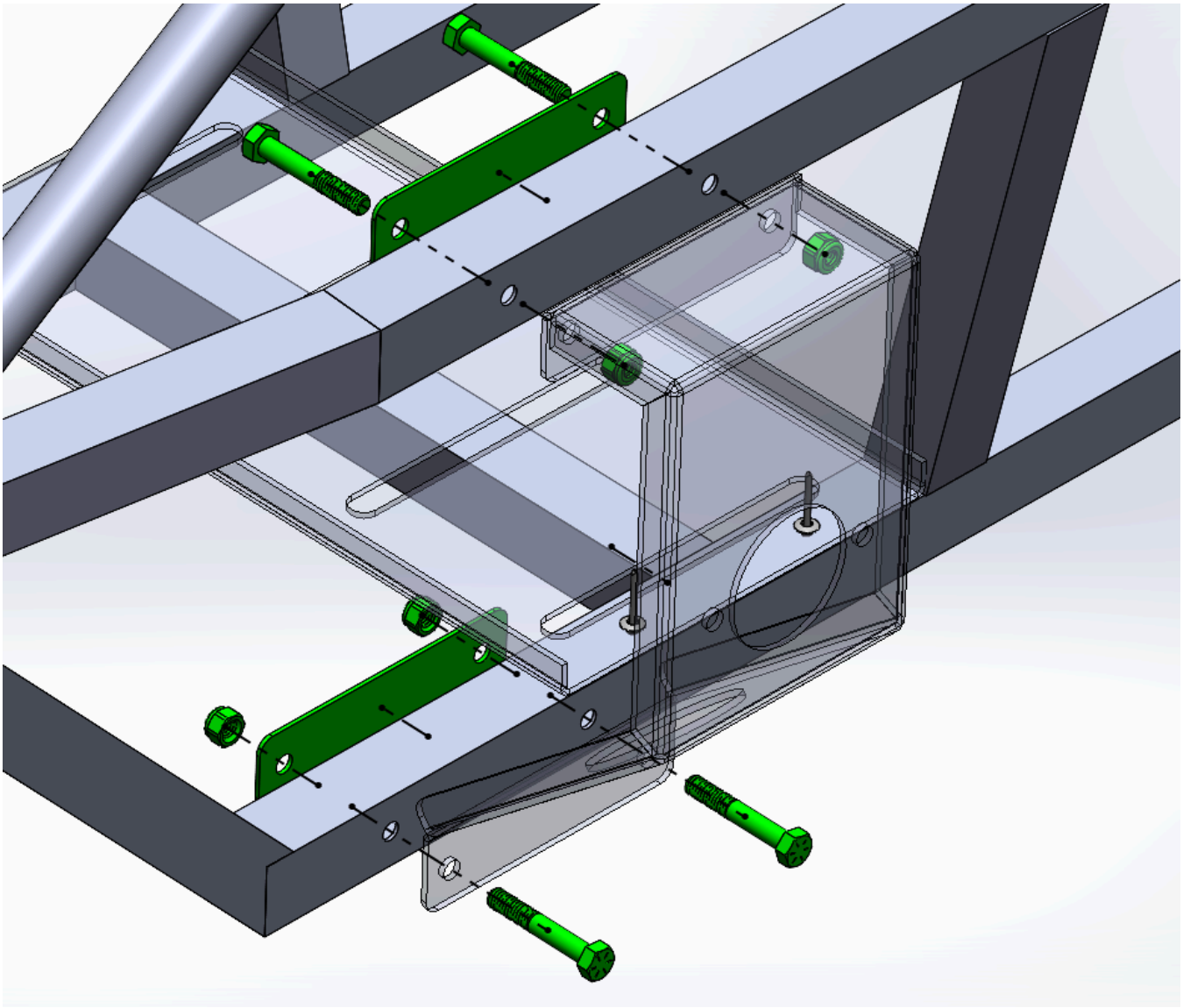
Left Rear Bearing Support



1x Rear Bearing Support
4x 2” 5/16-18 Hex Head Bolt
4x 5/16-18 Nylon Nut
2x Crush Plate

Attach, but do not tighten the nuts; we will need them loose when we attach the chain guard

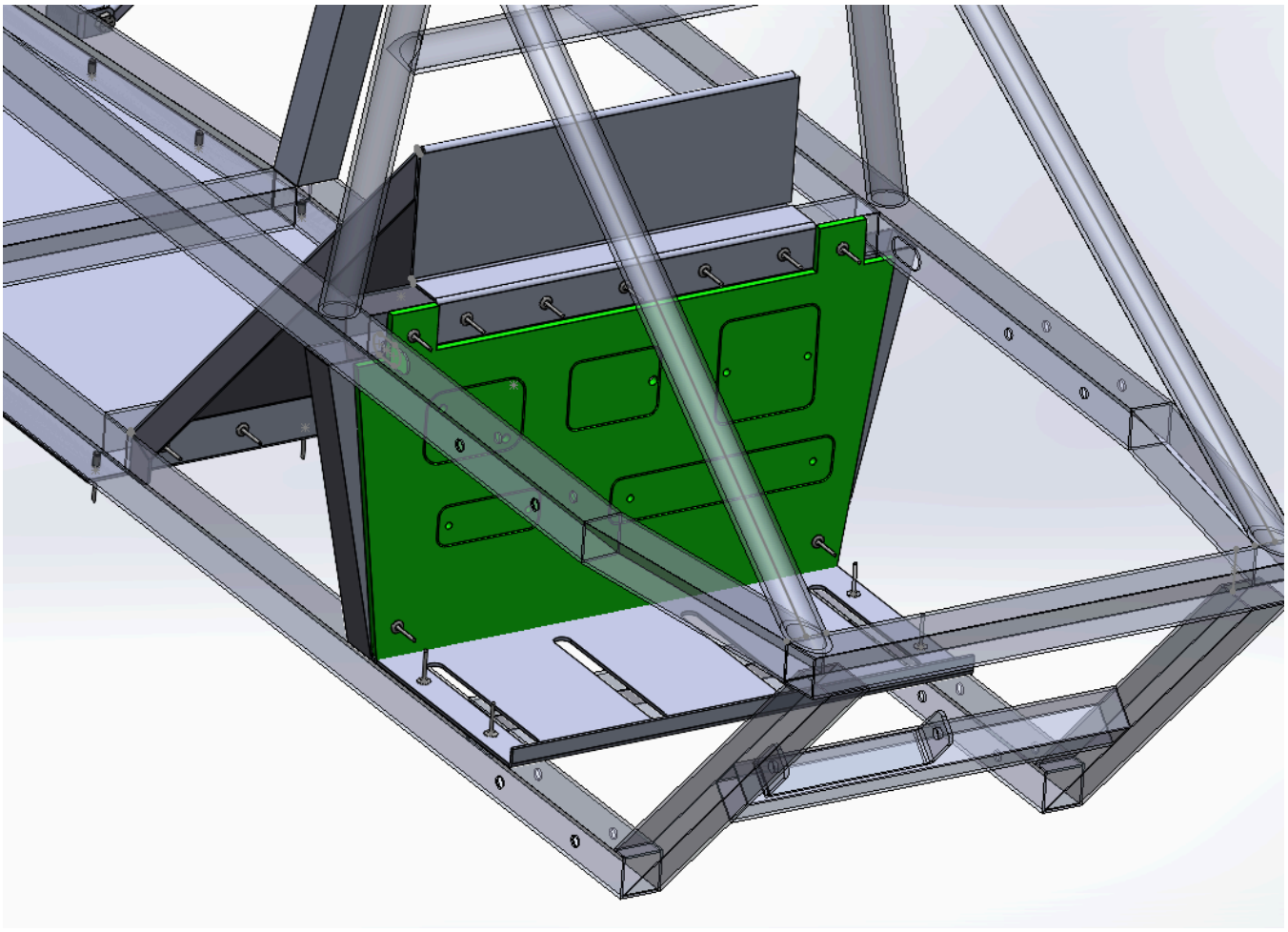
Right Rear Bearing Support



1x Rear Bearing Support
4x 2” 5/16-18 Hex Head Bolt
4x 5/16-18 Nylon Nut
2x Crush Plate

Attach, but do not tighten the nuts, we will need them loose when we attach the chain guard
If one hole is misaligned, drill it out with a 5/16 drill.

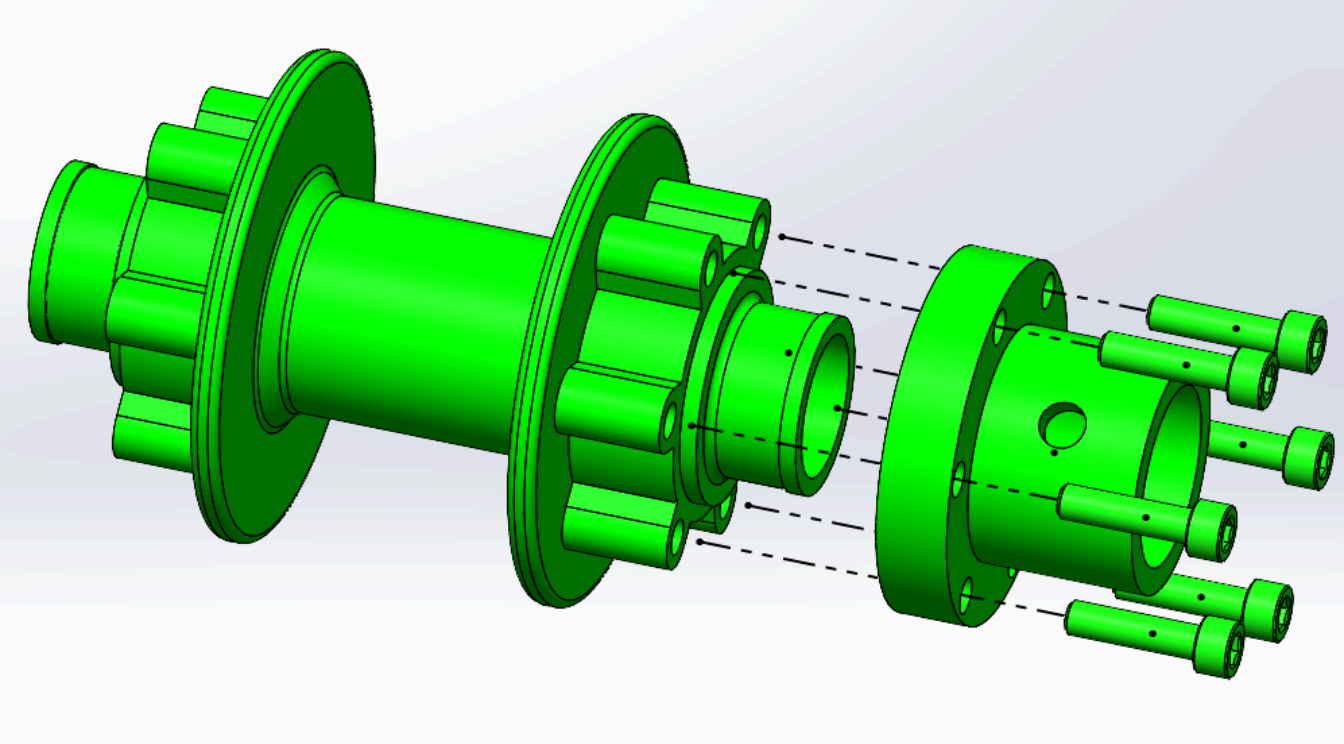
Electronics Board - Concept



1x Electronics Board (Not Included)

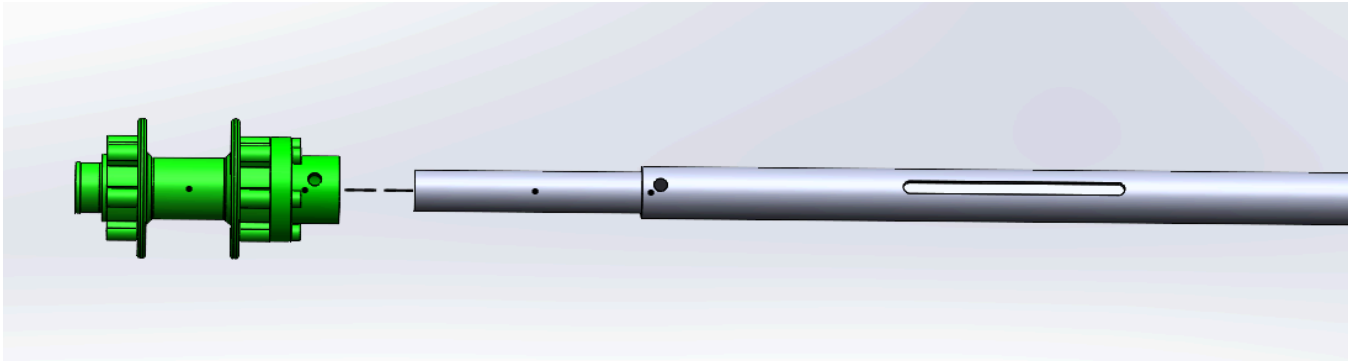
Design the electronics layout in a way that the electronics and batteries do not interfere with each other.

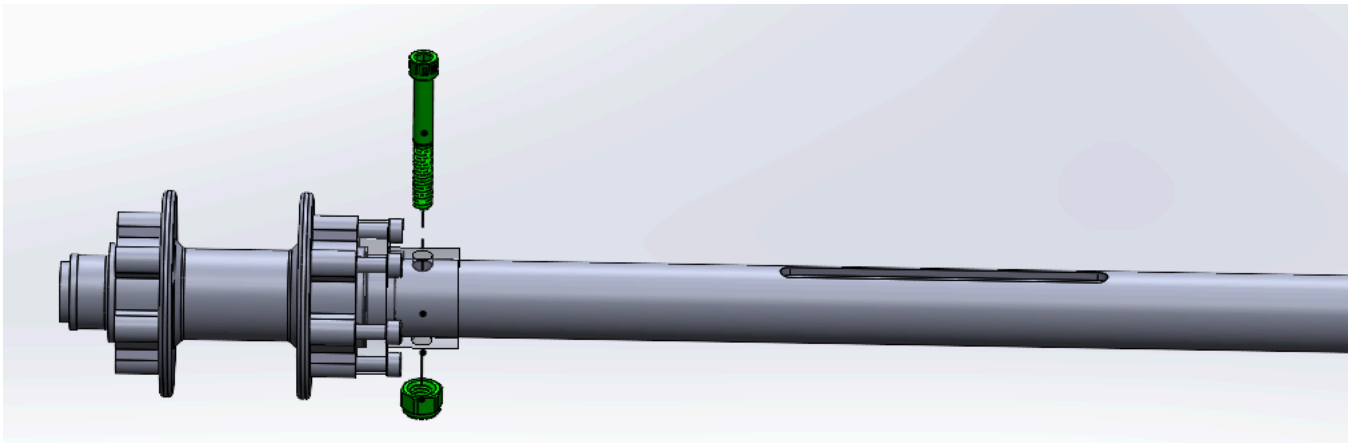
Rear Wheel Hub



1x Wheel
1x Fixed Wheel Hub
6x 1” 10-32 Socket Head Cap Screw

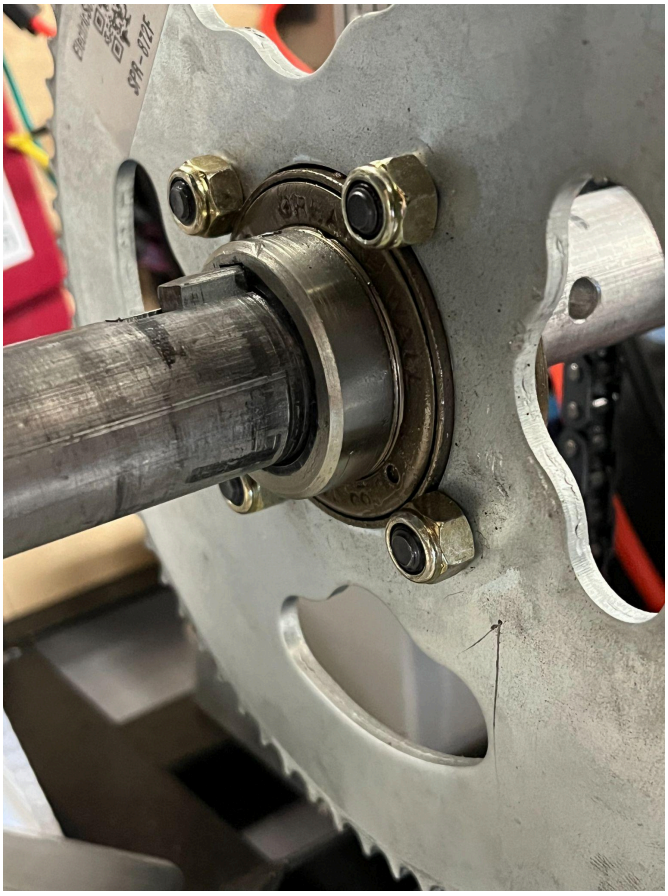
Fixed Wheel Hub Installation



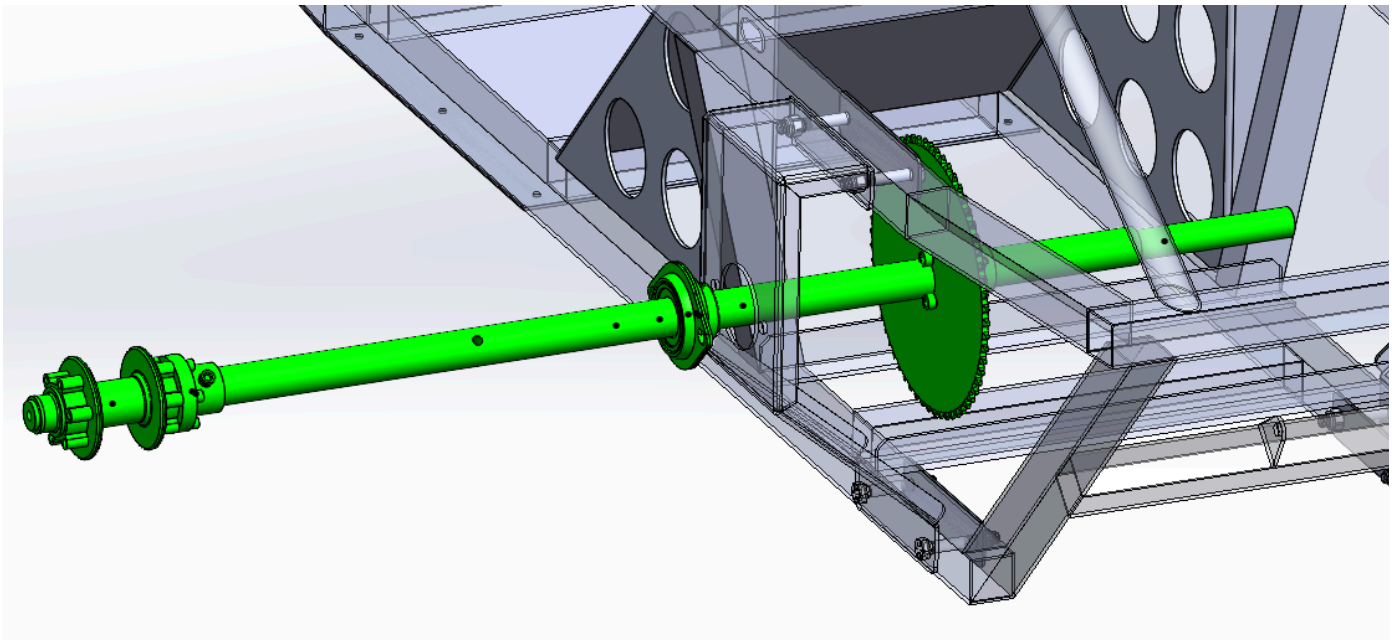


1x Rear Axle
1x Rear Wheel Hub
1x 1.75” 1/4-20 Socket Head Cap Screw
1x 1/4-20 Nylon Nut

Axle Installation







1x Rear Axle w/ Fixed Wheel Hub
1x 1” Axle Bearing
1x Sprocket w/freewheel clutch and freewheel clutch adaptor
4x ¼-20 Nylon Nuts

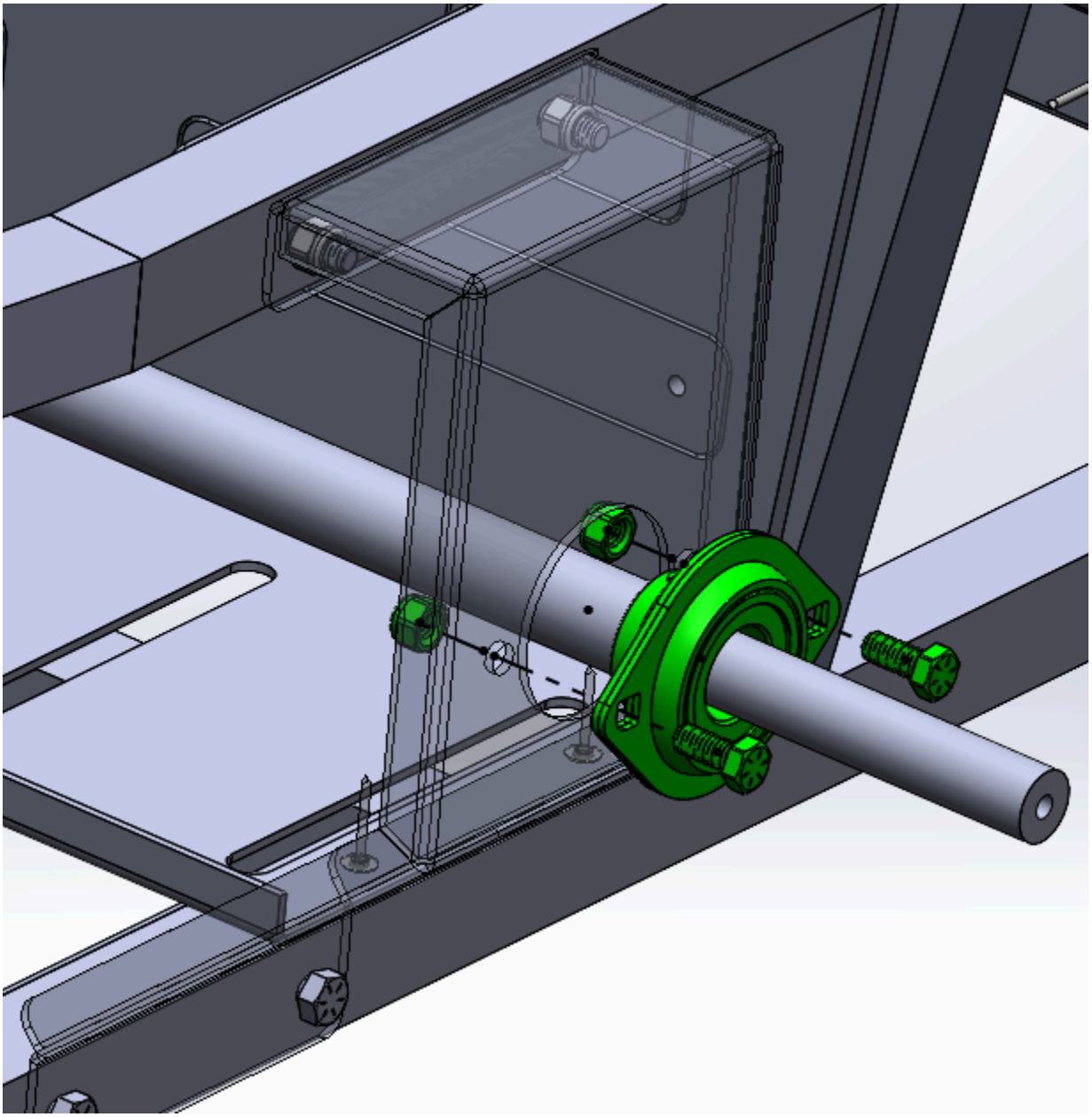
4x ¼-20 .75” Button Head Bolts

The model image does not depict a freewheeling sprocket. Use the pictures to orient the freewheeling sprocket and bolt it together.
Perform the steps in this order:

1. Loosen set screw from rear bearing DO NOT LOSE THE SET SCREW
2. Slide the 1” Bearing on the axle
3. Slide the axle through the bearing mount
4. Slide the Sprocket Assembly onto the axle (ORIENTATION IS IMPORTANT! LOOK AT PICTURES CAREFULLY)
5. Insert keyway and tighten set screw in freewheeling sprocket
6. When you are done, manually turn the sprocket. If it turns the wheel forward, then you have done it correctly. If it only turns the wheel backward, then you need to flip the sprocket 180°

Note: If you have GreenPower F24 kart wheels (not the wheels specified in this kit), then your bearings should be flipped so the set screw is on the outside. (Opposite to the picture above)

Rear Right Bearing

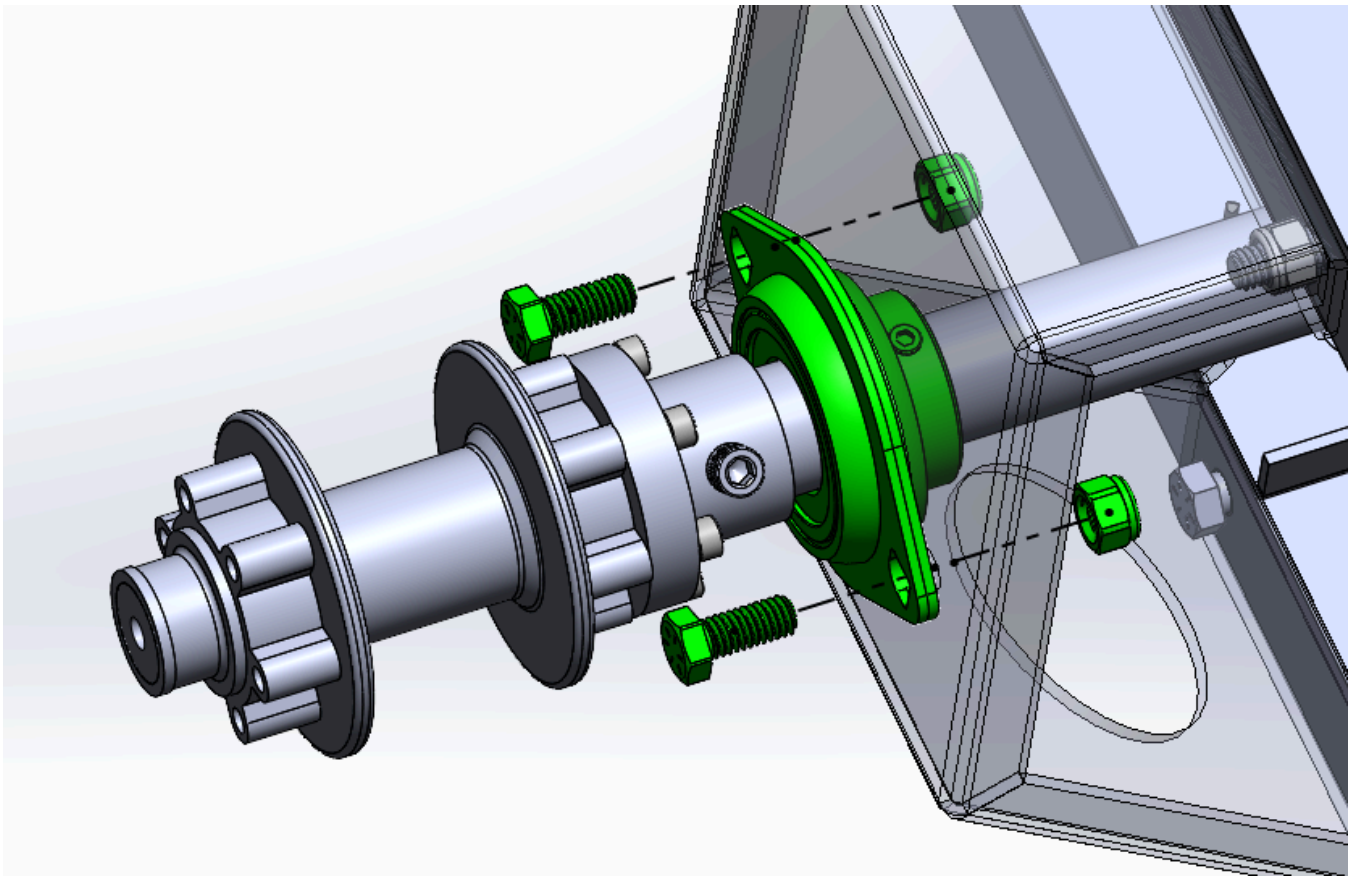


1x 1” Axle Bearing
2x .75” 5/16-18 Hex Head Bolt
2x 5/16-18 Nylon Nut

Loosen set screw **before** inserting axle. DO NOT LOSE THE SET SCREW

Note: If you have GreenPower F24 kart wheels (not the wheels specified in this kit), then your bearings should be flipped so the set screw is on the outside. (Opposite to the picture above)

Rear Left Bearing



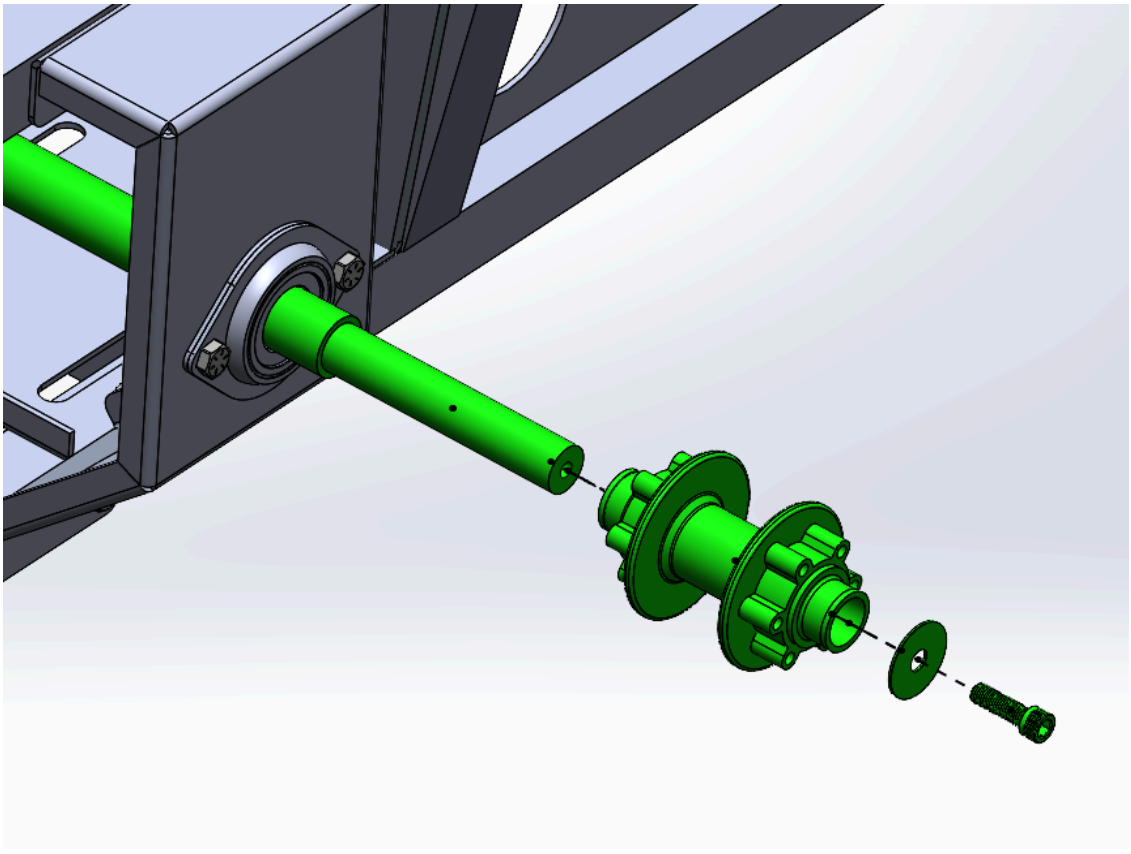
2x .75” 5/16-18 Hex Head Bolt
2x 5/16-18 Nylon Nut

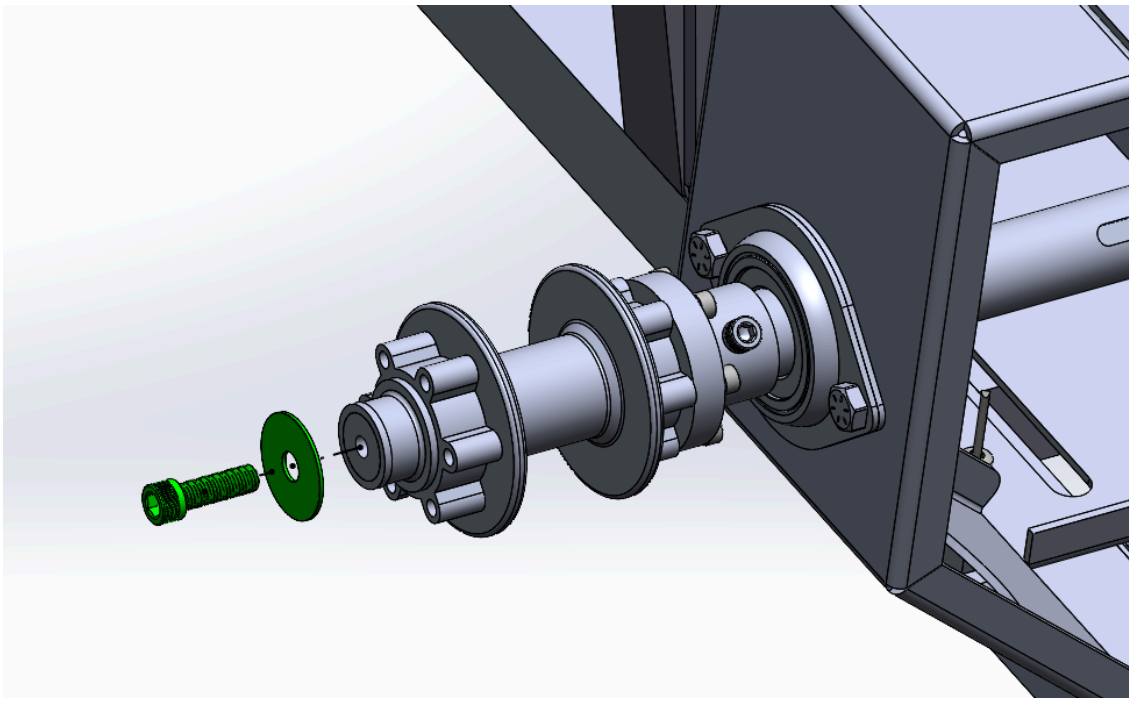
Bearing Set Screws

2x Bearing Set Screws

Install/Tighten set screws in both rear bearings.
There is no picture for this step.

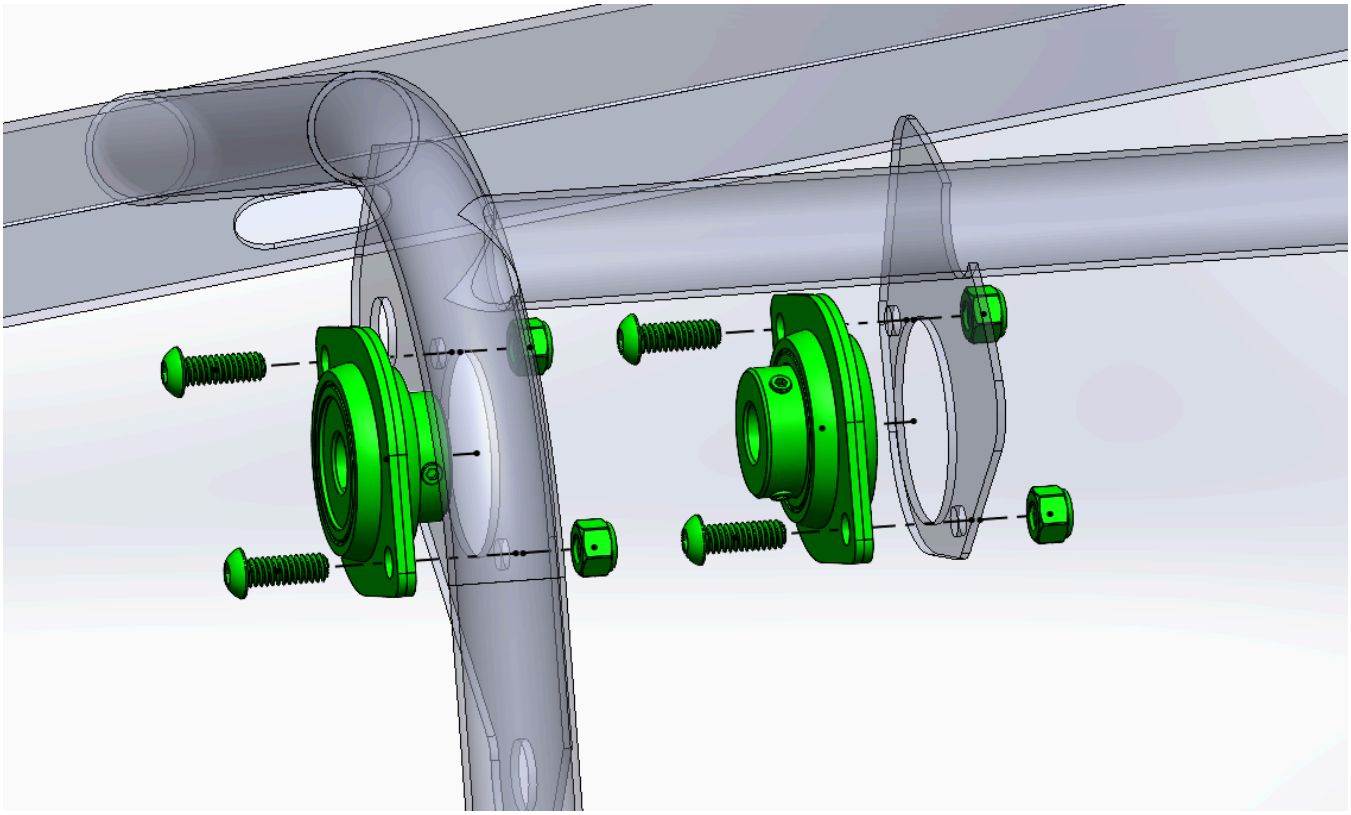
Installing Wheel Fasteners





1x Wheel
2 5/16 Oversized Washer
2x 5/16-18 Socket Head Cap Screw (apply Blue Loctite)

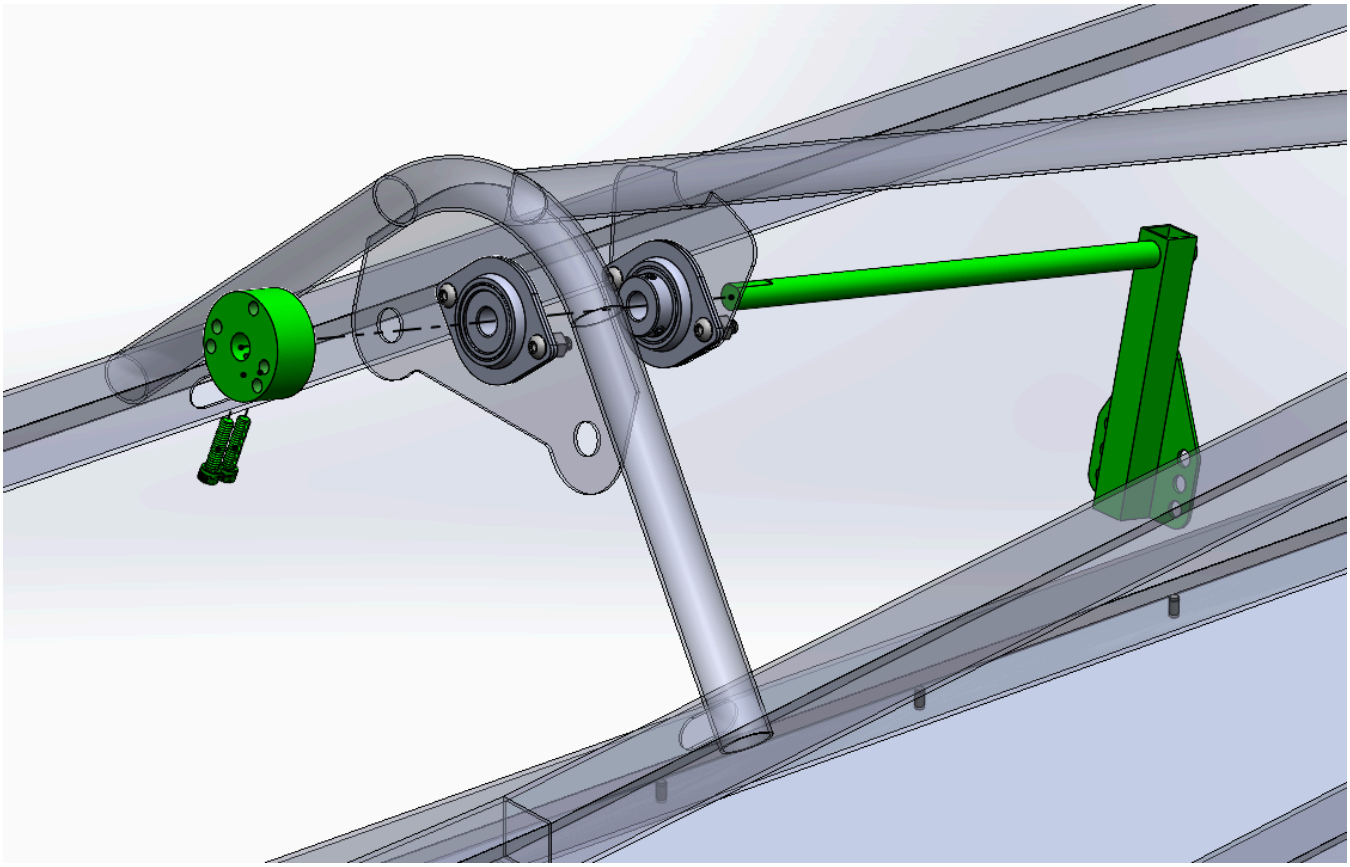
Steering Bearings



2x ½” Bearing
4x .75” 1/4-20 Hex Head Bolt
4x 1/4-20 Nylon Nut

Remove set screws from bearings. Leave nuts loose.

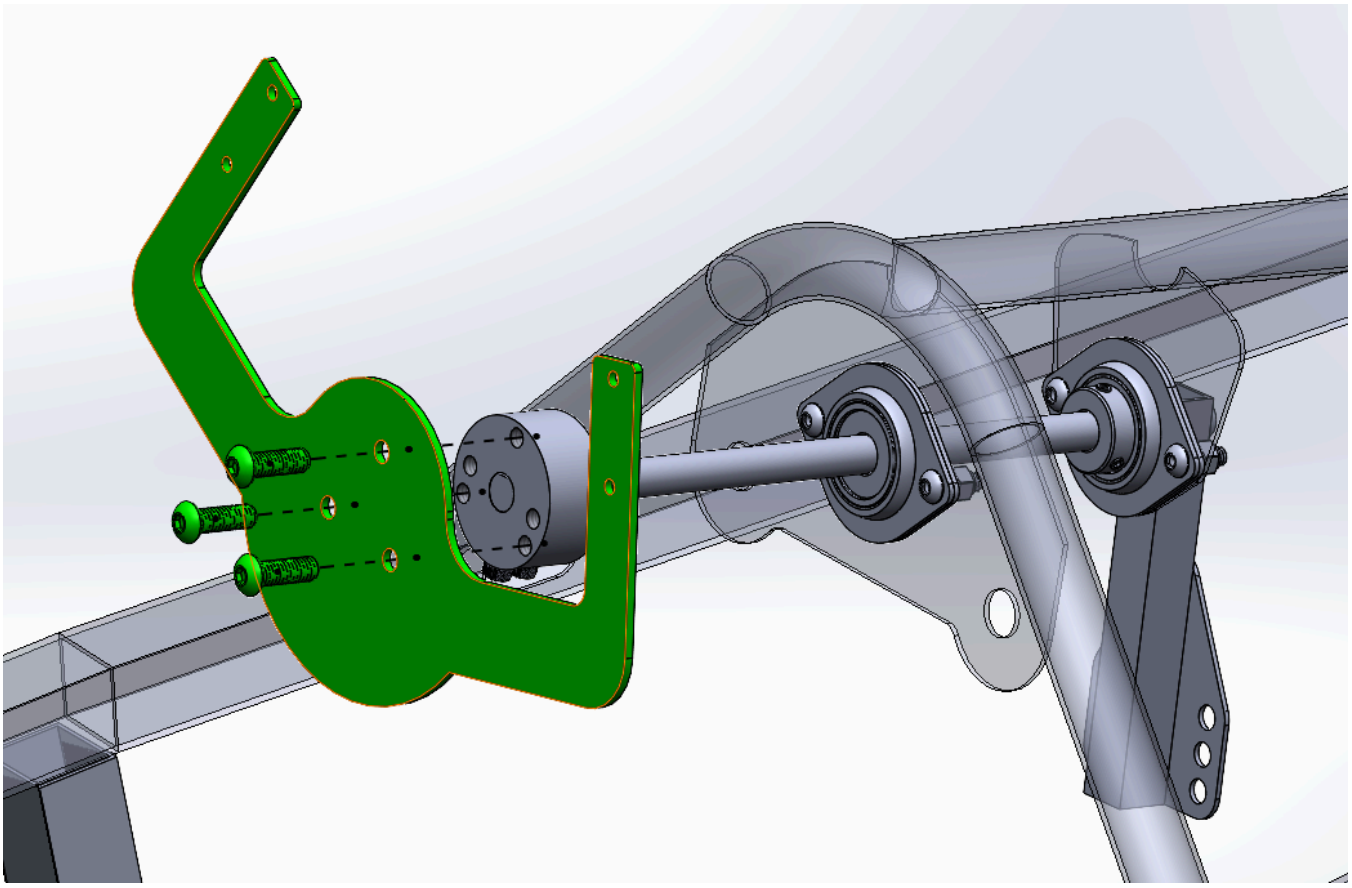
Steering Column



1x Steering Rod
1x Steering Hub
2x 1” 1/4-20 Socket Head Cap Screws

Insert the steering column with six inches protruding from the steering bearing nearest the driver seat. Tighten the nuts on the bearings, then apply blue Loctite 242 to the set screws and screw those into the bearings. Apply blue Loctite 242 to the 1/4-20 Socket Head Cap Screws. Align the socket head cap screws in the hub with the flat of the Steering Rod and tighten.

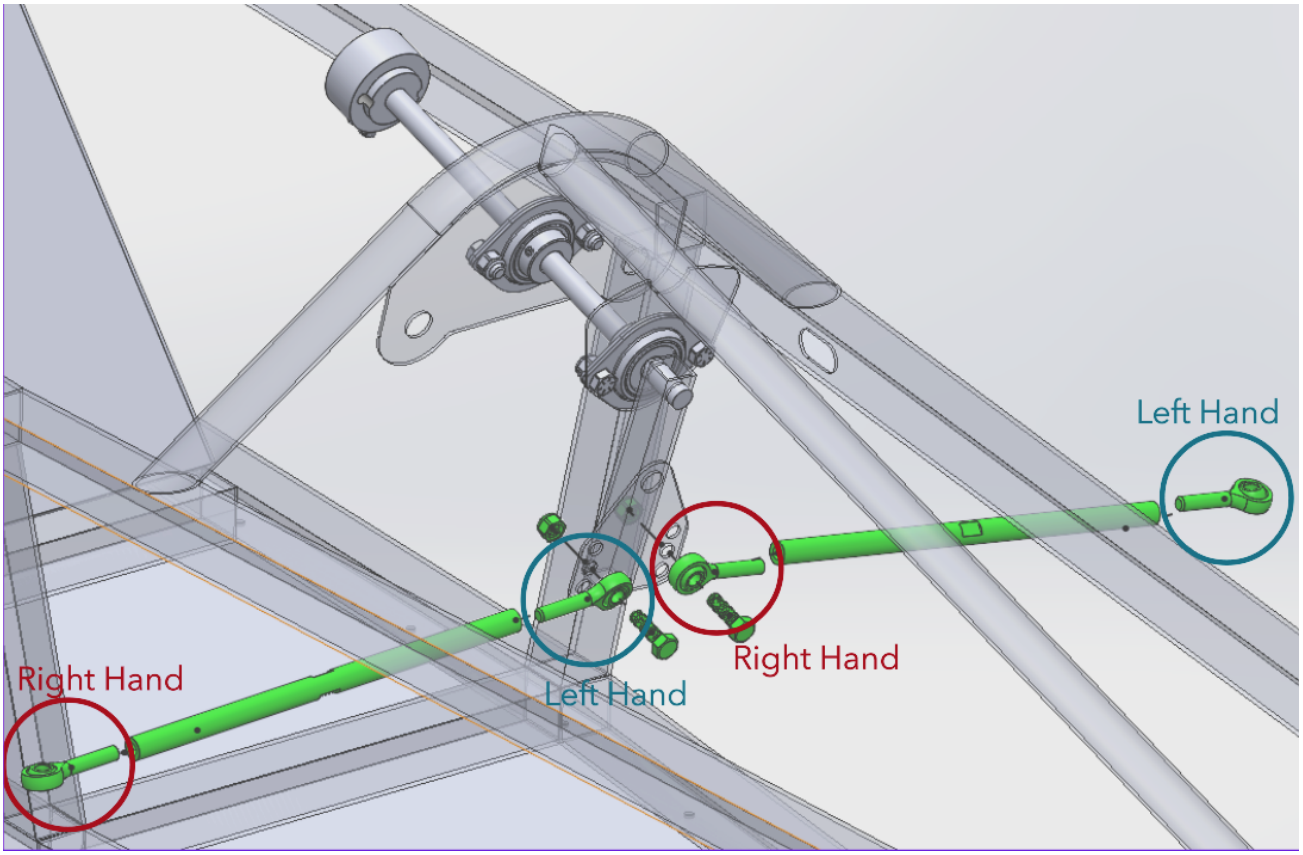
Steering Wheel Installation



1x Steering Wheel (Not included)
3x 1” 5/16-18 Button Head Bolt

Your steering wheel will look different. If you are using the Amazon Steering Wheel, drill the 3 holes in the steering wheel to 5/16”

Tie Rods

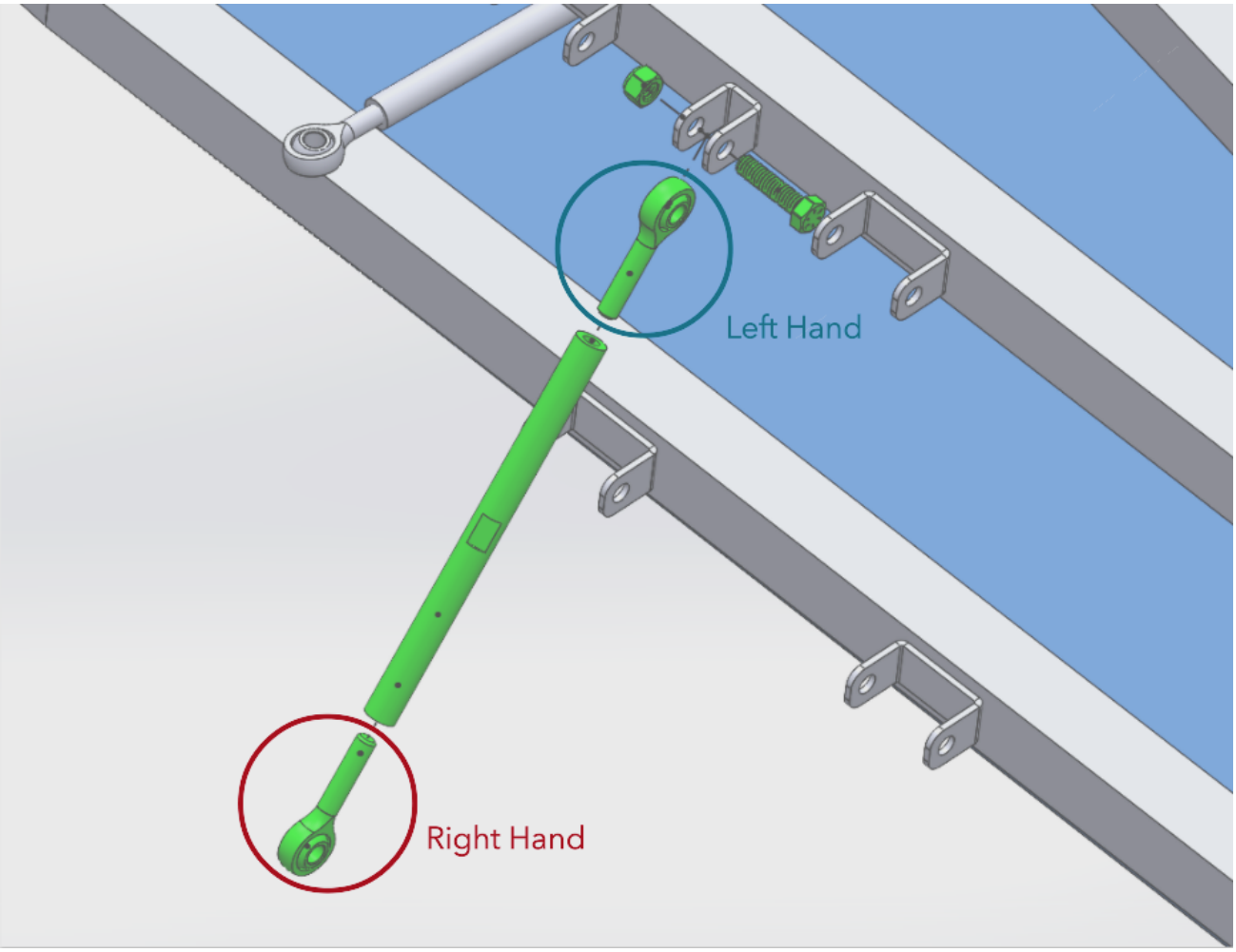


2x Tie Rod
2x 5/16” Right Hand Rod End and 2x Right Hand 5/16-24 nuts
2x 5/16” Left Hand Rod End and 2x Left Hand 5/16-24 nuts

2x 1” 5/16-18 Hex Head Bolt
2x 5/16-18 Nylon Nut

Recommendation: Apply red tape to all Right Hand Rod ends and blue tape to all Left Hand Rod Ends.
Fully thread 5/16”-24 Right Hand nuts on Right Hand Rod Ends and fully thread 5/16”-24 Left Hand nuts on Left Hand Rod Ends before attaching Rod Ends to Tie Rods (nuts not shown in picture).
Rod Ends must be screwed in equally.
Threading one Rod End further than the other limits steering adjustments.

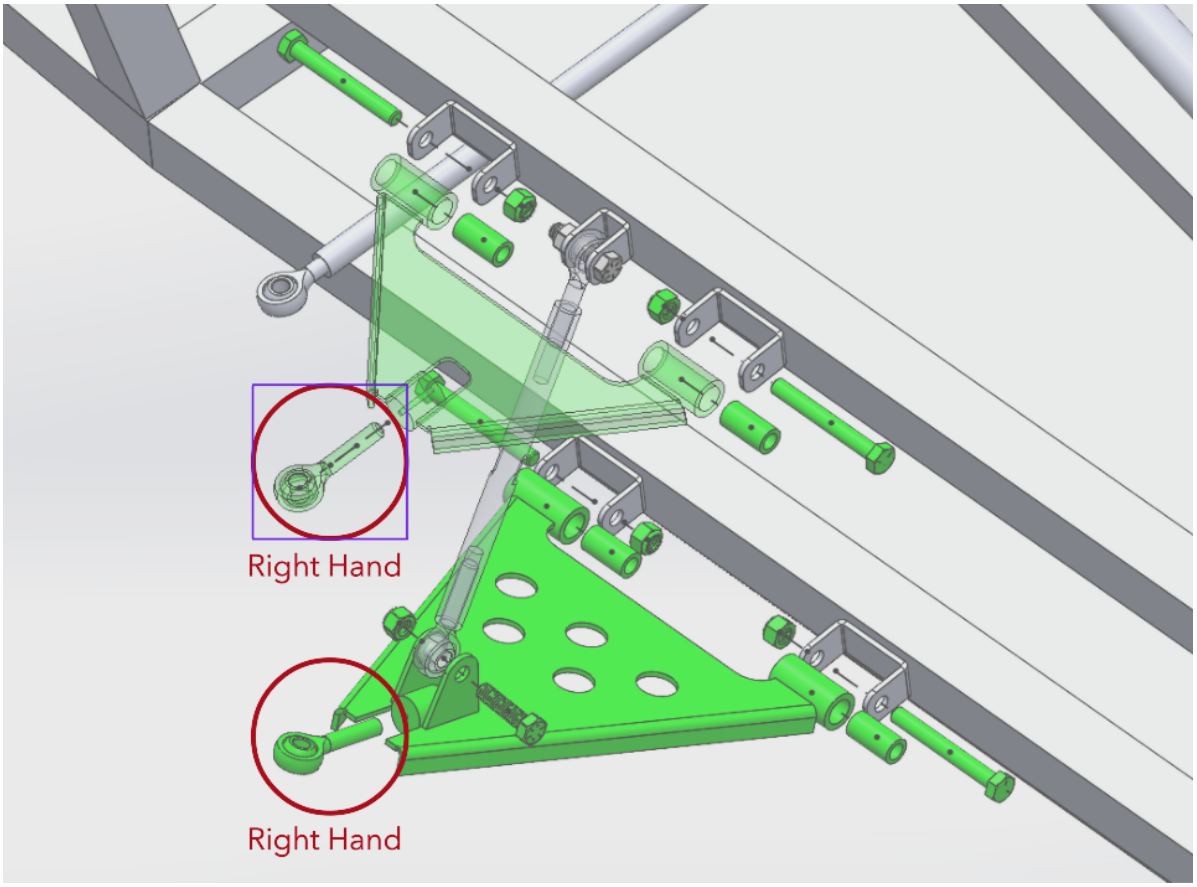
Right Strut



1x Strut
1x 5/16” Right Hand Rod End and 1x Right Hand 5/16-24 nut
1x 5/16” Left Hand Rod End and 1x Left Hand 5/16-24 nut
1x 1.25” 5/16-18 Hex Head Bolt
1x 5/16-18 Nylon Nut

Fully thread 5/16”-24 Right Hand nut on Right Hand Rod End and fully thread 5/16”-24 Left Hand nut on Left Hand Rod End prior to attaching Rod Ends to Strut (nuts not shown in picture).
Rod ends must be screwed in equally.
Threading one Rod End further than the other limits wheel adjustments.
Do not overtighten the nutt on the bracket! This will bend the bracket.

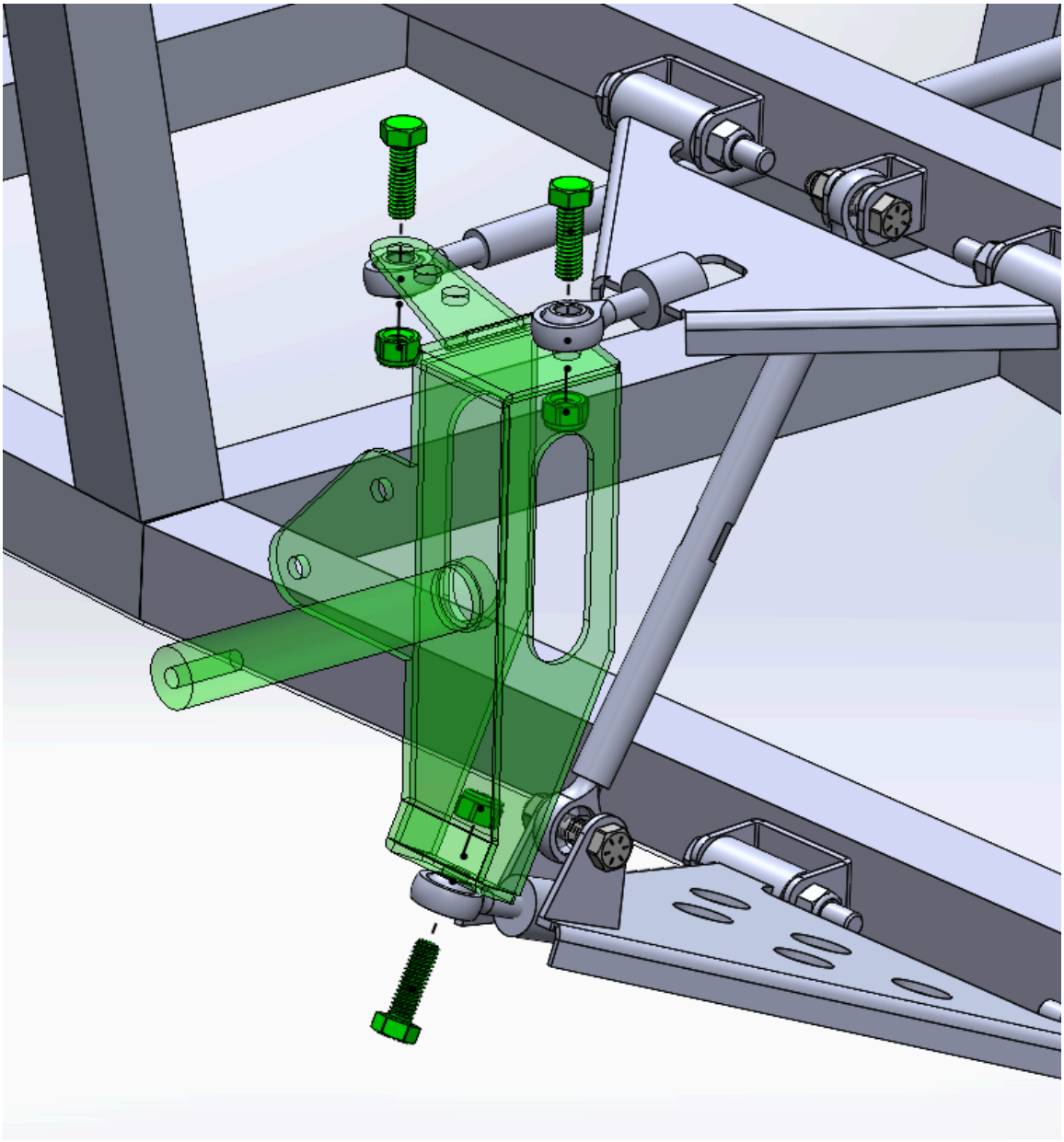
Right Steering A-Arms



1x Upper Right A-Arm
1x Lower Right A-Arm
2x ⅜” Right Hand Rod End
4x Large Plastic Spacer
4x 2.25” 5/16-18 Hex Head Bolt
5x 5/16-18 Nylon Nut
1x 1.25” 5/16-18 Hex Head Bolt

Important: The threaded cylinder on the A-arms has a five-degree angle toward the back of the kart. Ensure each A-arm is mounted with the cylinder angled toward the back.
Insert plastic spacers into A-Arms, then insert A-Arms into brackets and bolt in place.
Screw the rod ends into the A-Arms until the rod end threads are flush with the end of the threaded cylinder.
Do not overtighten the nut on the bracket! This will bend the bracket.

Right Steering Knuckle

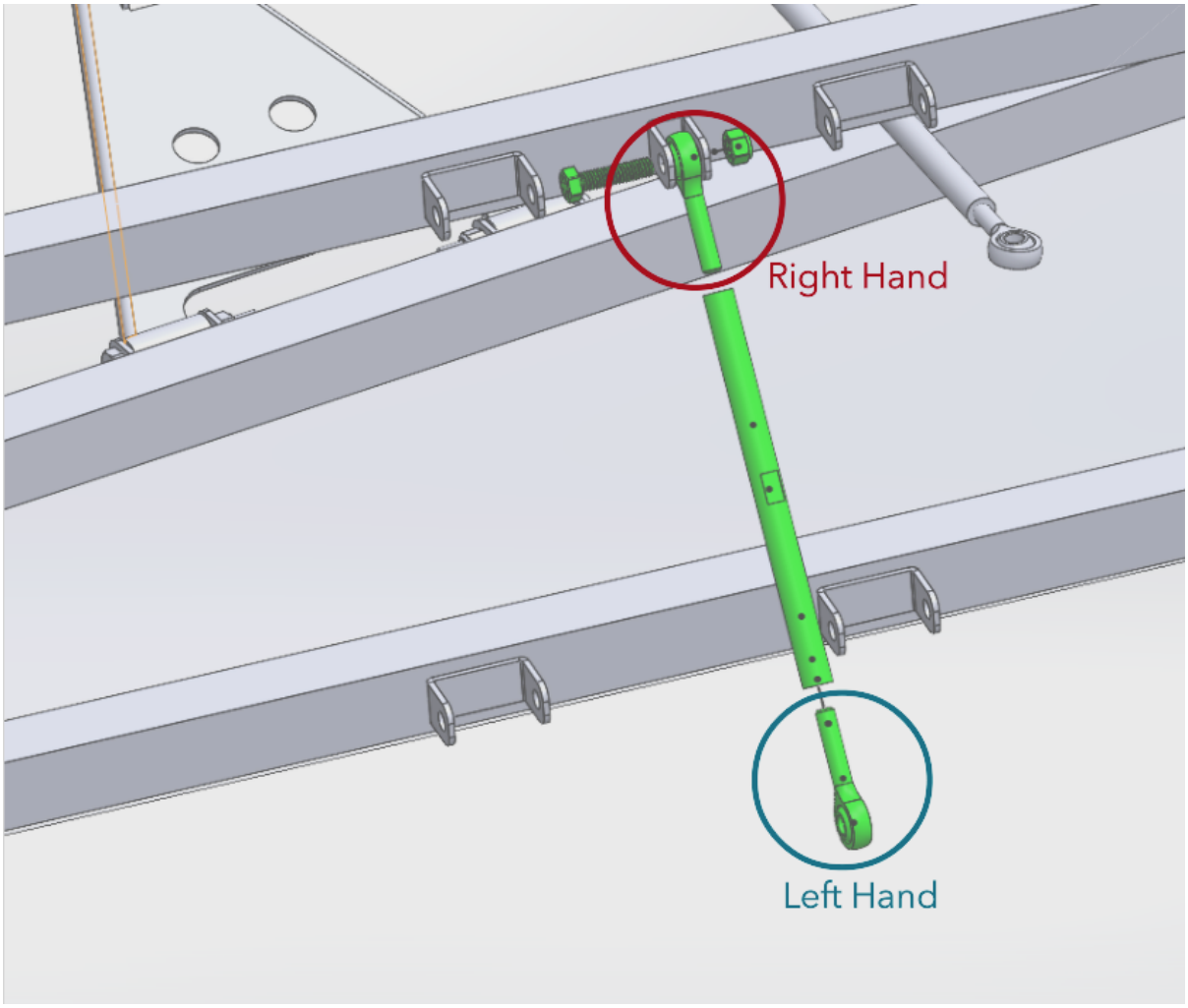


1x Right Steering Knuckle
3x 1” 5/16-18 Hex Head Bolt
3x 5/16-18 Nylon Nut

Ensure that the rod ends in the tie rods are tightened equally on both sides.

Tie rod end hole is depicted to attach in the farthest hole, we recommend attaching it in the second hole instead.

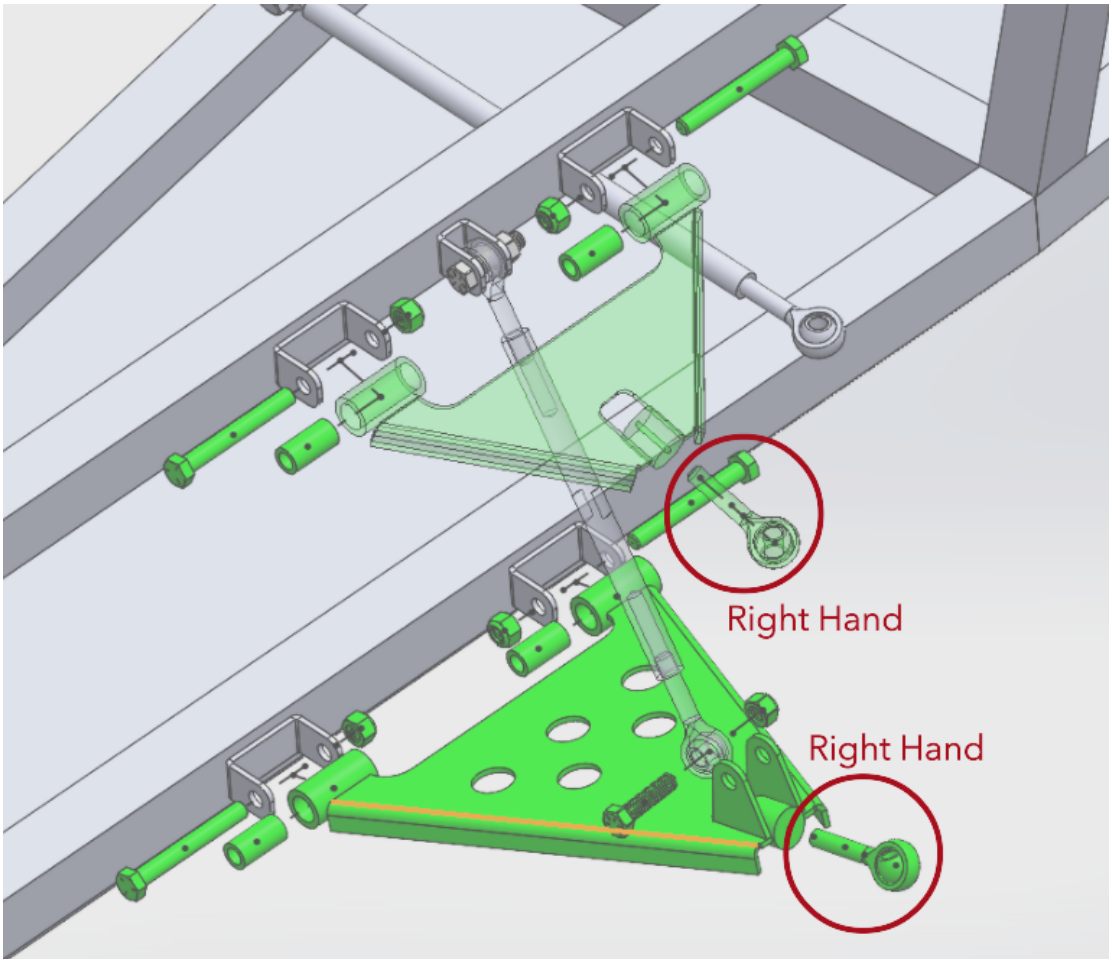
Left Strut



1x Strut
1x 5/16” Right Hand Rod End and 1x Right Hand 5/16-24 nut
1x 5/16” Left Hand Rod End and 1x Left Hand 5/16-24 nut
1x 1.25” 5/16-18 Hex Head Bolt
1x 5/16-18 Nylon Nut

Fully thread 5/16”-24 Right Hand nut on Right Hand Rod End and fully thread 5/16”-24 Left Hand nut on Left Hand Rod End prior to attaching Rod Ends to Strut (nuts not shown in picture).
Rod ends must be screwed in equally.
Threading one Rod End further than the other limits wheel adjustments.
Do not overtighten the nutt on the bracket! This will bend the bracket.

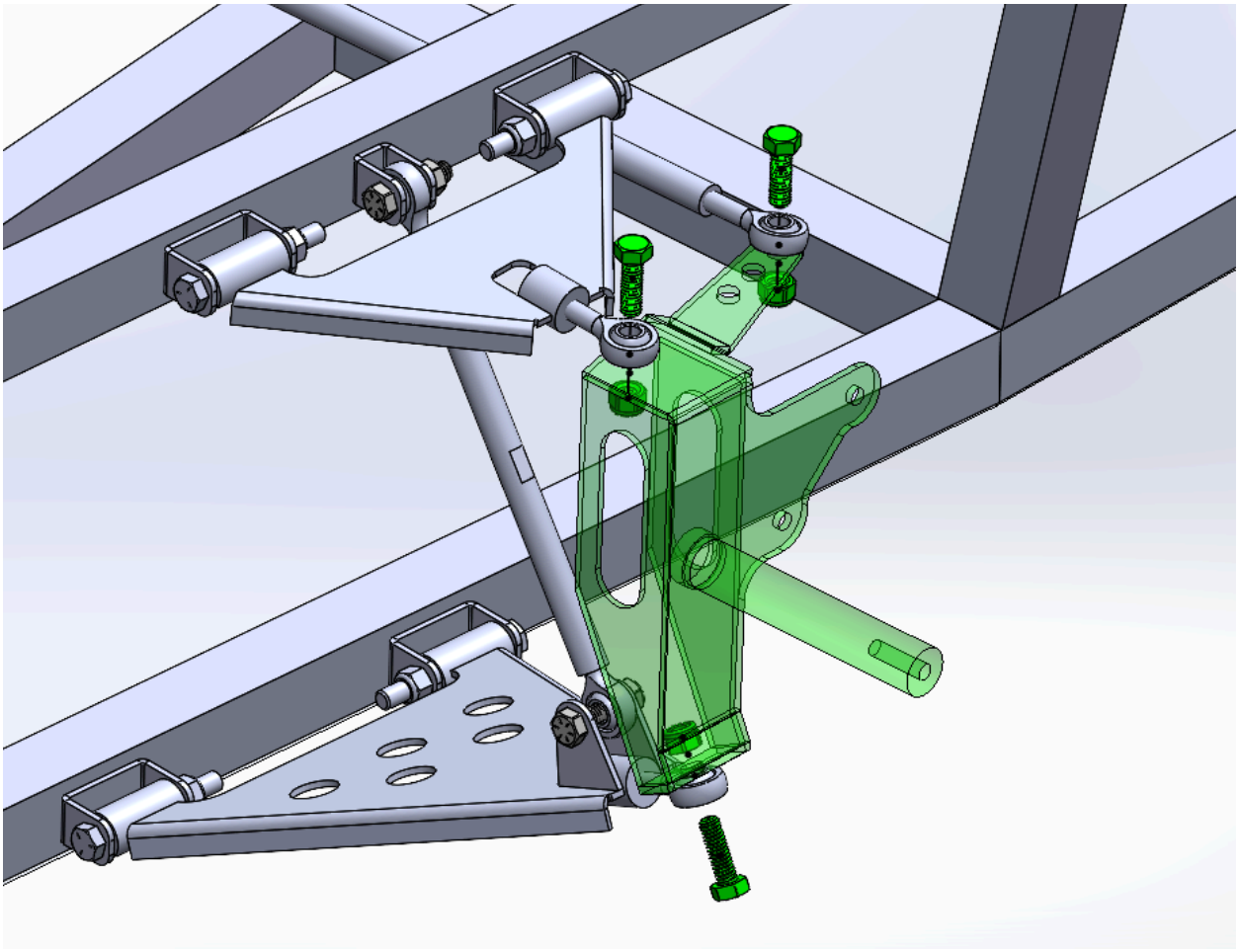
Left Steering A-Arms



1x Upper Left A-Arm
1x Lower Left A-Arm
2x ⅜” Right Hand Rod End
4x Large Plastic Spacer
4x 2.25” 5/16-18 Hex Head Bolt
5x 5/16-18 Nylon Nut
1x 1.25” 5/16-18 Hex Head Bolt

Important: The A-arms cylinder on the A-arms has a five-degree angle toward the back of the kart. Install the right A-arms on the right and left A-arms on the left. Insert plastic spacers into A-Arms, then insert A Arms into brackets and bolt in place.
Screw the rod ends into the A-Arms until the rod end threads are flush with the end of the threaded cylinder.
Do not overtighten the nut on the bracket! This will bend the bracket.

Left Steering Knuckle



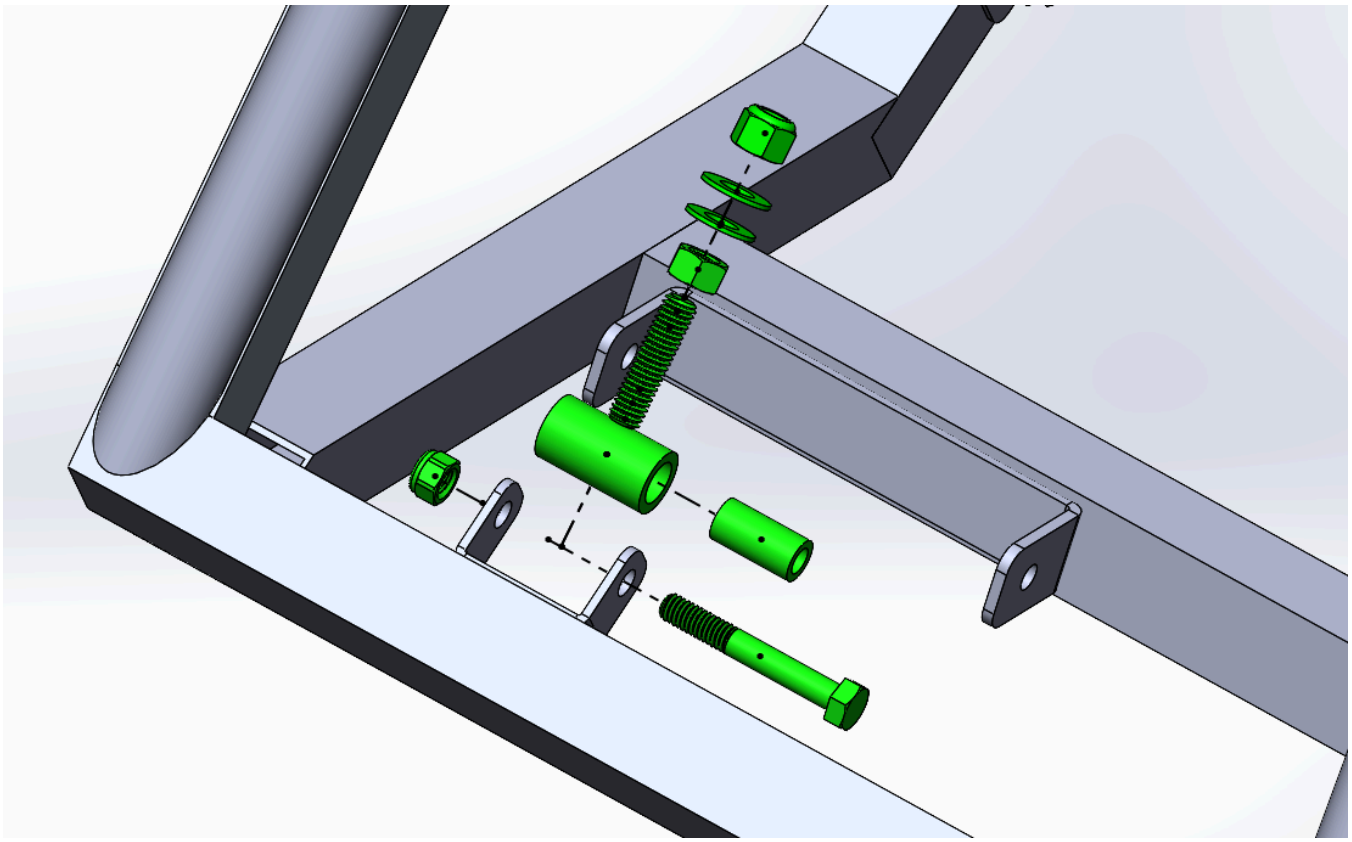
1x Left Steering Knuckle
3x 1” 5/16-18 Hex Head Bolt
3x 5/16-18 Nylon Nut

Ensure that the rod ends in the tie rods are tightened equally on both sides.

The tie rod end hole is depicted to attach in the farthest hole; we recommend attaching it in the second hole instead.

Brake Installation

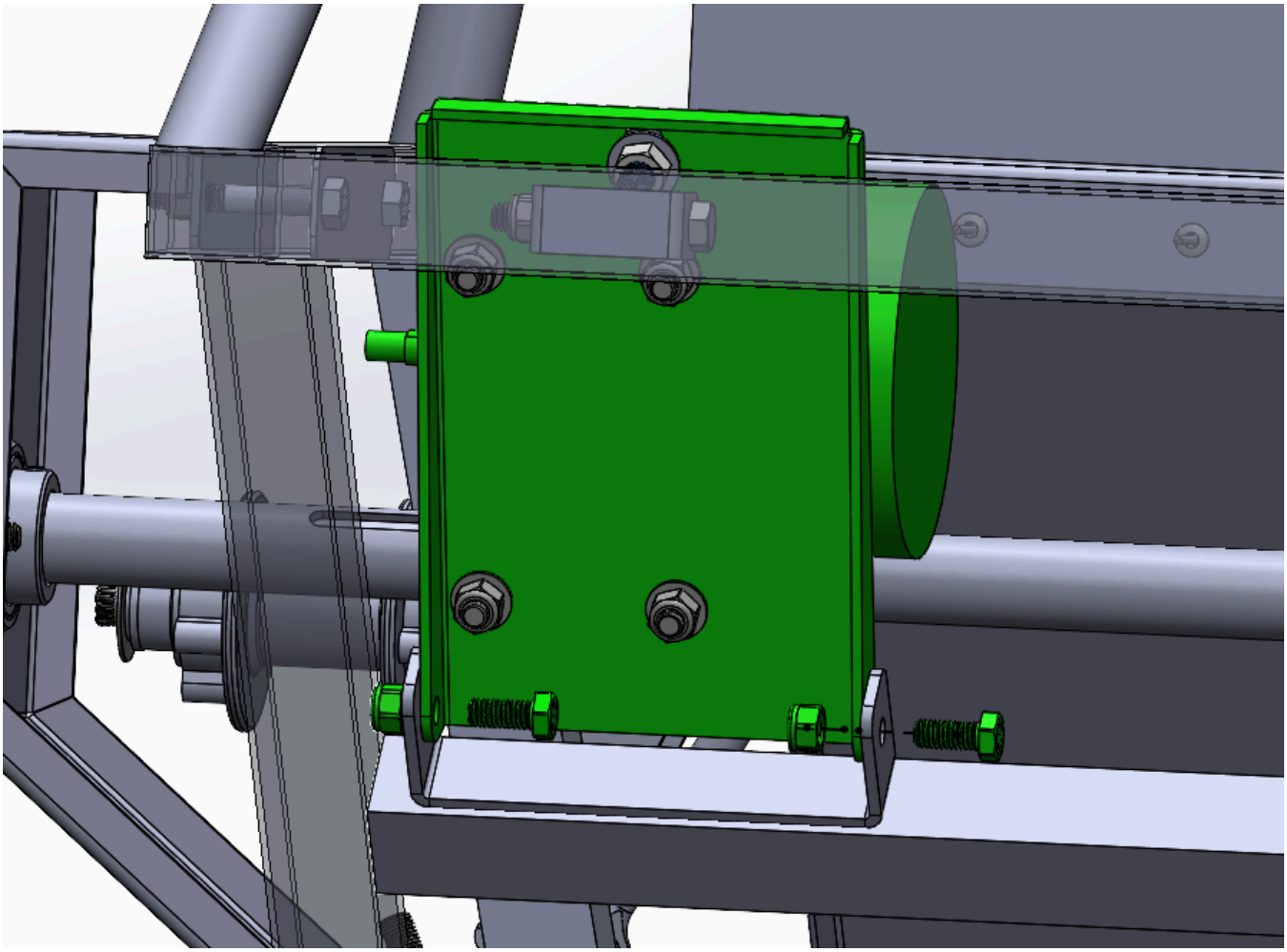
Motor Mount Swivel Joint



1x Motor Swivel Joint
1x 2.25” 5/16-18 Hex Head Bolt
1x 5/16-18 Nylon Nut
1x Large Plastic Spacer
1x 3/8-16 Nylon Nut
1x 3/8-16 Jam Nut
2x 3/8 Washer

Insert the plastic spacer into the swivel joint, then fasten it in with the hex head bolt and the Nylon nut.
Do not over-tighten!
The jam nut goes below the motor mount, and the Nylon nut goes above it (next step).
To adjust the position of the motor, turn both nuts in the same direction.

Motor Mount & Motor

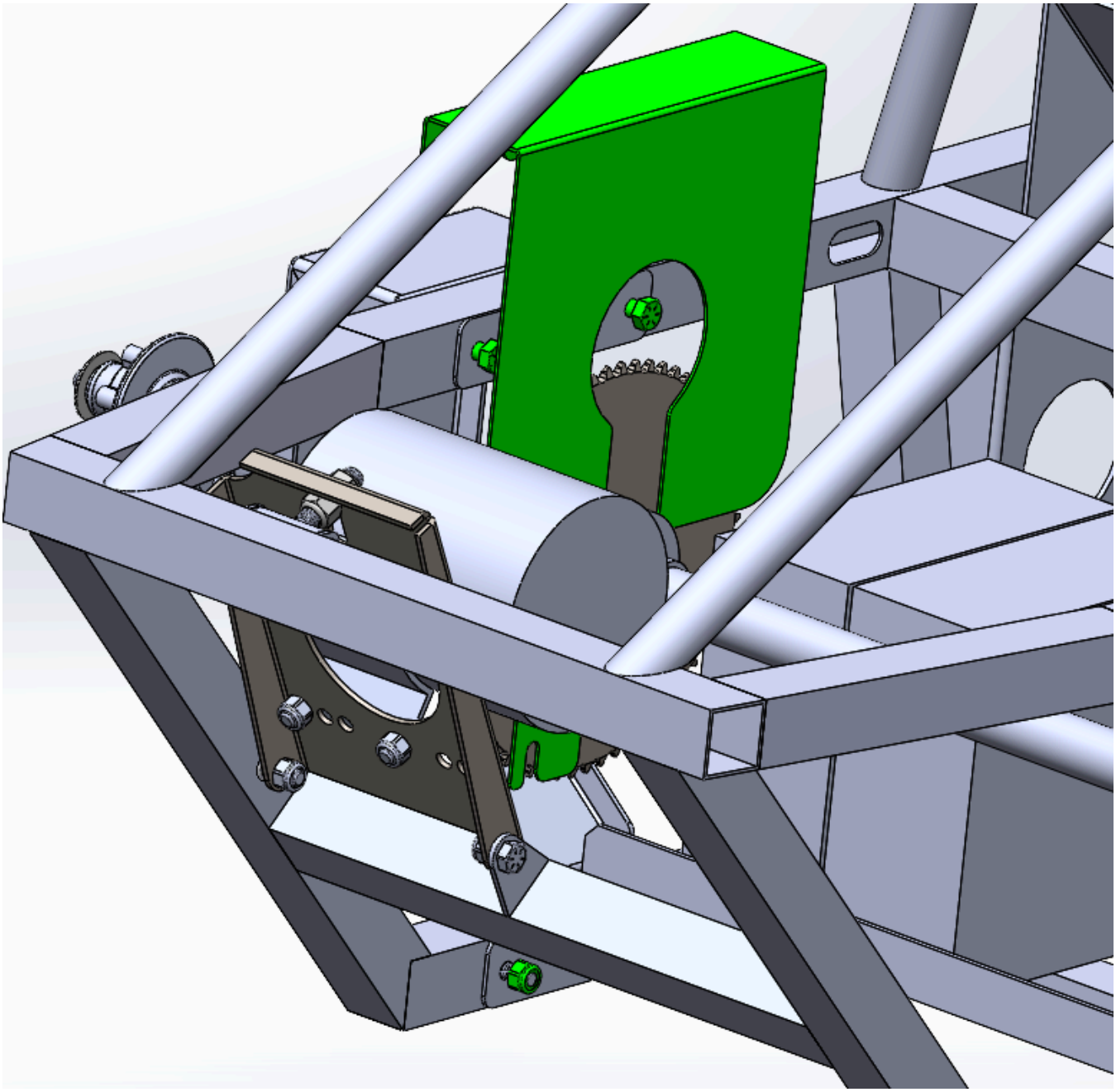


1x Motor mount
2x .75” 5/16-18 Hex Head Bolt
2x 5/16-18 Nylon Nut

1x MY1020 Motor
4x 5/16-18 Nylon Nut
4x .75” 5/16-18 Hex Head Bolt

Align the holes in the MY1020 motor with the holes in the mounting plate.
Use 4x 5/16” washers, 4x 5/16-18 Nylon Nuts and 4x 5/16-18 .75” Hex Bolts to bolt the motor to the plate.

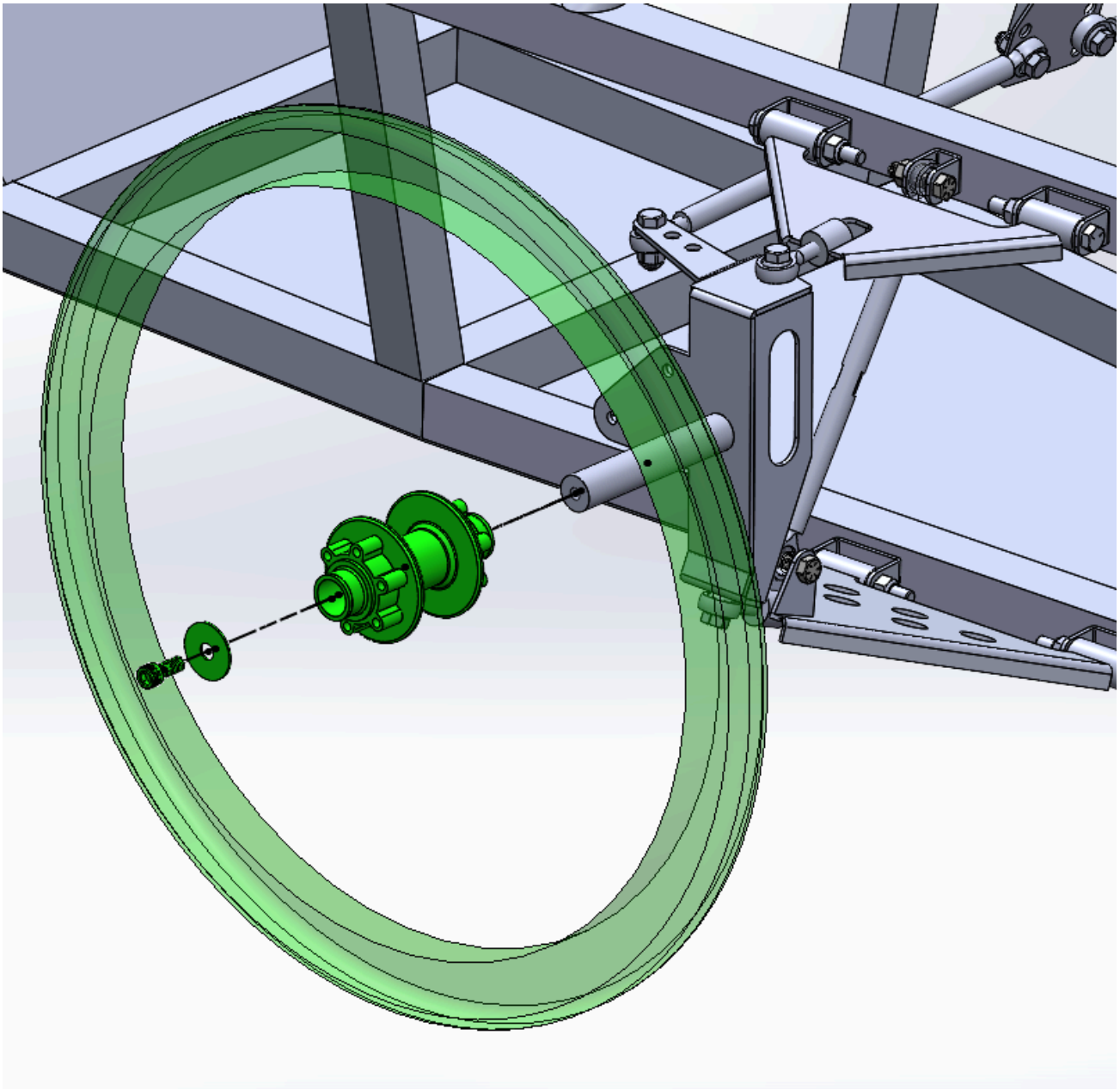
Chain Guard



1x Chain Guard

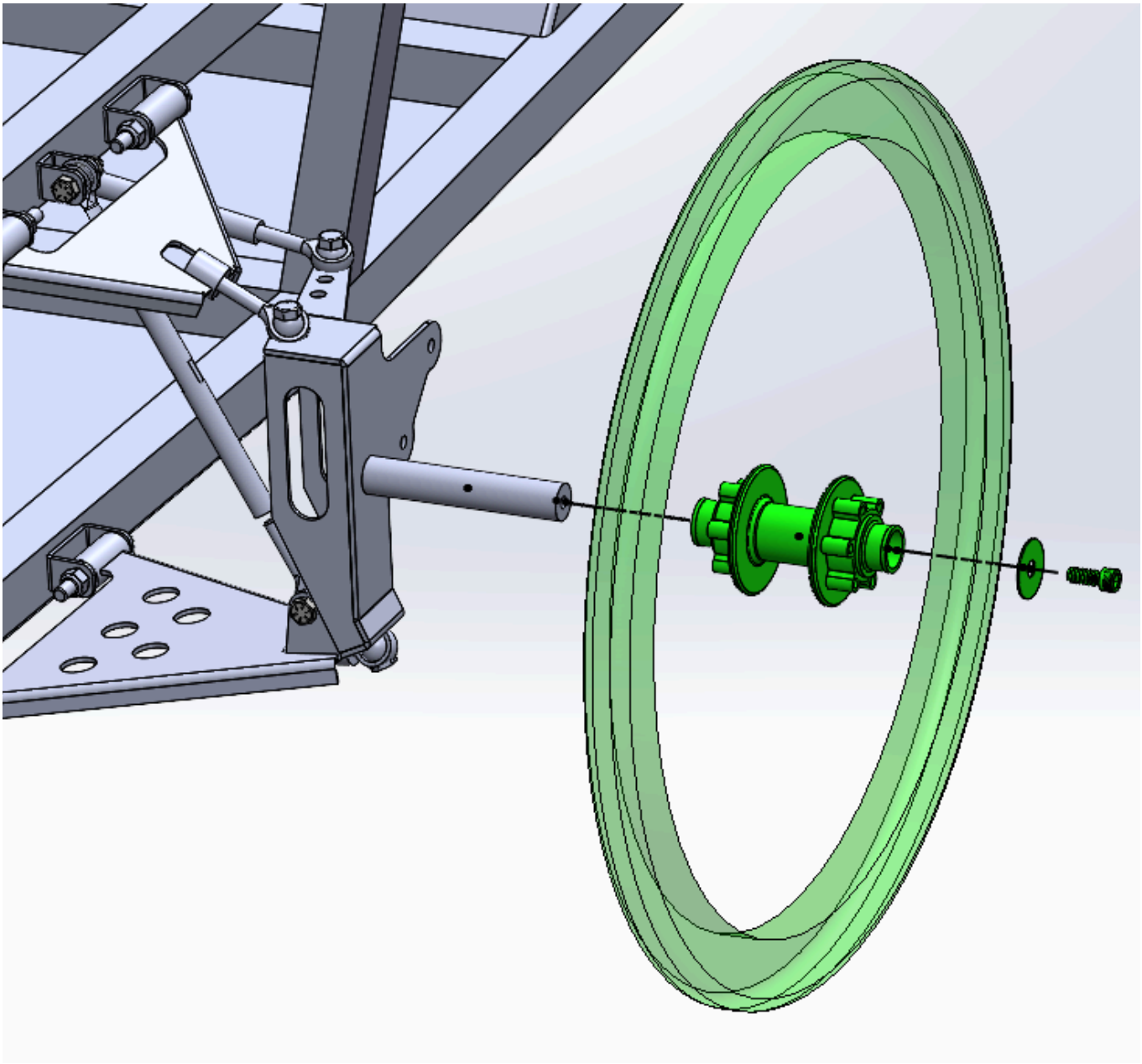
The Chain Guard slides over the existing bolts on the Left Rear Bearing Support. Tighten nuts after sliding in place.

Front Right Wheel



1x Wheel
1x .75” 5/16-18 Socket Head Cap Screw (apply Blue Loctite).
1x 5/16 Oversized Washer

Front Left Wheel



1x Wheel
1x .75” 5/16-18 Socket Head Cap Screw (apply Blue Loctite).
1x 5/16 Oversized Washer

Grommets

4x Grommet
Insert the grommets in the chassis slots before installing the wiring. The grommets protect wires from chaffing on the frame tubes. This step does not have an image.

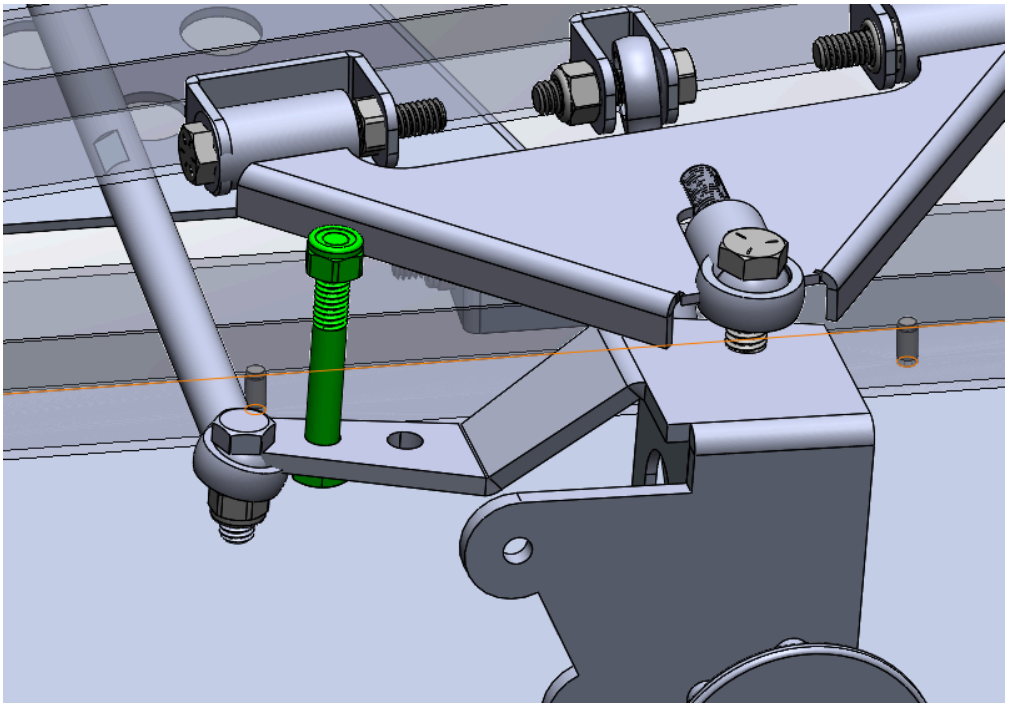
5 Point Harness

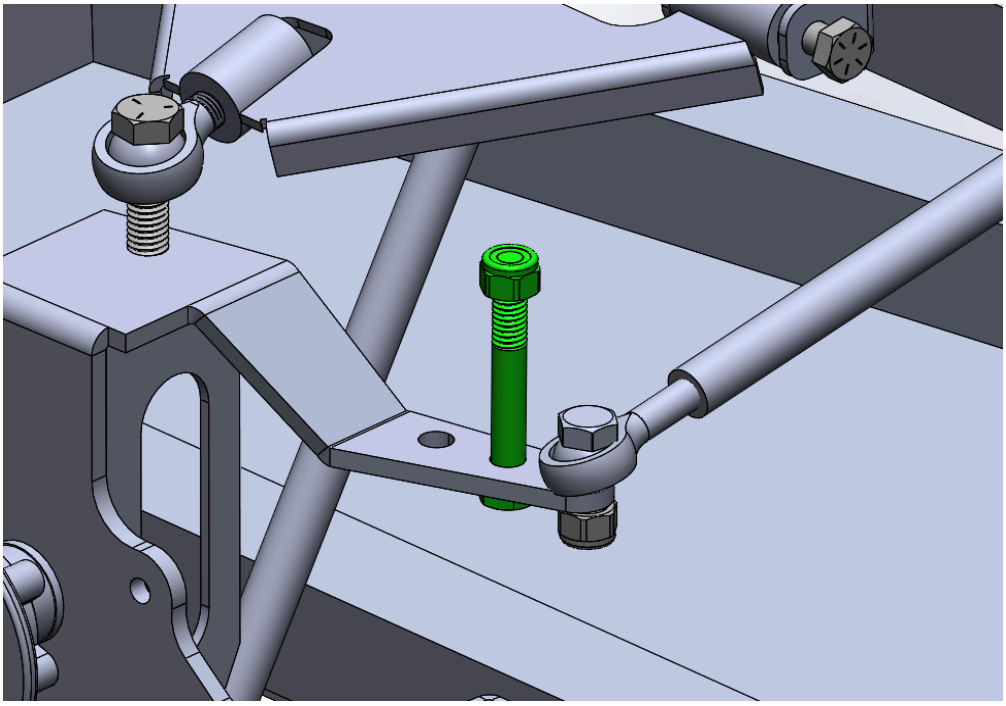
1x 5 Point Harness
3x 2” 5/16 Hex Head Bolt
3x 5/16 Nylon Nut

The harness will attach to the horizontal crossbar on the roll bar, the horizontal crossbar beneath the driver’s legs, and the 2 bars to the sides of the driver's hips. You can remove the 2 fasteners from the top two straps of the harness to wrap them around the horizontal bar on the roll bar.

You will need to drill holes to install the harness.

Steering Hard Stops (Left & Right)

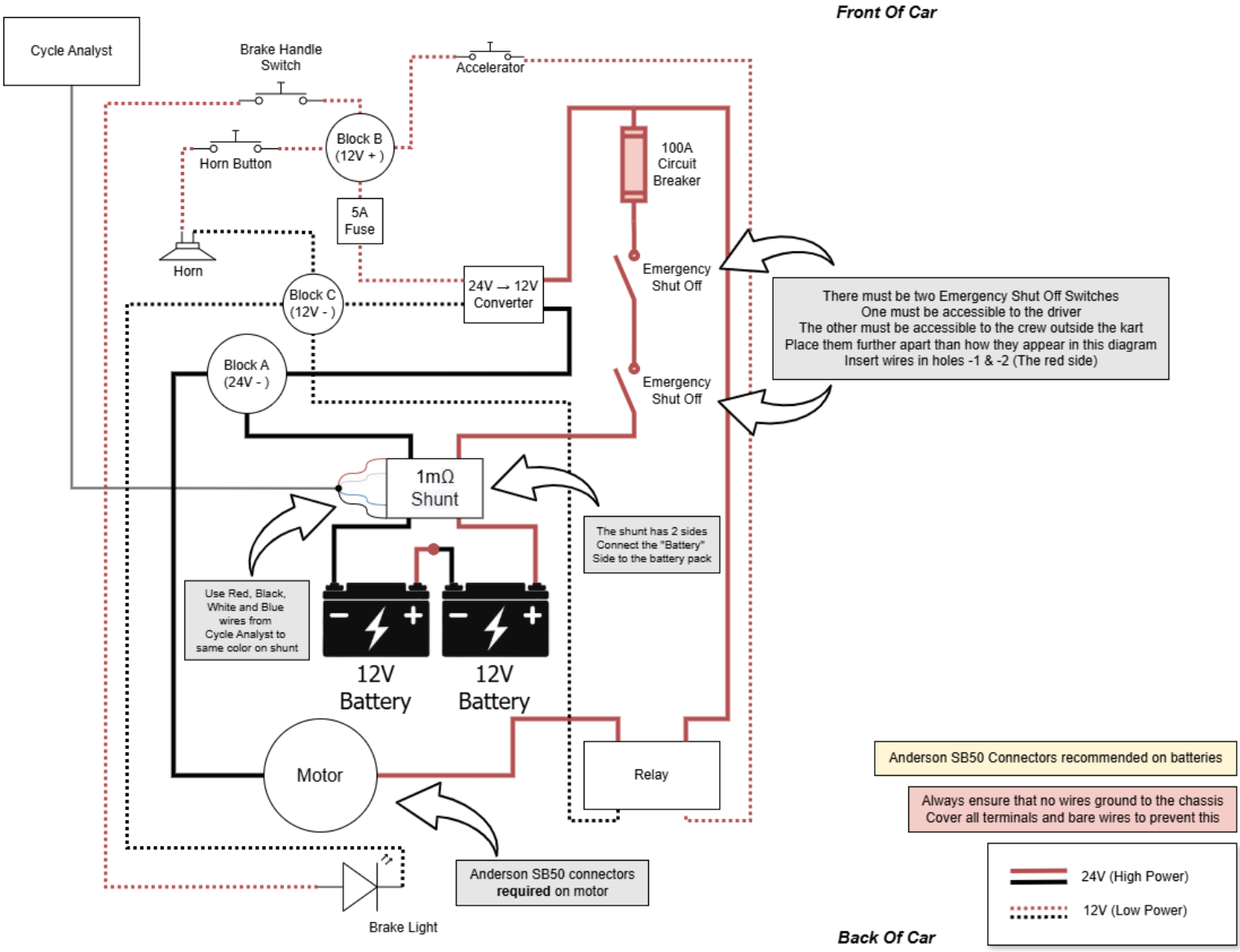


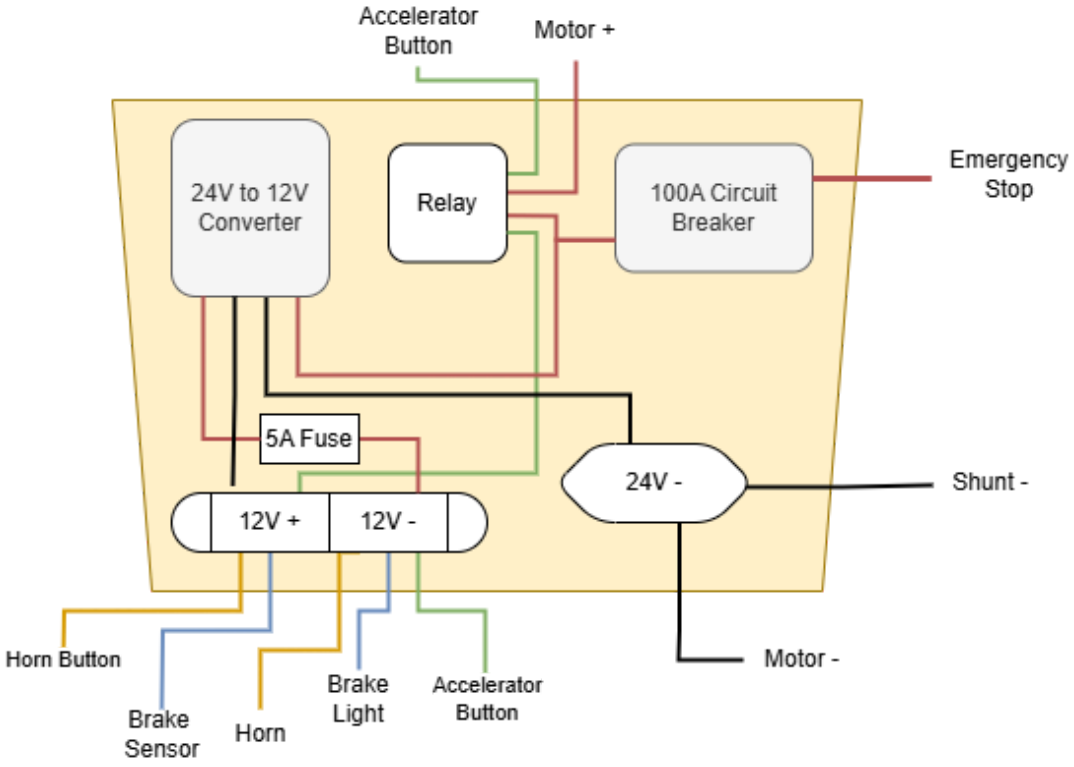


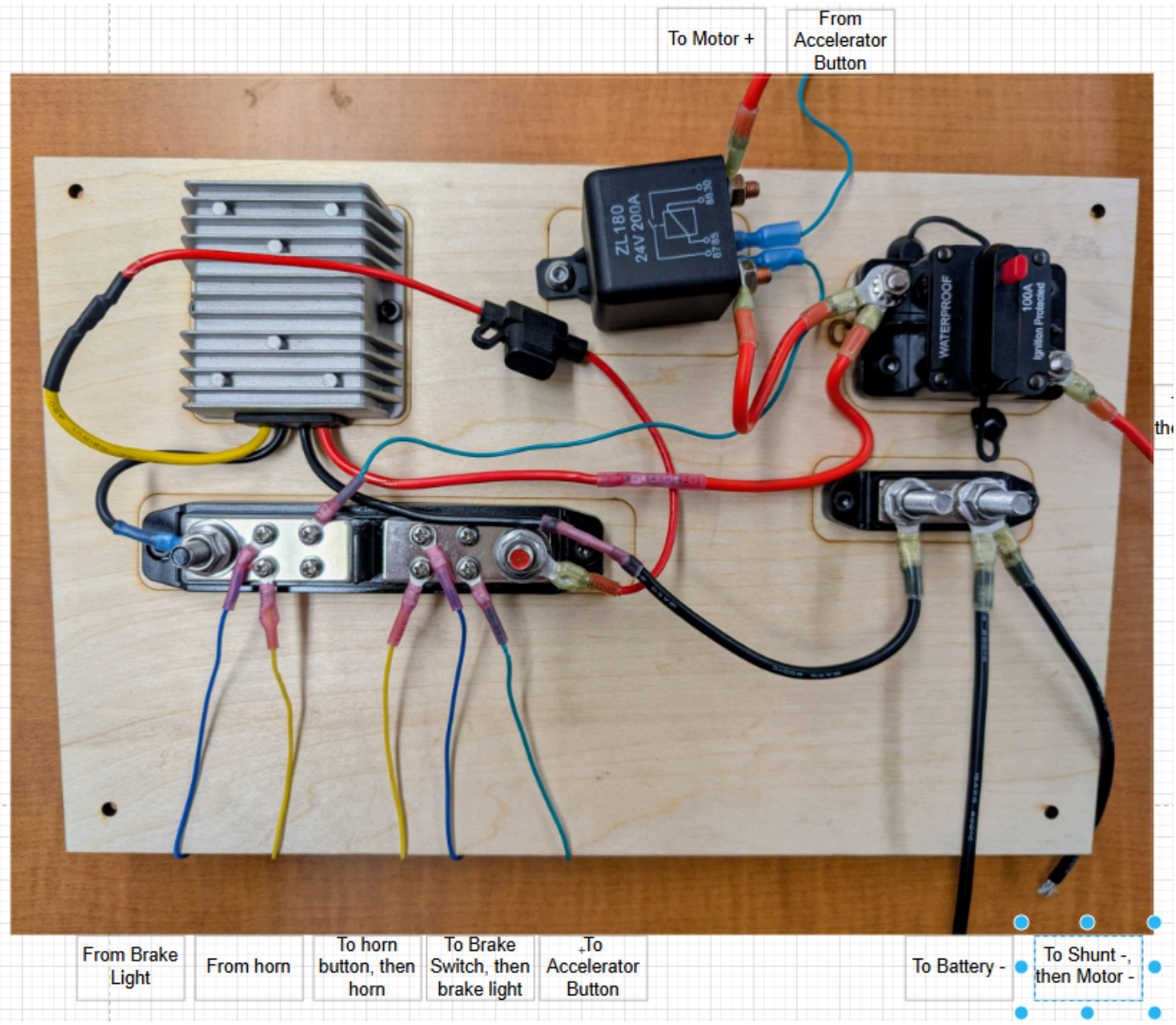
2x Black Hard Stop Spacer
2x 2.25” 5/16-18 Hex Head Bolt
2x 5/16-18 Nylon Nut

Repeat on other side

Electrical: Wiring and Wiring Diagram




Accelerator Button
Motor +
24V to 12V Converter
Relay
100A Circuit Breaker
Emergency Stop
5A Fuse
24V -
Shunt -
12V +
12V -
Horn Button
Brake Sensor
Horn
Brake Light
Accelerator Button
Motor -


To Motor +
From Accelerator Button
ZL180 24V 200A
WATERPROOF
100A Ignition Protected
From Brake Light
From horn
To horn button, then horn
To Brake Switch, then brake light
+To Accelerator Button
To Battery -
To Shunt -, then Motor -