

## **Mini RobotShop Rover Development Platform**

Mechanical Assembly Guide

Revision 1.1 (Oct 2014)

This manual is offered in English only.

[www.RobotShop.com](http://www.RobotShop.com)

# Introduction

Thank you for purchasing the Mini RobotShop Rover. Below you will find a step by step guide for assembling the gearbox and frame. Should you have purchased the Smartphone version of the kit, the guide also includes instructions on how to assemble the tilt mechanism and servo motor.

Note that the frame has mounting holes for either an Arduino compatible board or the Raspberry Pi. Which holes are used for which board is explained at step 20. Electronics and Programming guides can be found in separate documents within the same ZIP file. Note that although the Tamiya Twin Motor Gear Box allows for three different gear configurations, it must be assembled in configuration A for this kit.

## Mini RobotShop Rover Development Platform (Chassis Kit) Package Contents

### **Lexan brackets** (RB-Lyn-766)

- 1x Main plate
- 2x Side plates
- 1x Top support plate
- 1x Bottom support plate
- 1x SES to Arduino plate (Smartphone version only)

*Note: Lexan is covered on both sides with a thin piece of plastic used to protect the surface during laser cutting. It can be removed like a sticker.*

### **Hardware** (RB-Rbo-153)

- 8x RB-TeX-29 4-40 x 3/8in Pan Head Cap Socket Machine Screw
- 4x RB-TeX-42 4-40 x 1/2in F/F Nylon Hex Standoff (for Arduino Mounting)
- 2x RB-TeX-44 4-40 x 3/4in F/F Nylon Hex Standoff (for Raspberry Pi Mounting)
- 1x RB-Cap-01 Double-Sided Tape (Battery Mounting Option)
- 1x RB-Rbo-135 25" of #22 Gauge Black Hook-Up Wire
- 5x RB-Sha-25 Female Crimp Pin (18 to 22 AWG)

### **Track / Motors**

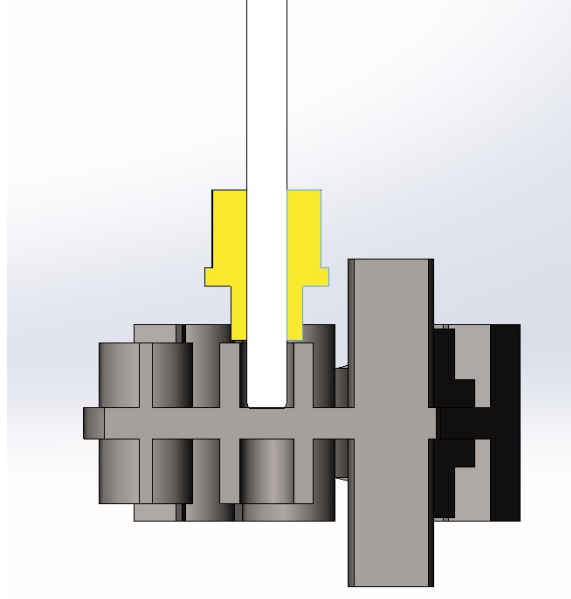
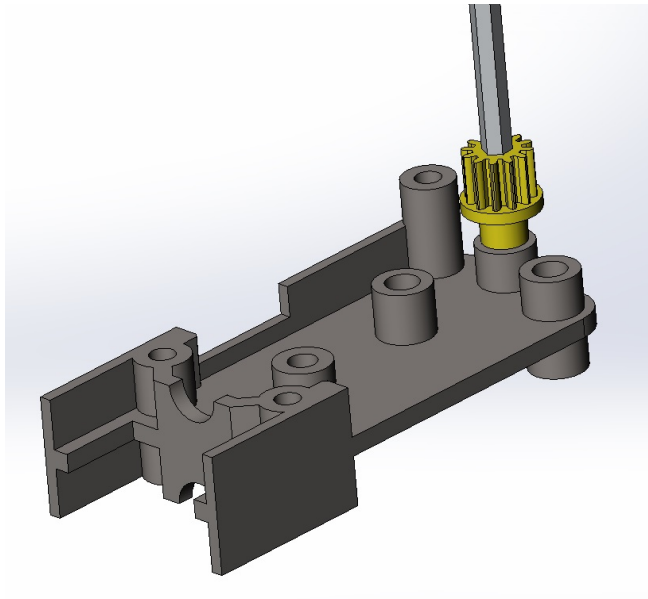
- 1x Tamiya Twin Motor Gear Box (Assemble in Configuration A)
- 1x Tamiya Track & Sprocket Kit (Use only two large and two medium tracks)
- 1x Hitec HS-422 Servo Motor (Smartphone version only)

### **Brackets** (included only with Smartphone version)

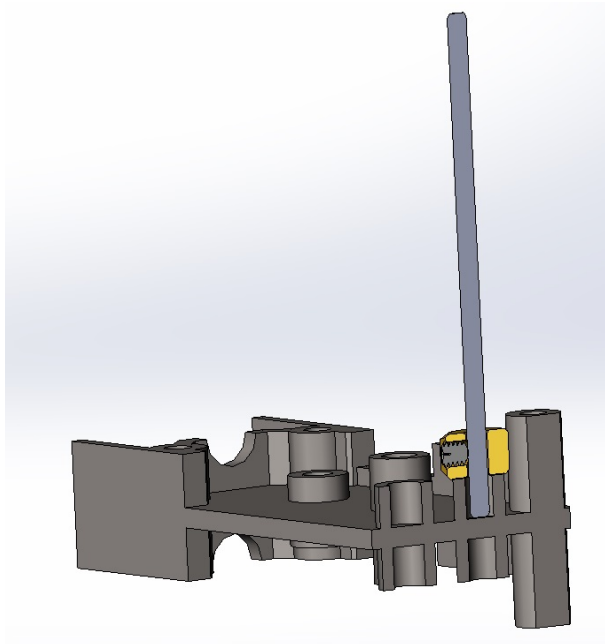
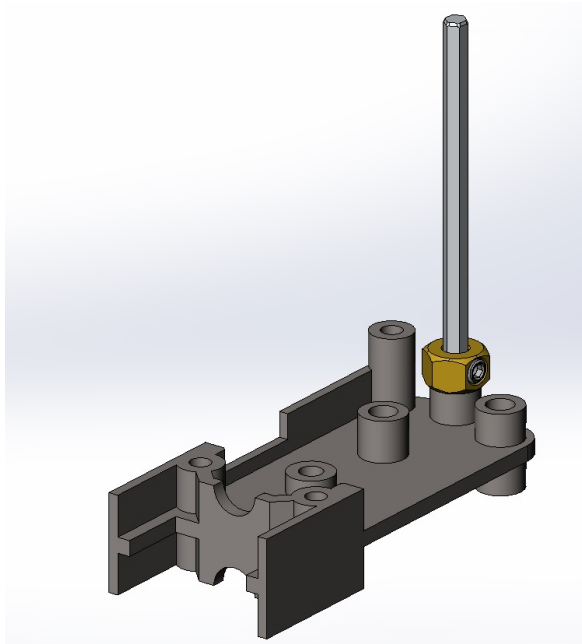
- 1x Multipurpose bracket
- 1x Angled C-bracket
- 1x Cell phone plate
- 1x Anti-slip pad

## GEARBOX ASSEMBLY (Configuration A Required)

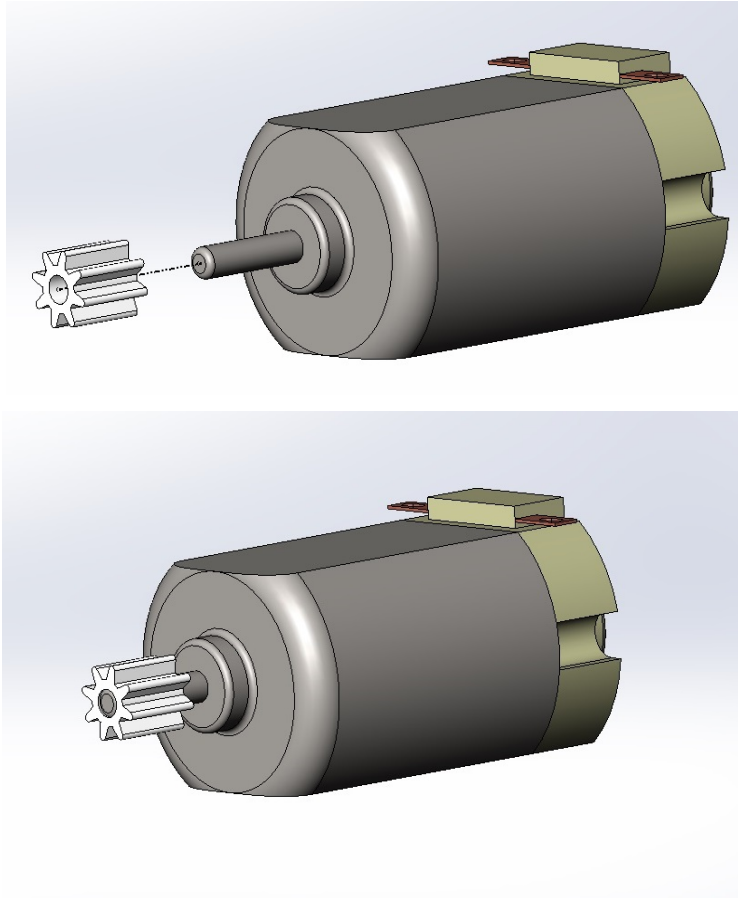
### STEP 1A (2x): Drive Gear Positioning



### STEP 1B: Center Axle Collar Positioning (With Set Screw)



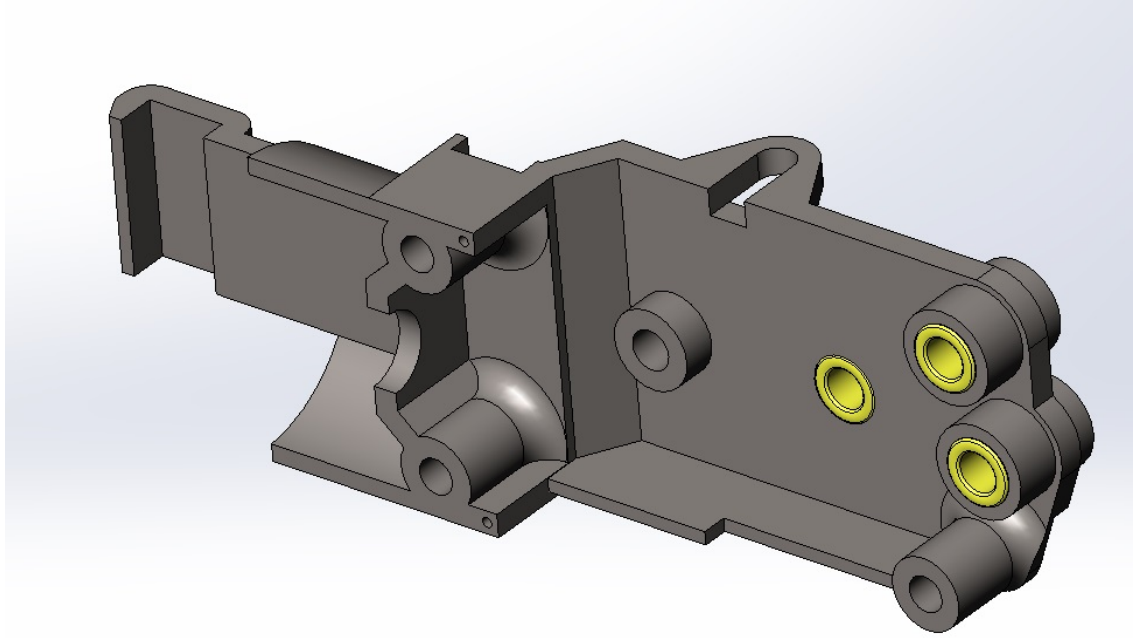
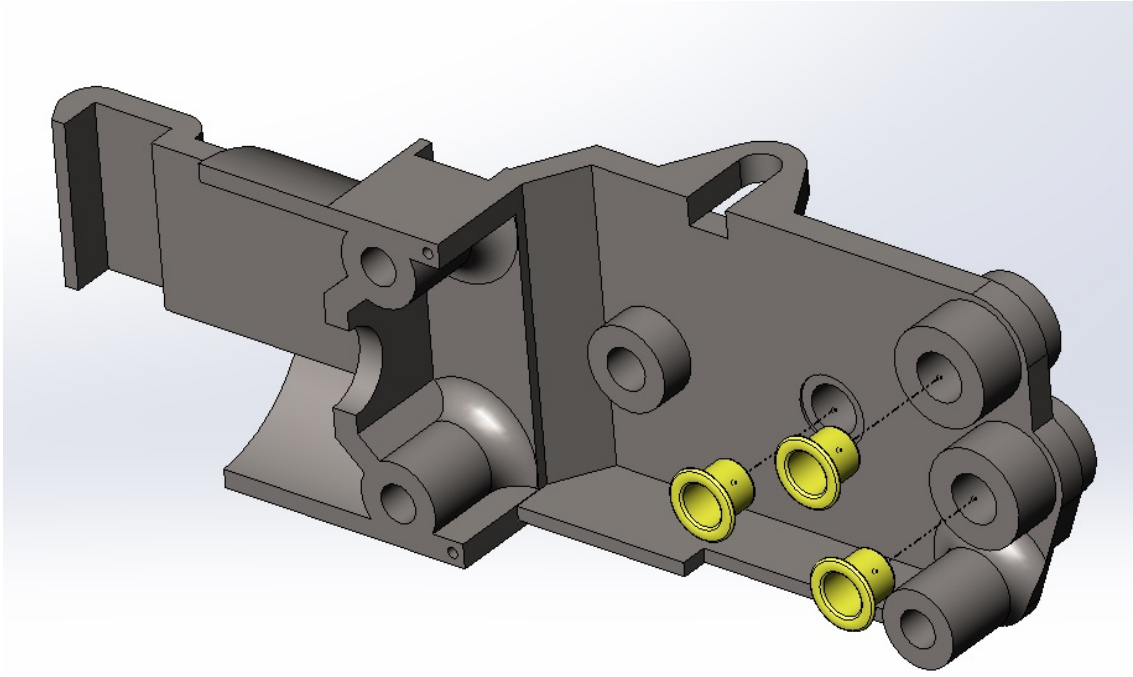
## STEP 2 (2x): Motor Pinion



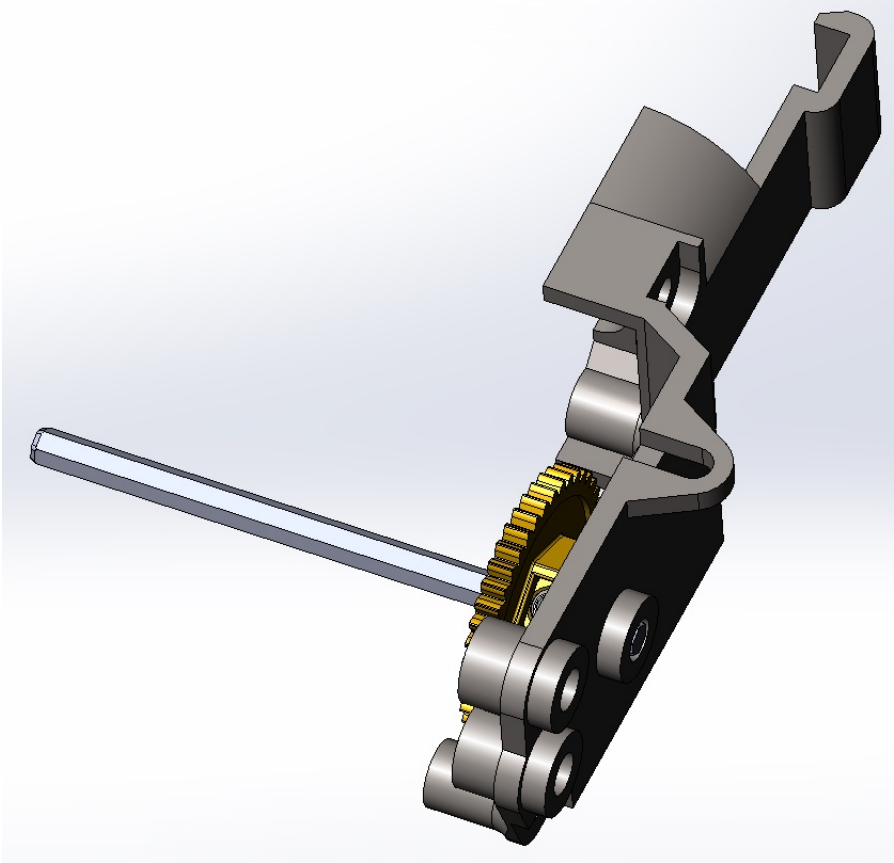
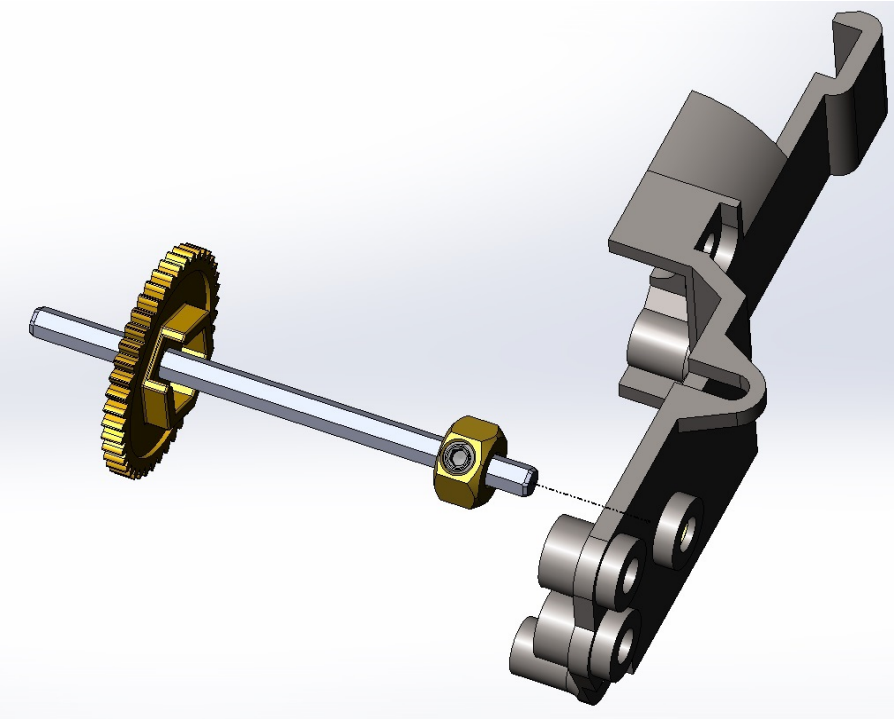
*Note: At this point you can also attach / solder wires to the motor. We suggest the wires be at least 14cm long. There are five crimps included with the kit as well as 25" of 22 AWG wire. You can cut the wire into four equal sections, strip ~5mm of wire from each end and use the crimps between one end of the wire and the motor terminals. Alternatively, you can use your own materials.*

*The motor's terminals are very fragile - do not bend them too much or repeatedly flex them as they will break.*

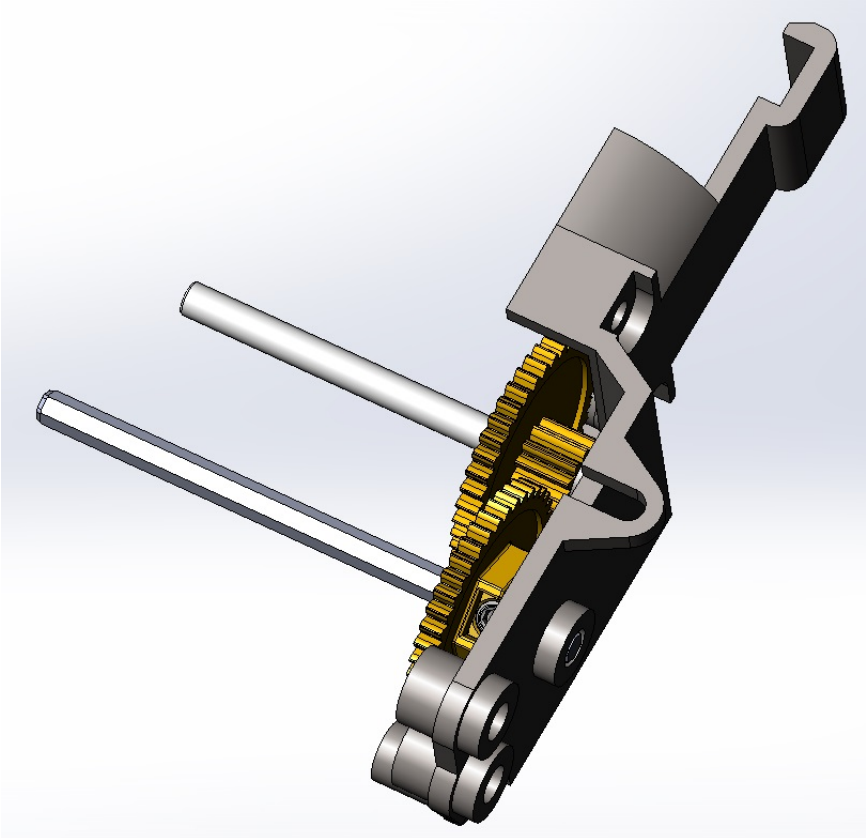
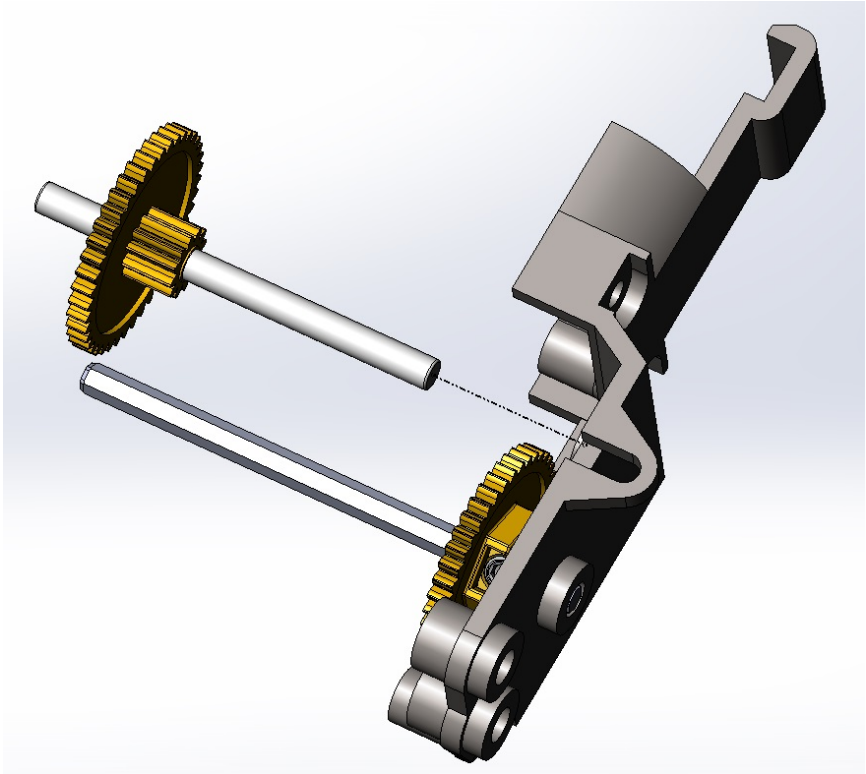
**STEP 3: Brass Bearings**



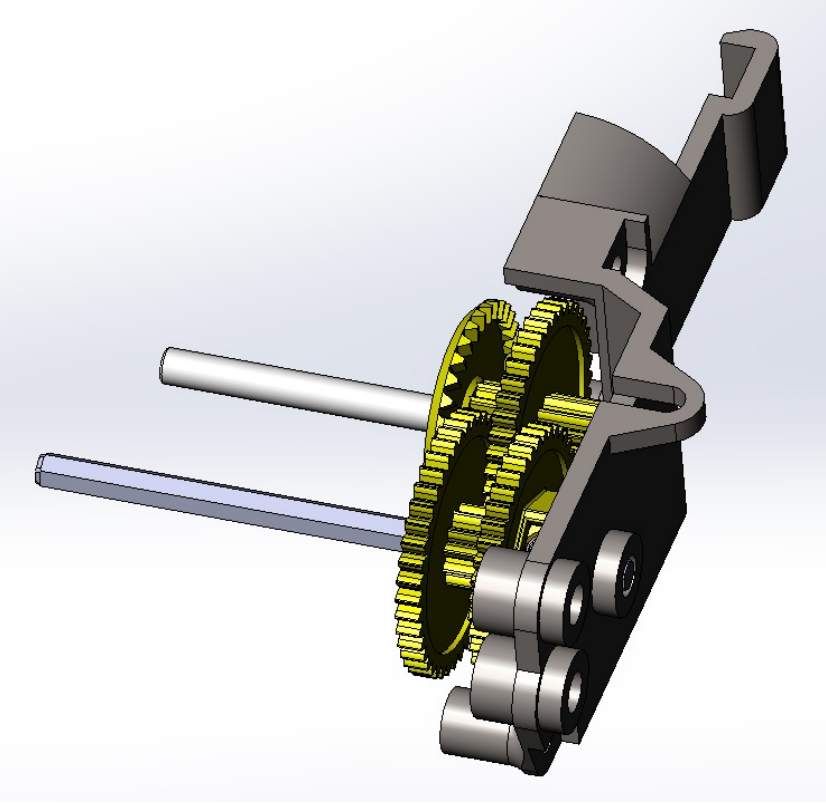
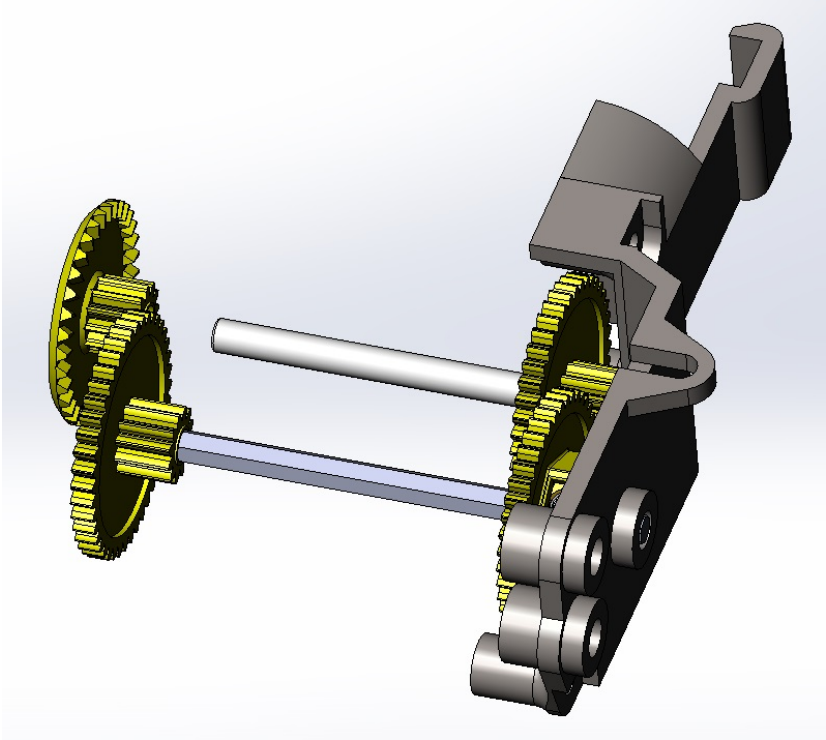
**STEP 4: Center Axle + Gear**



**STEP 5: Plastic Gears (Righe Side)**

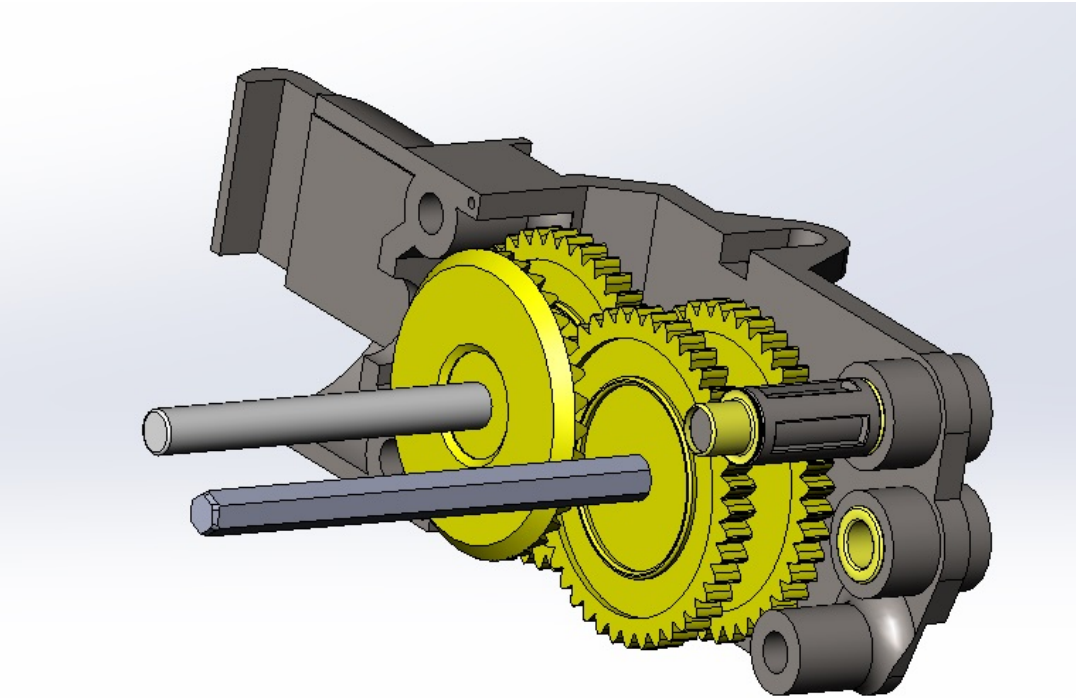
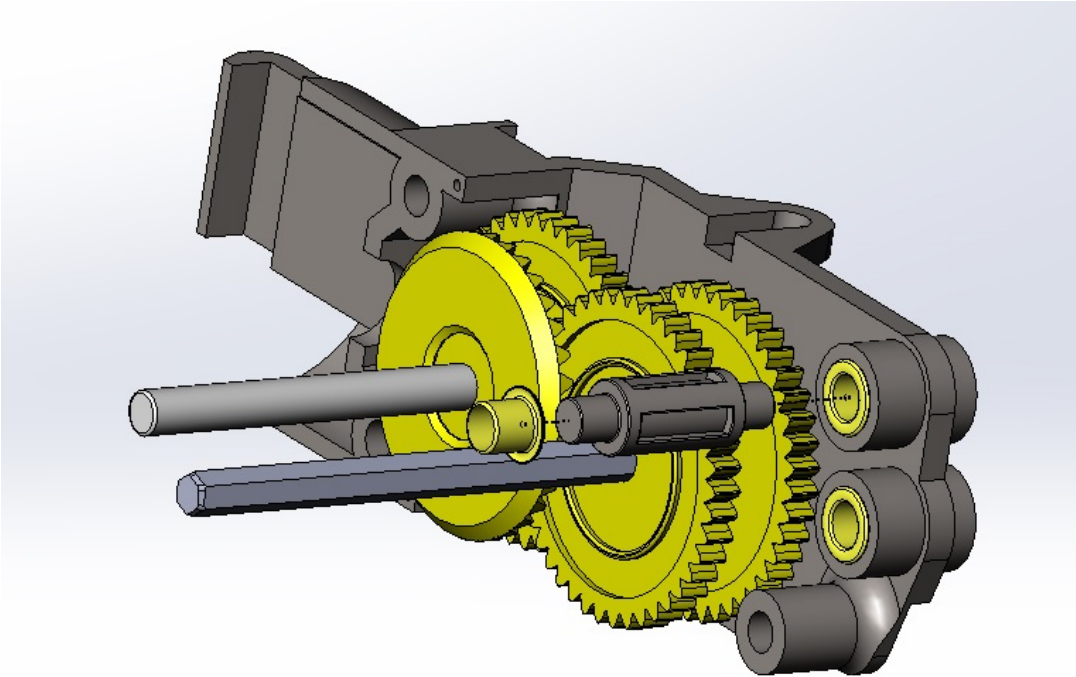


**STEP 6: Plastic Gears (Right Side)**

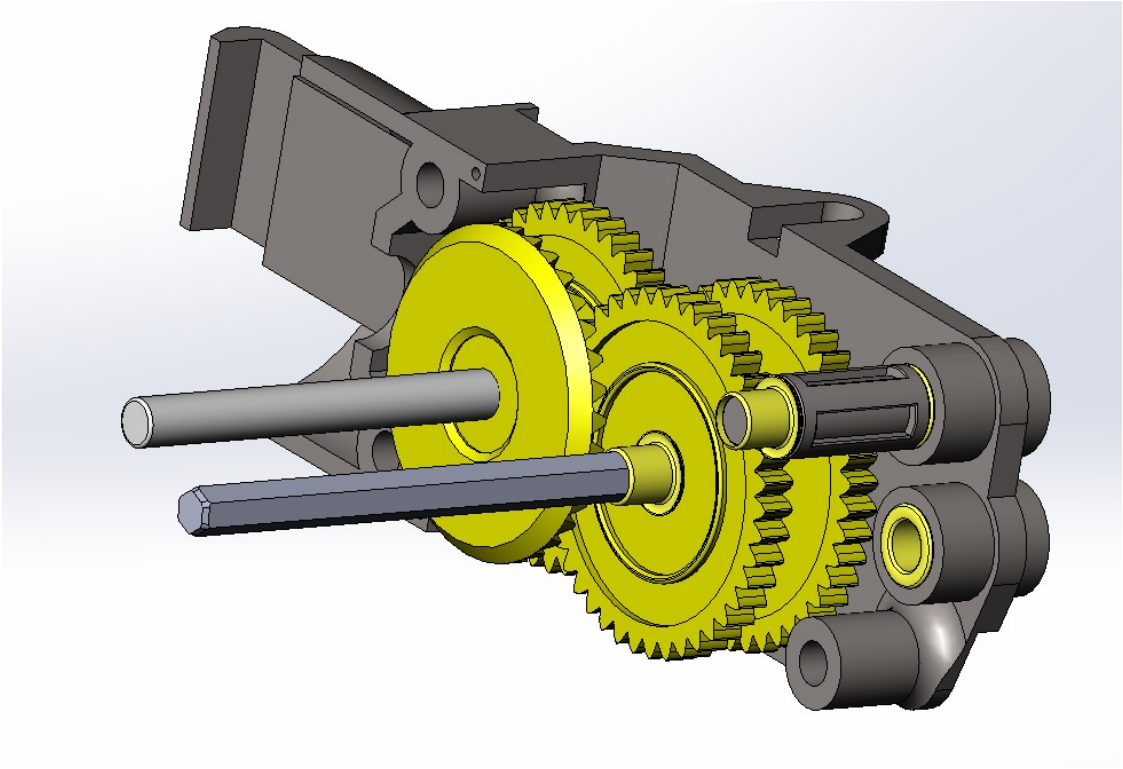
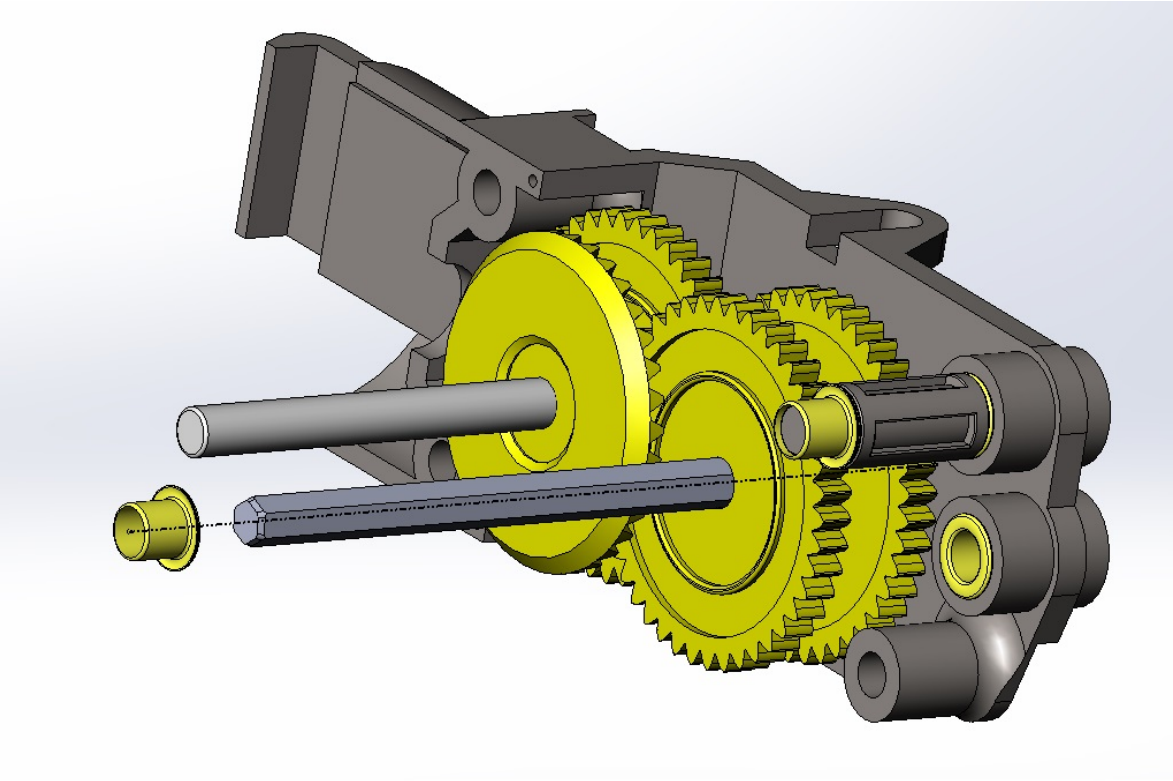




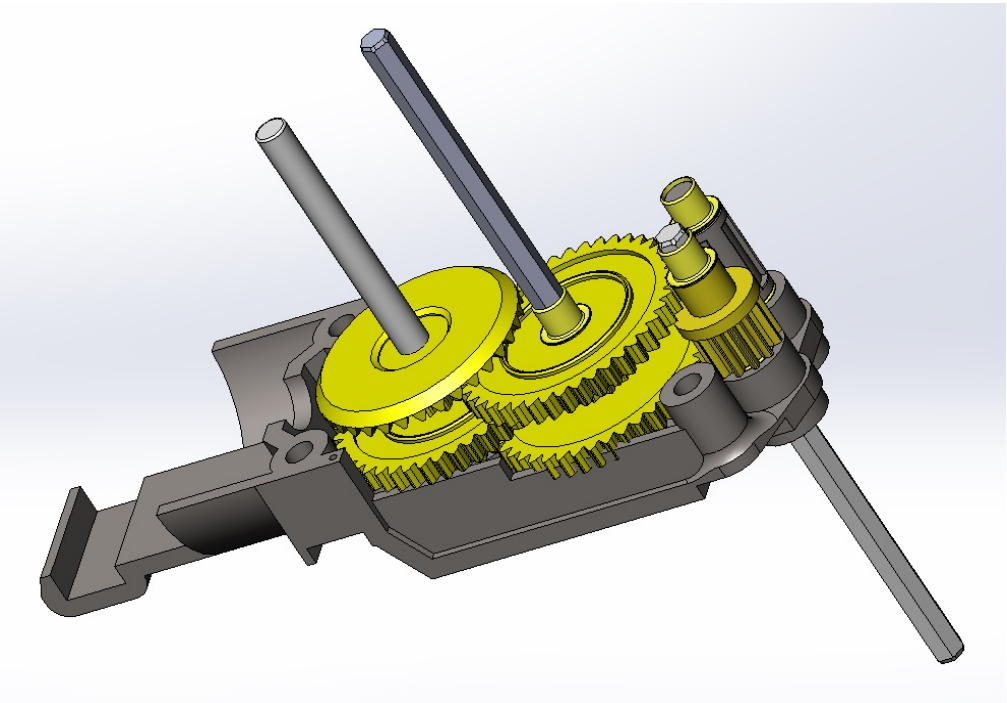
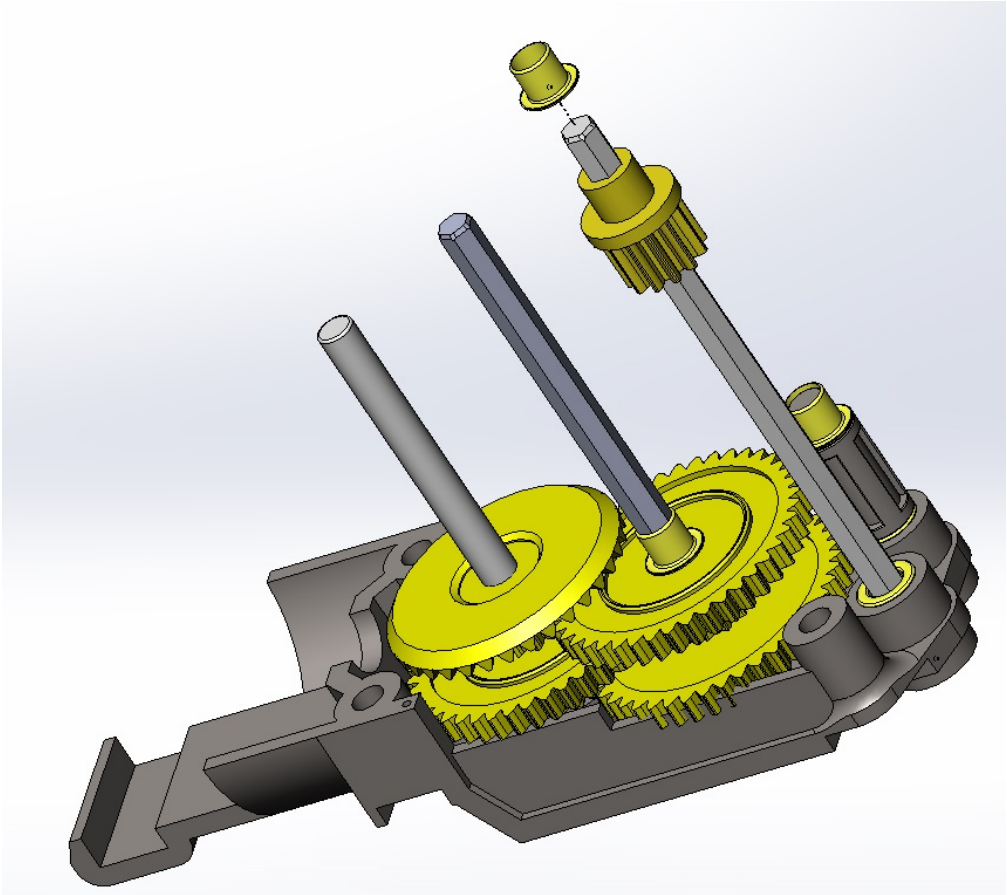
**STEP 7: Plastic Spacer + Brass Bearing**



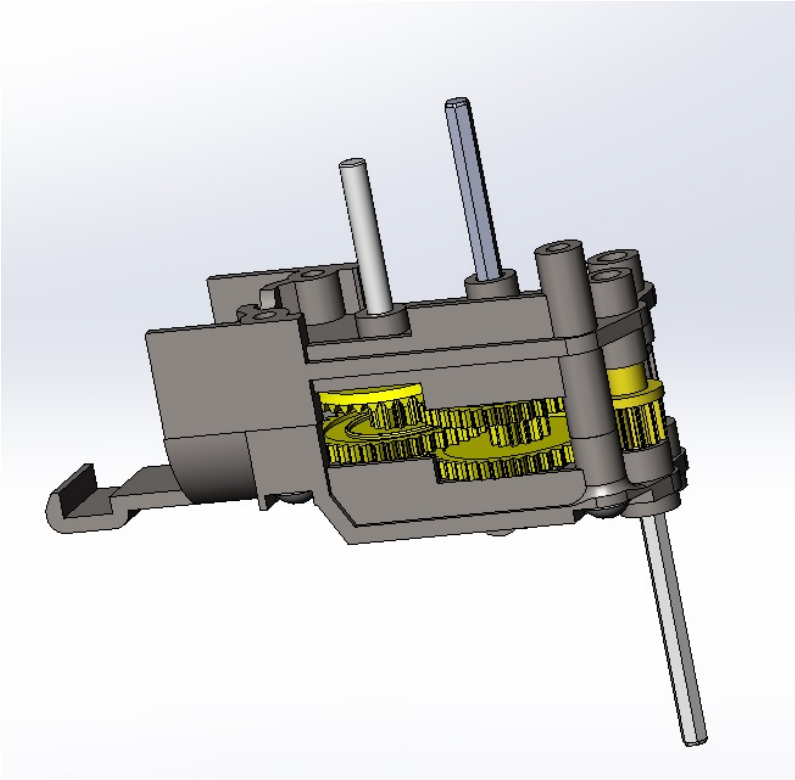
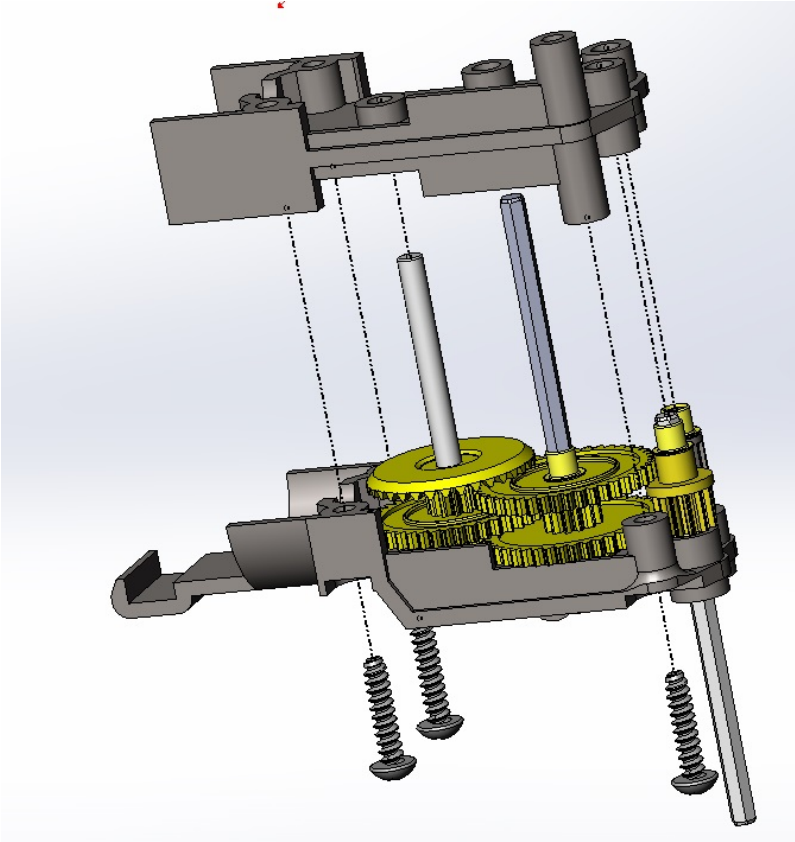
**STEP 8: Brass Bearing**



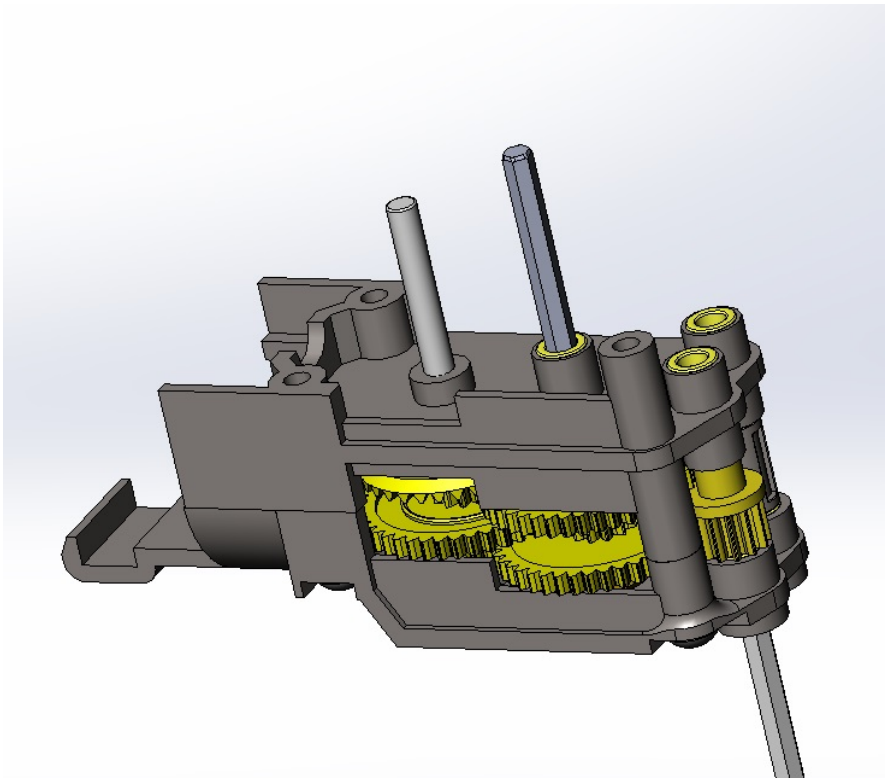
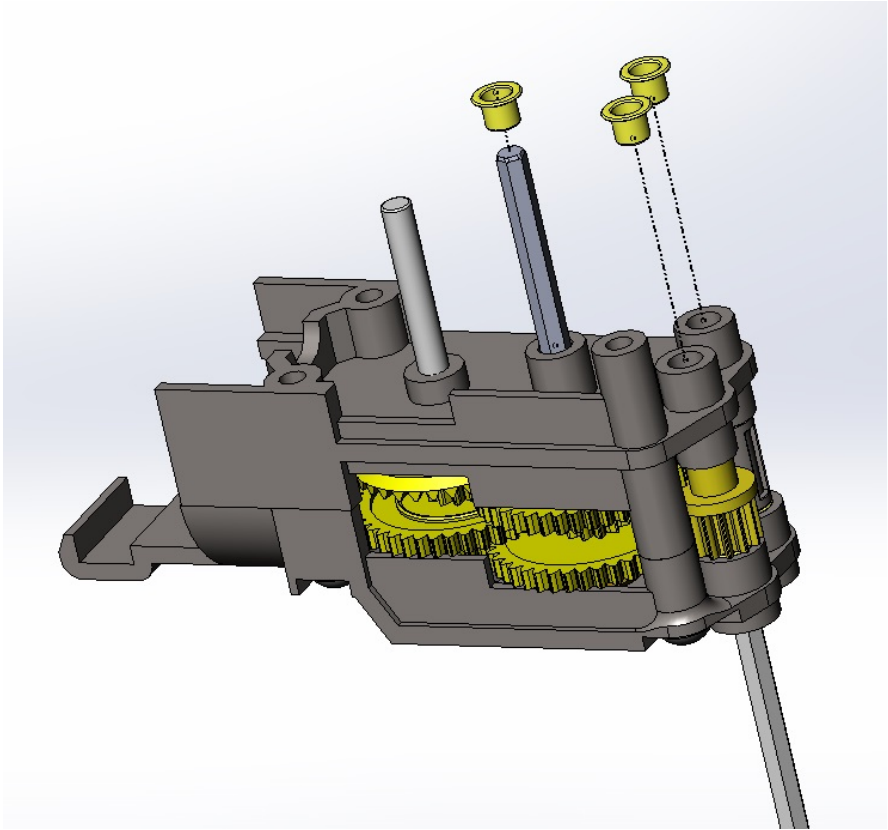
**STEP 9: Right Drive Shaft + Brass Bearing**



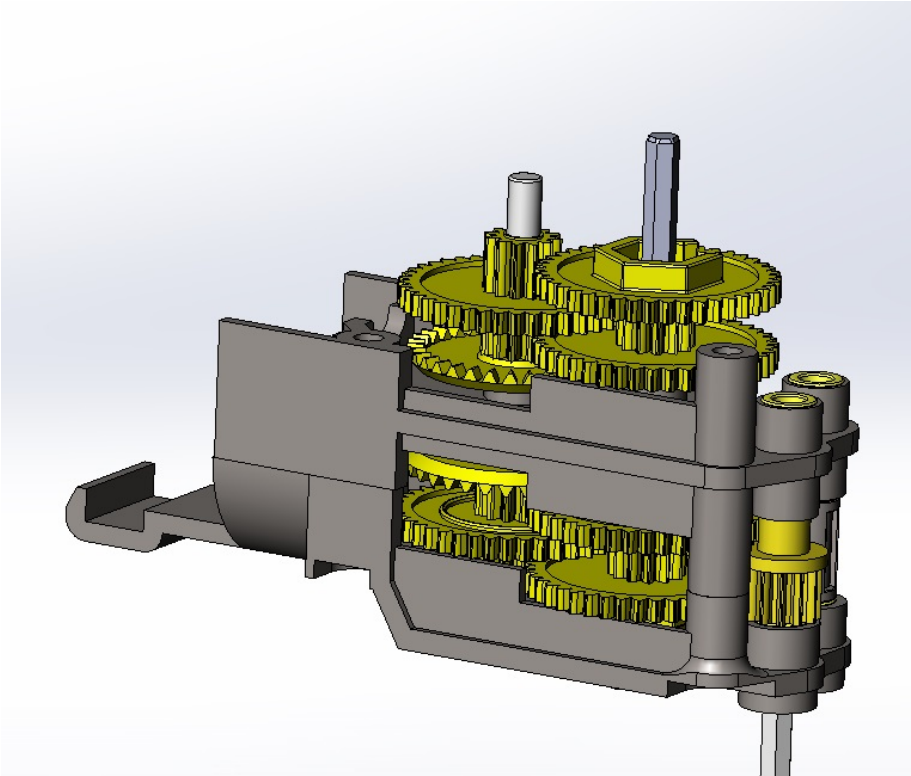
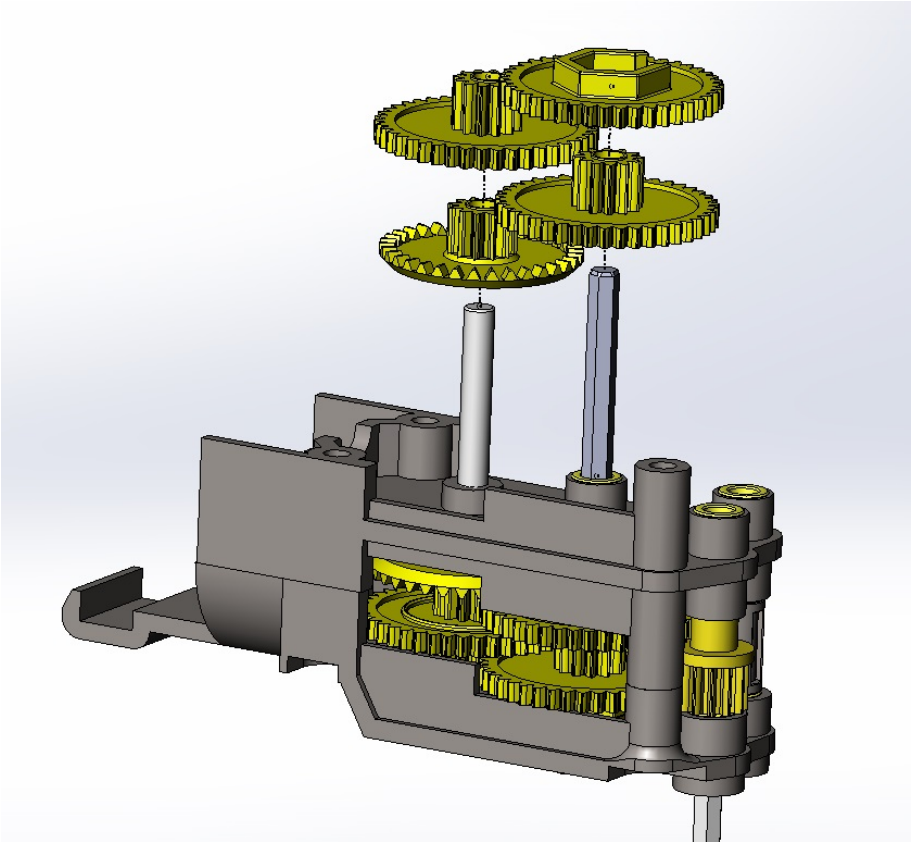
STEP 10: Center Bracket



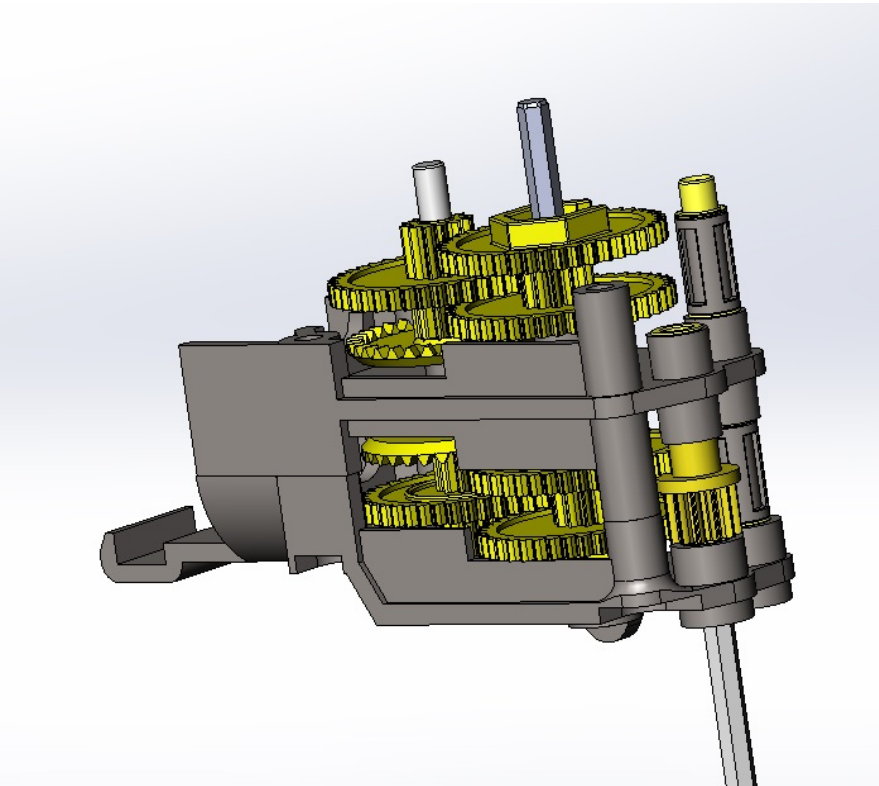
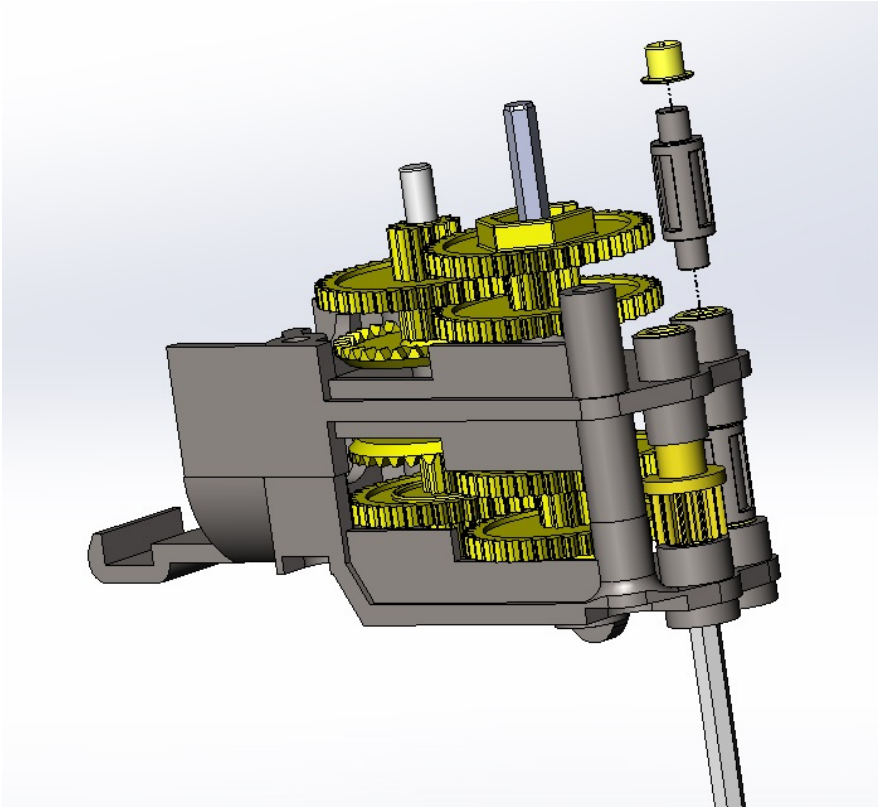
**STEP 11: Brass Bearings**



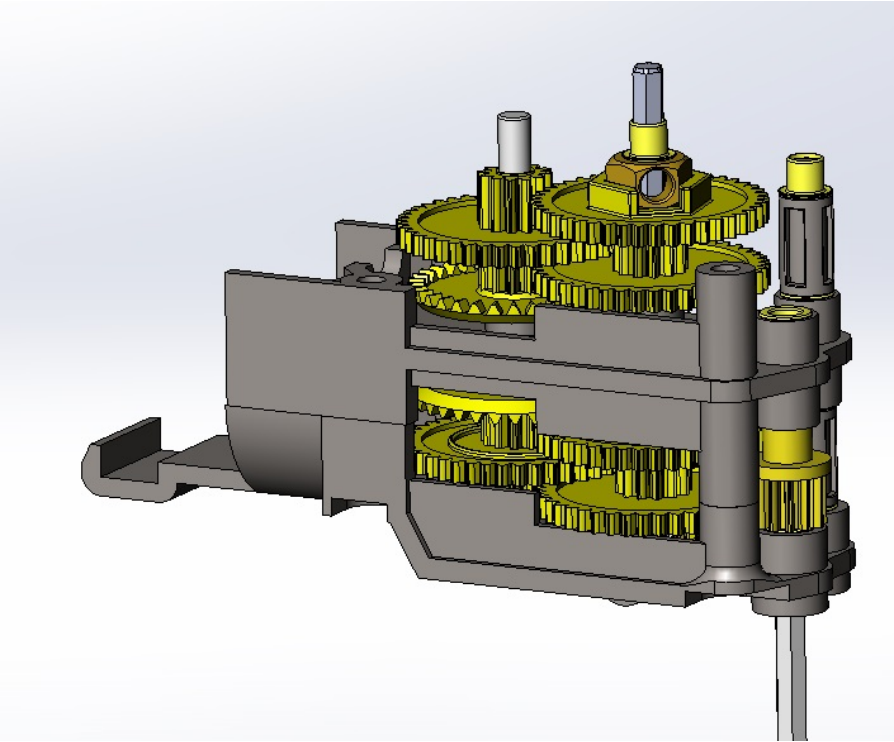
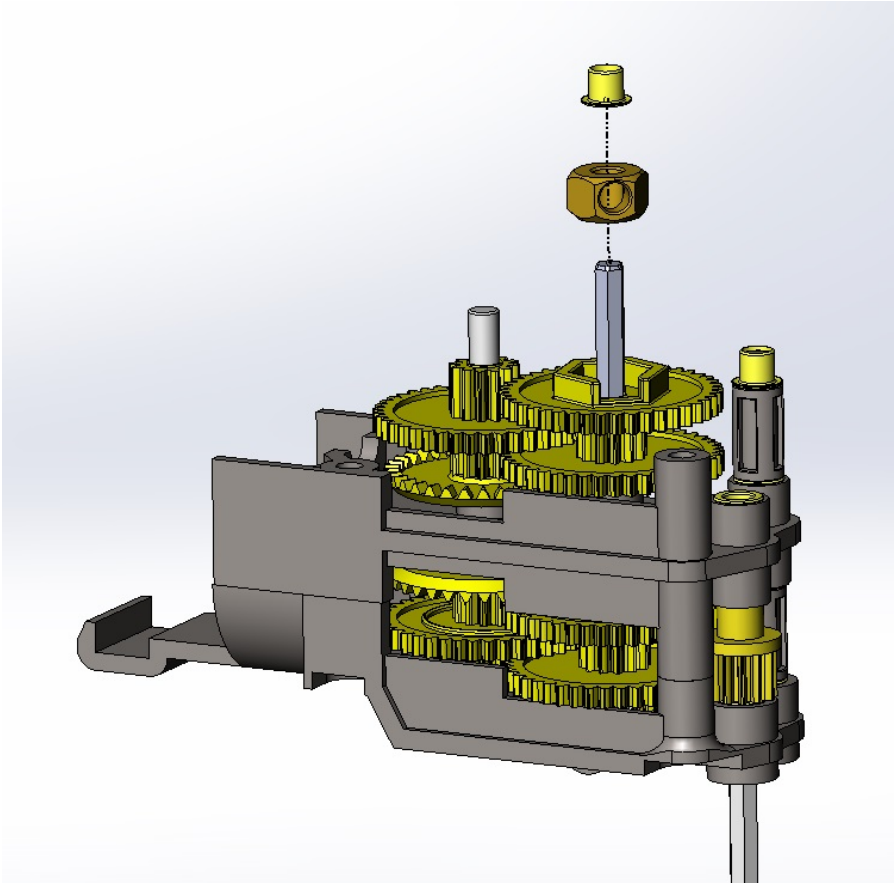
**STEP 12: Gears (Left Side)**



**STEP 13: Plastic Spacer + Brass Bearing**

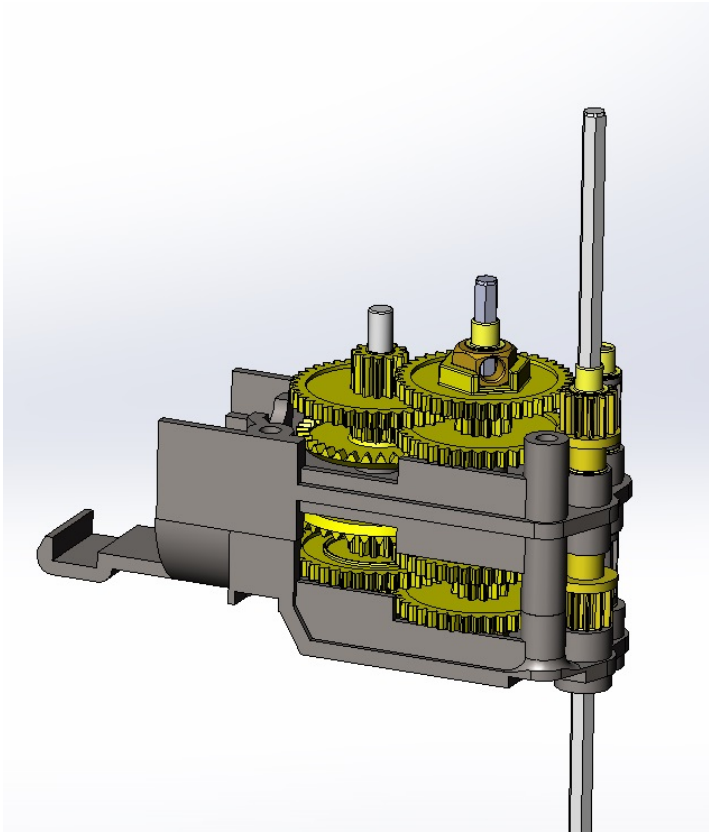
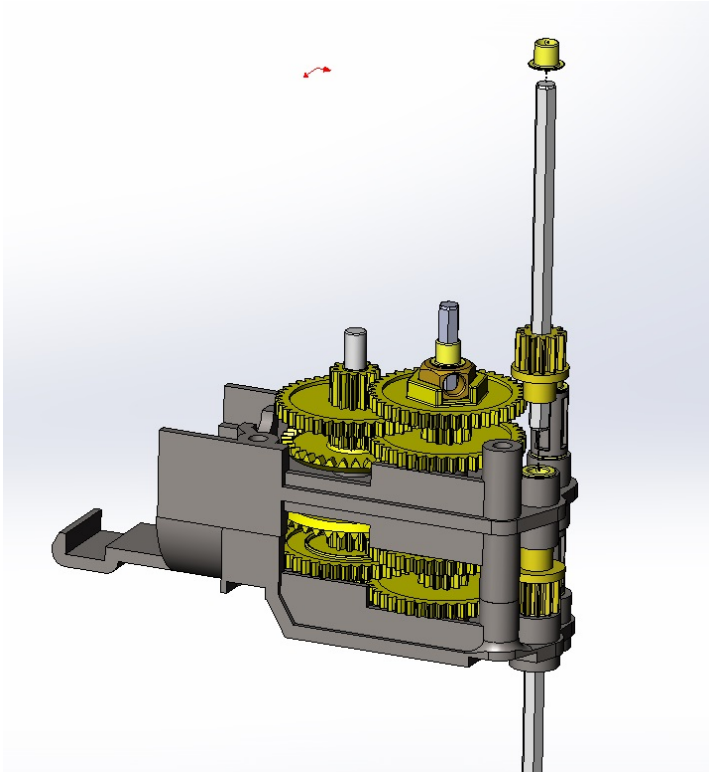


**STEP 14: Shaft Collar (note: NO set screw) + Brass Bearing**

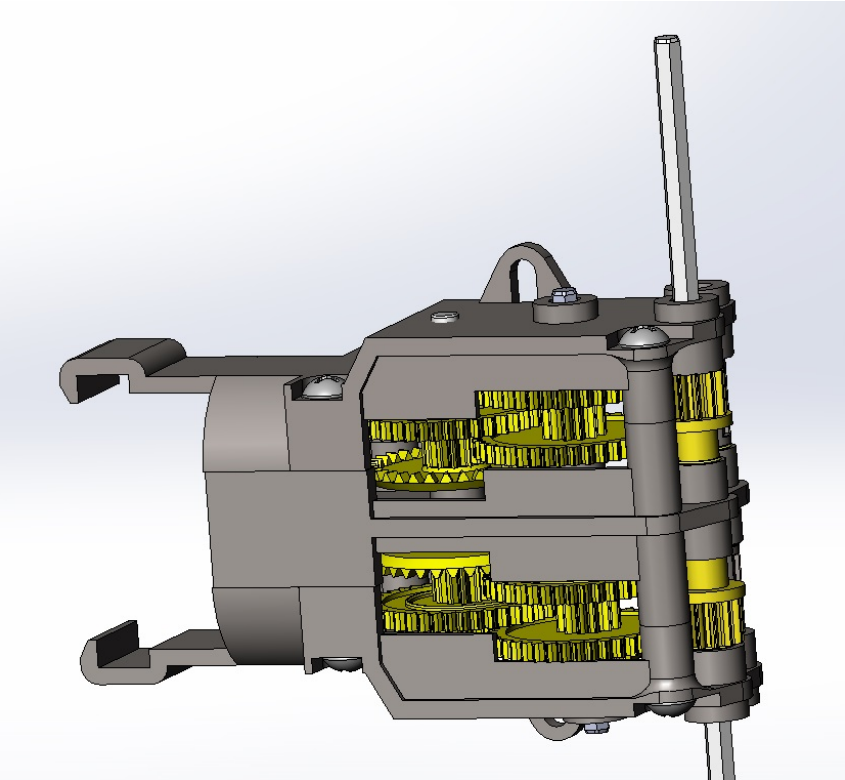
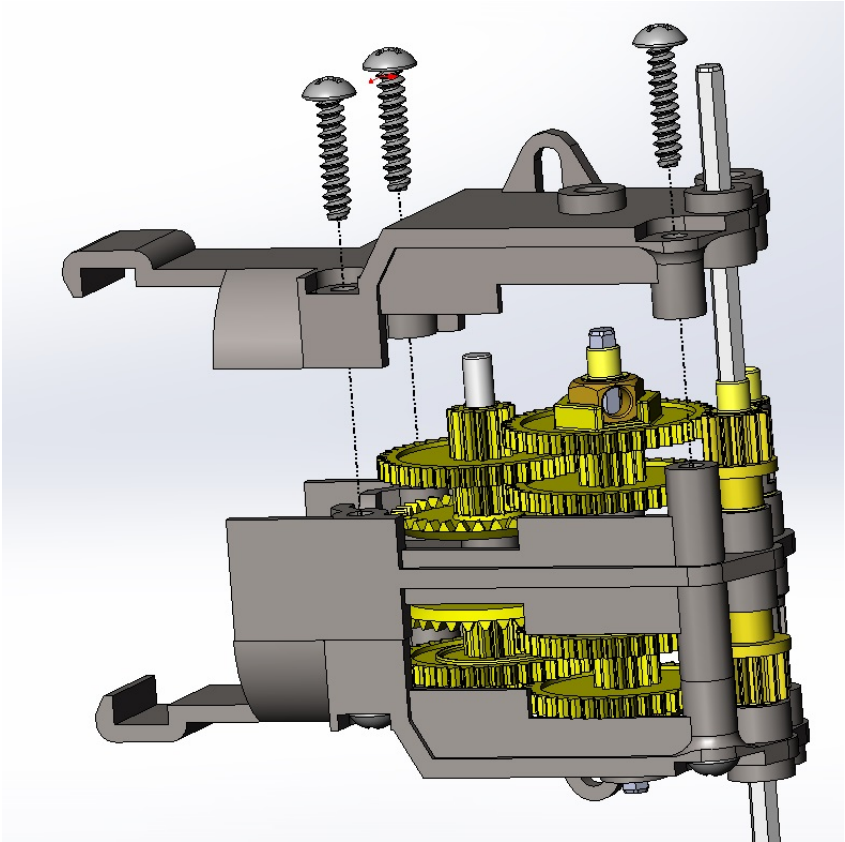




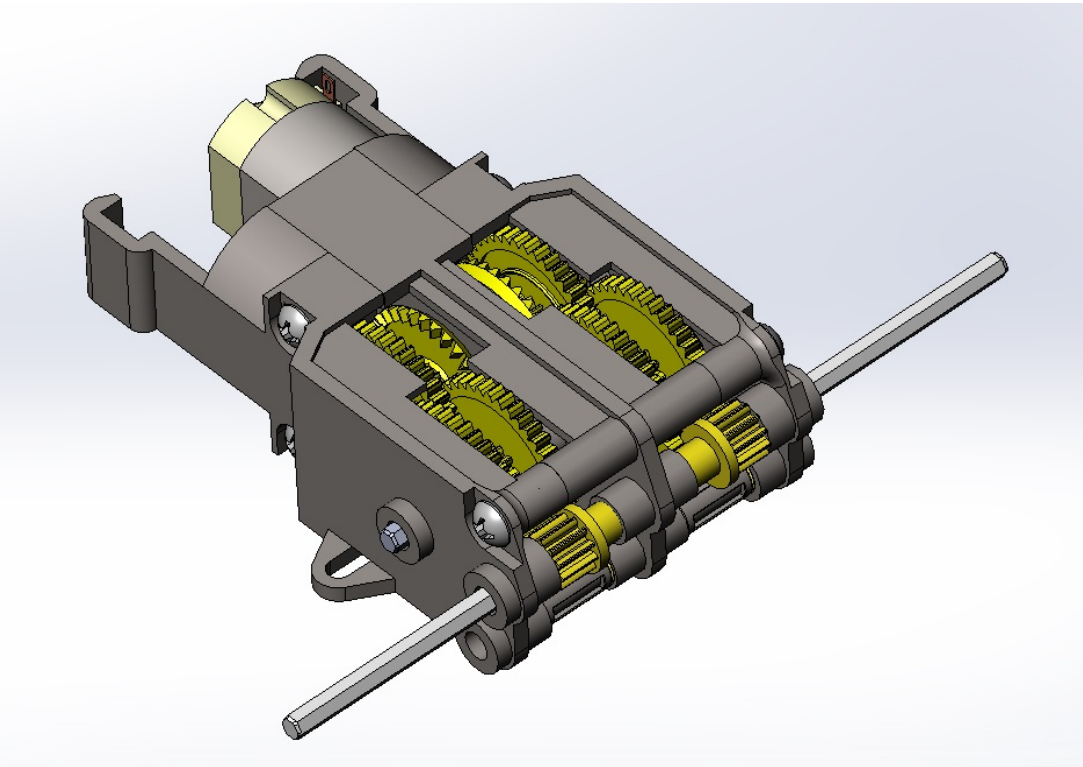
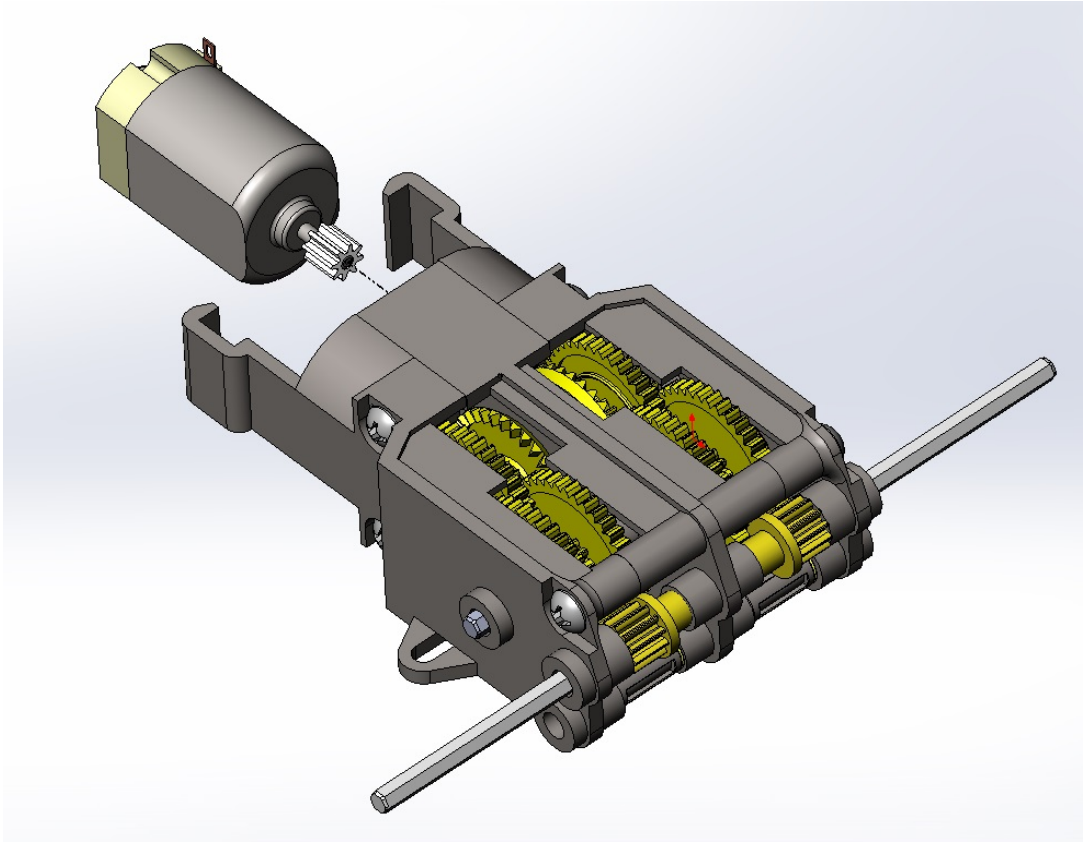
**STEP 15: Left Drive Shaft + Brass Bearing**

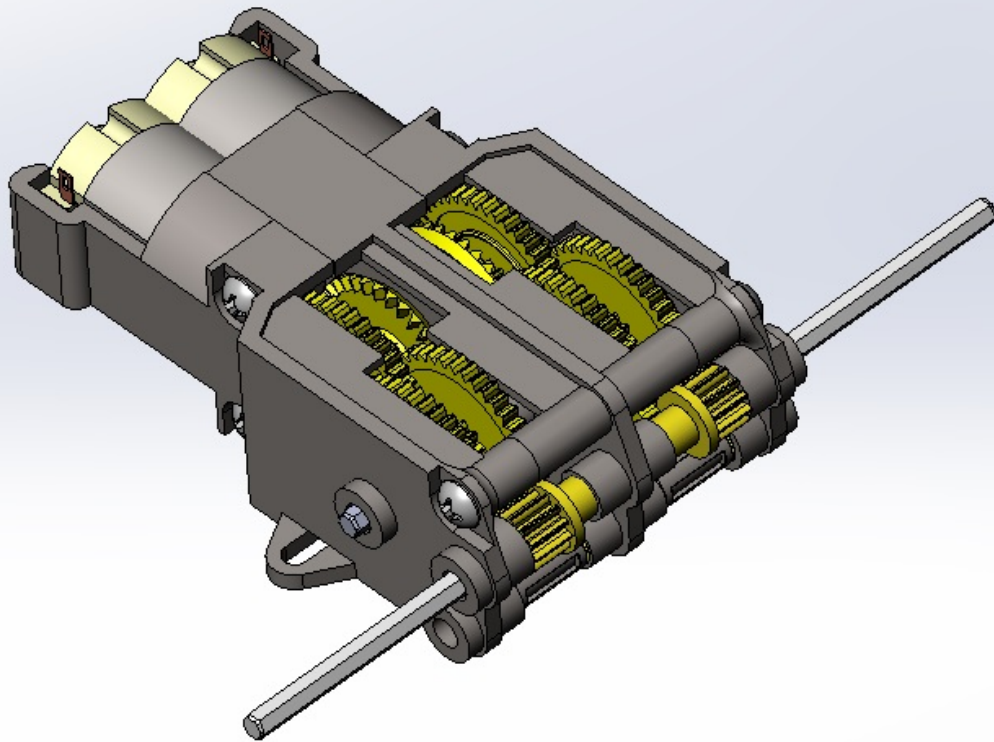
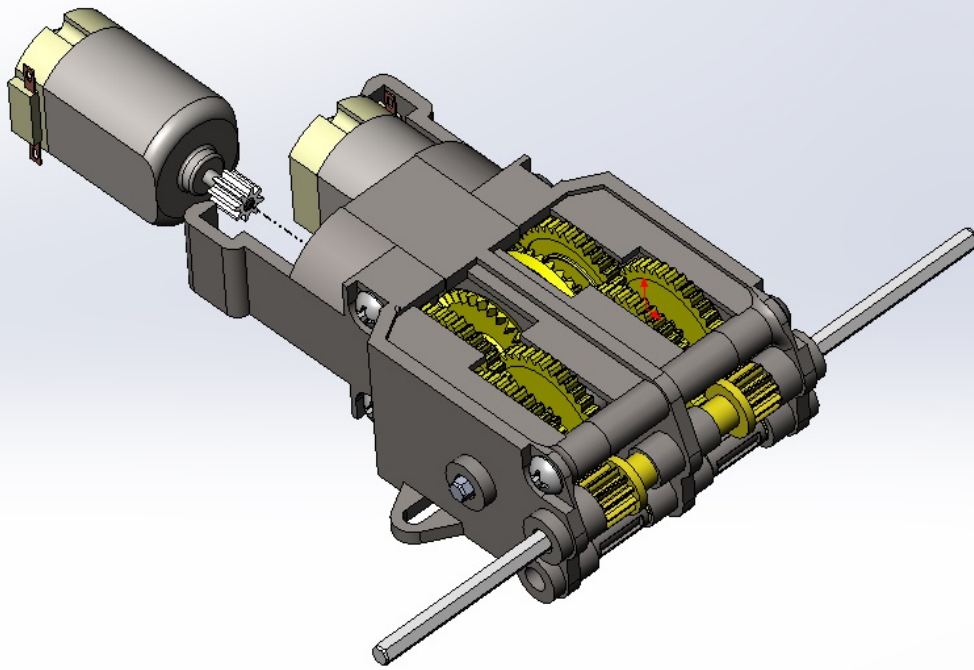


**STEP 16: Left Bracket**

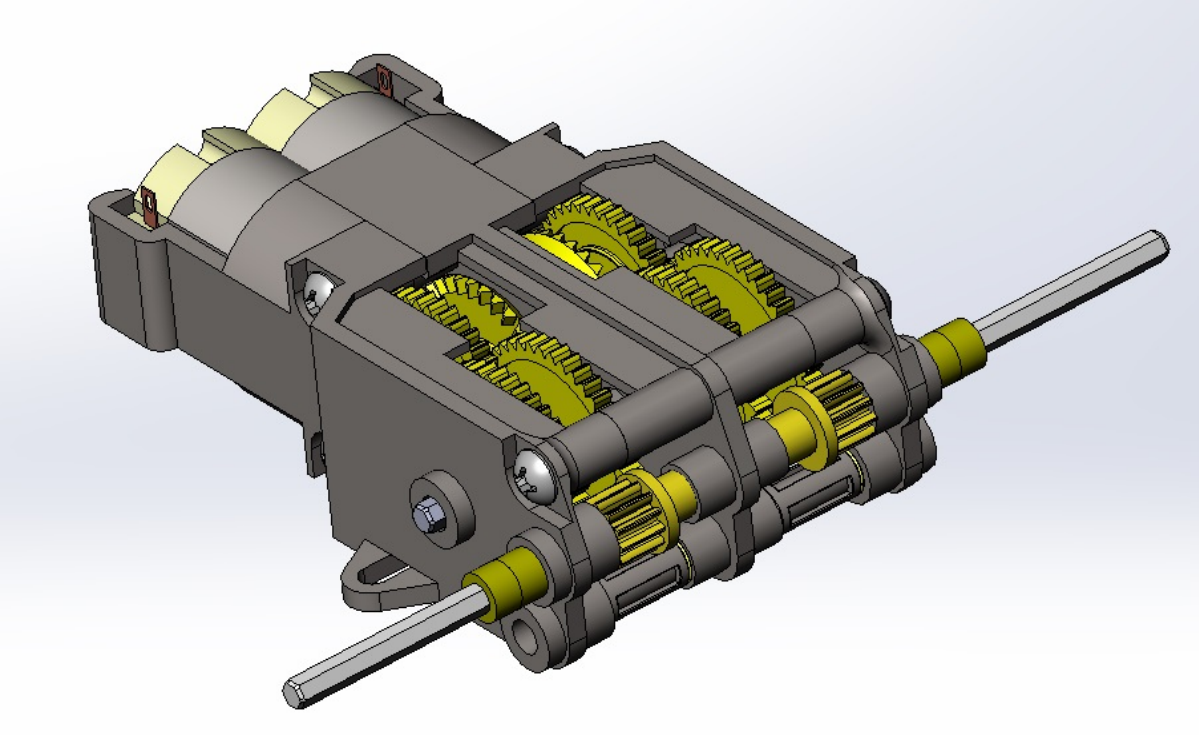
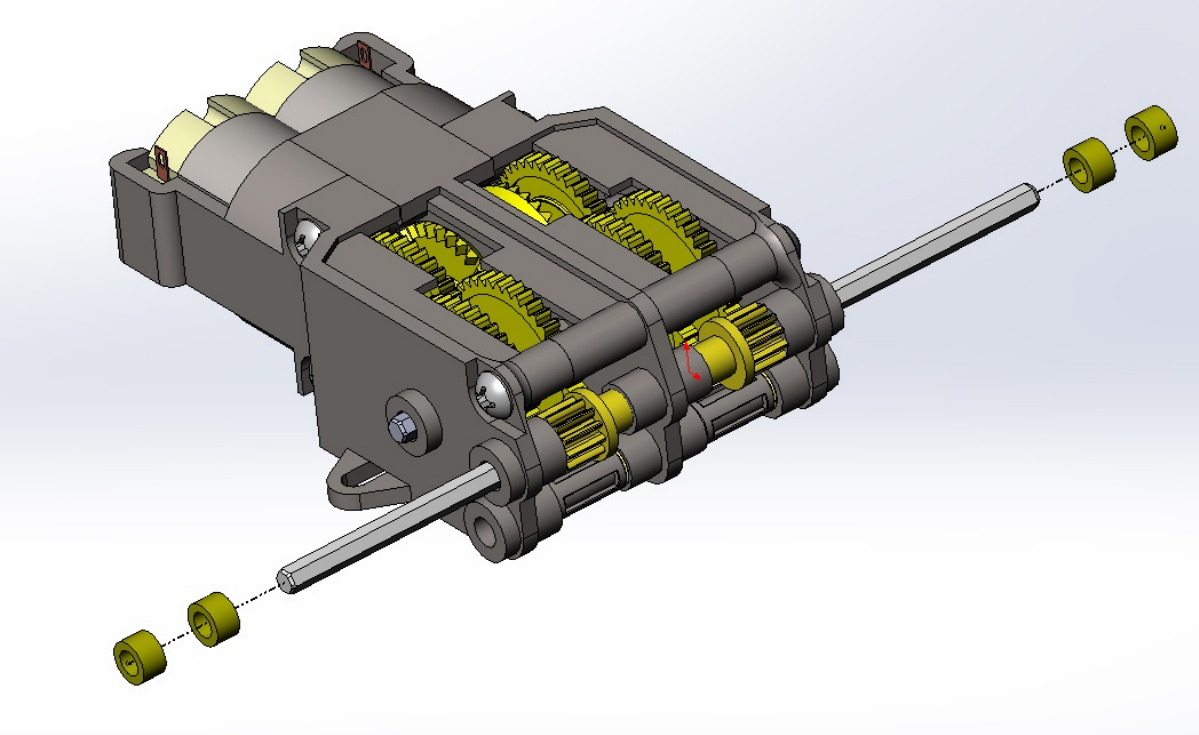


**STEP 17: DC Motors**

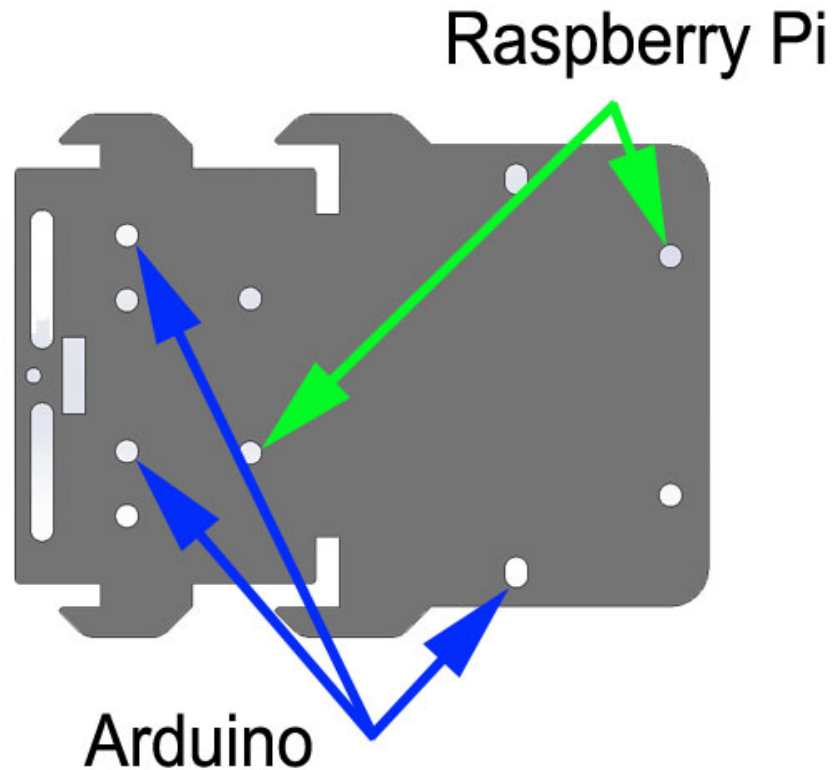




**STEP 19: Spacers**



The locations for the hex standoffs are determined based on the board you plan to connect. The Mini RobotShop Rover has mounting holes for either an Arduino (Uno for example) or a Raspberry Pi. The plate is symmetric.



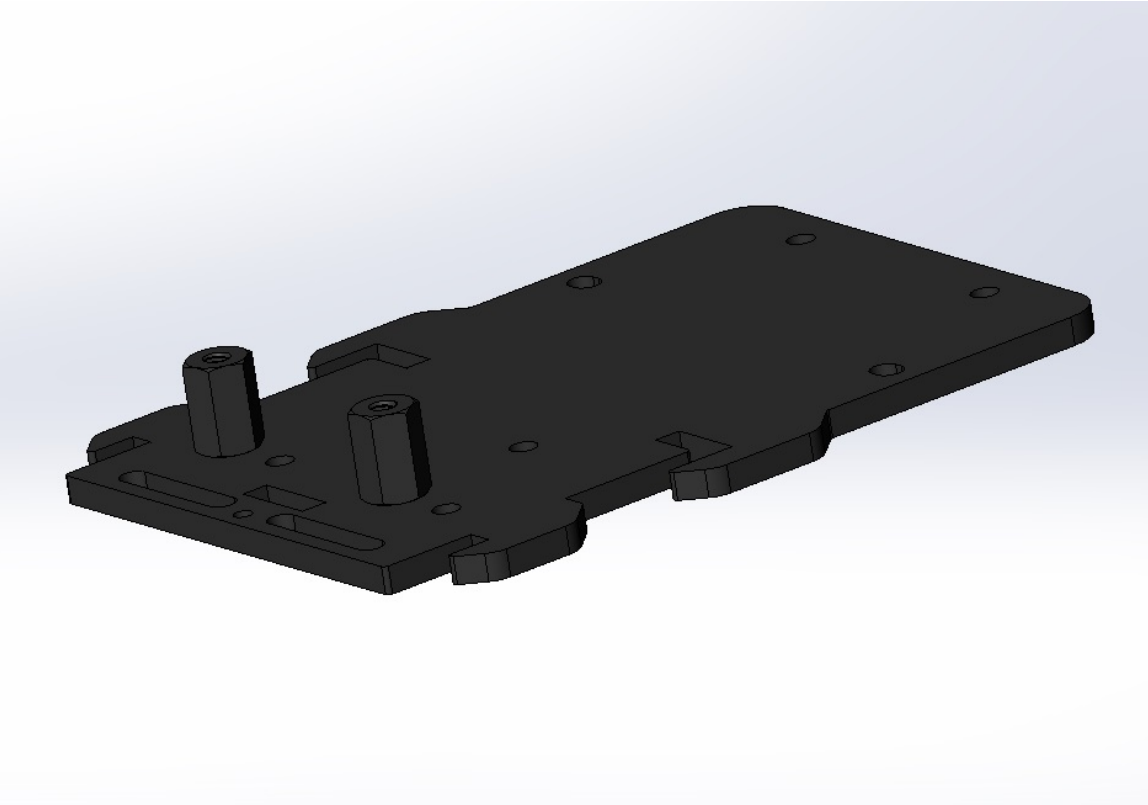
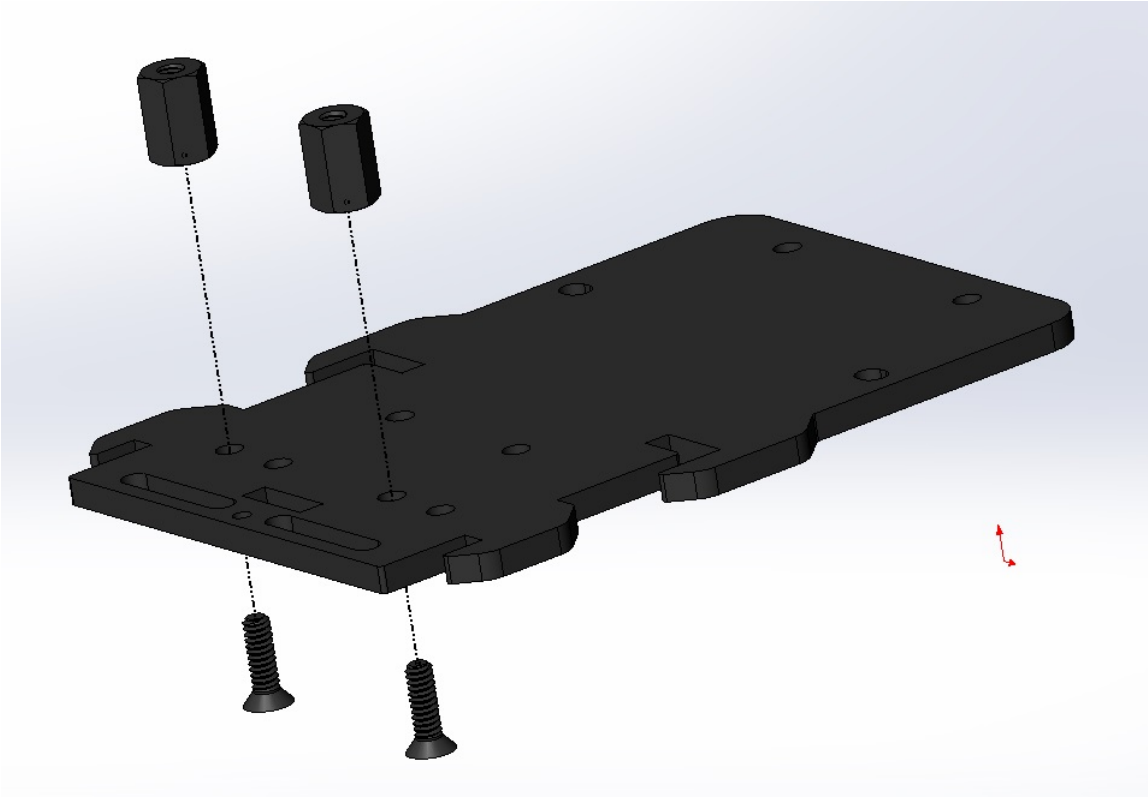
### Arduino

The Arduino mounting uses three (or four) hex standoffs, one of which is shared with the Tamiya Twin Motor Gear Box mounting (used instead of the 3mm screw and nut included with the Tamiya Twin Motor Gear Box). The USB connector / barrel connector face the rear of the board. The guide below shows how to install an Arduino Uno.

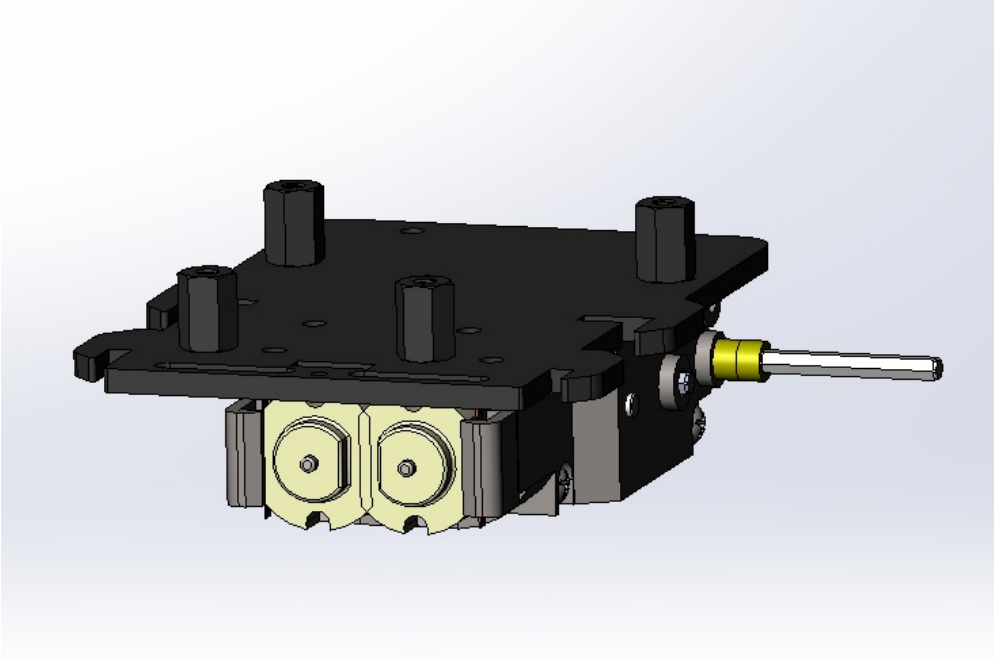
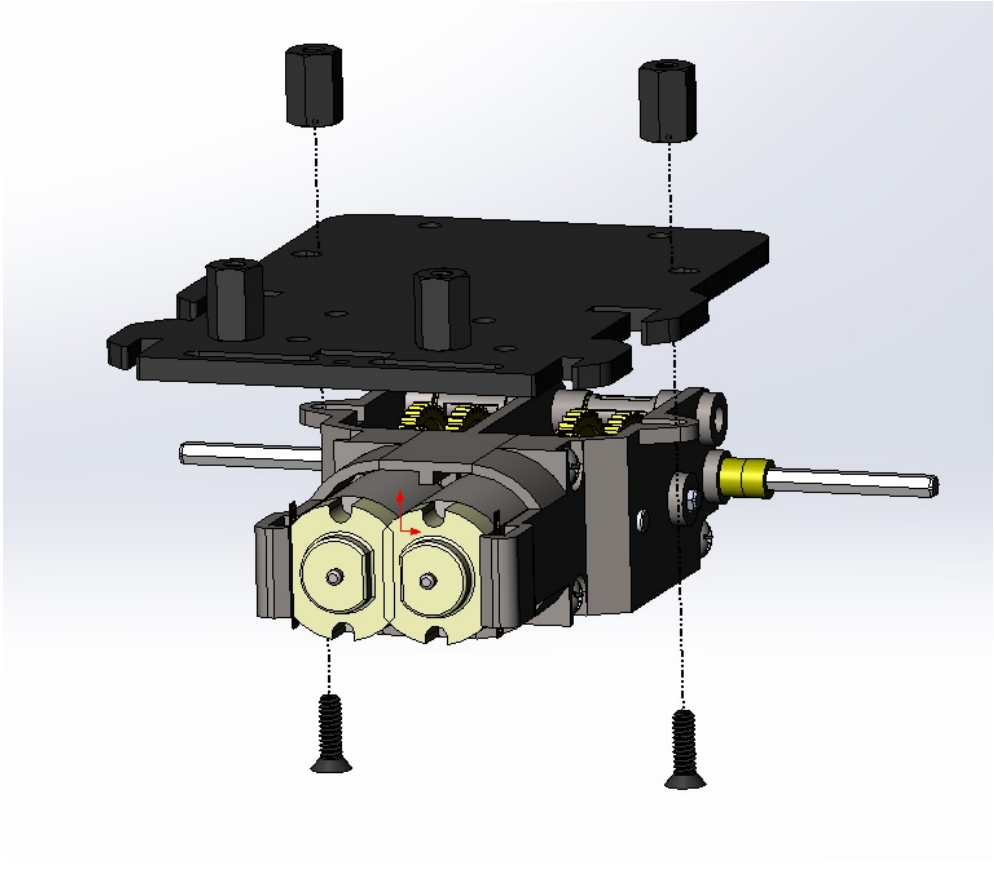
### Raspberry Pi

The Raspberry Pi uses two hex standoffs. The USB connector / Ethernet port face the rear of the robot. If you are mounting a Raspberry Pi, use the holes indicated in the image above for step 20, and use the two 3mm screws and nuts provided with the Tamiya Twin Motor Gear Box for mounting the gear box. The guide below however shows how to install an Arduino Uno.

**STEP 20: Standoffs for Electronics (Arduino shown)**

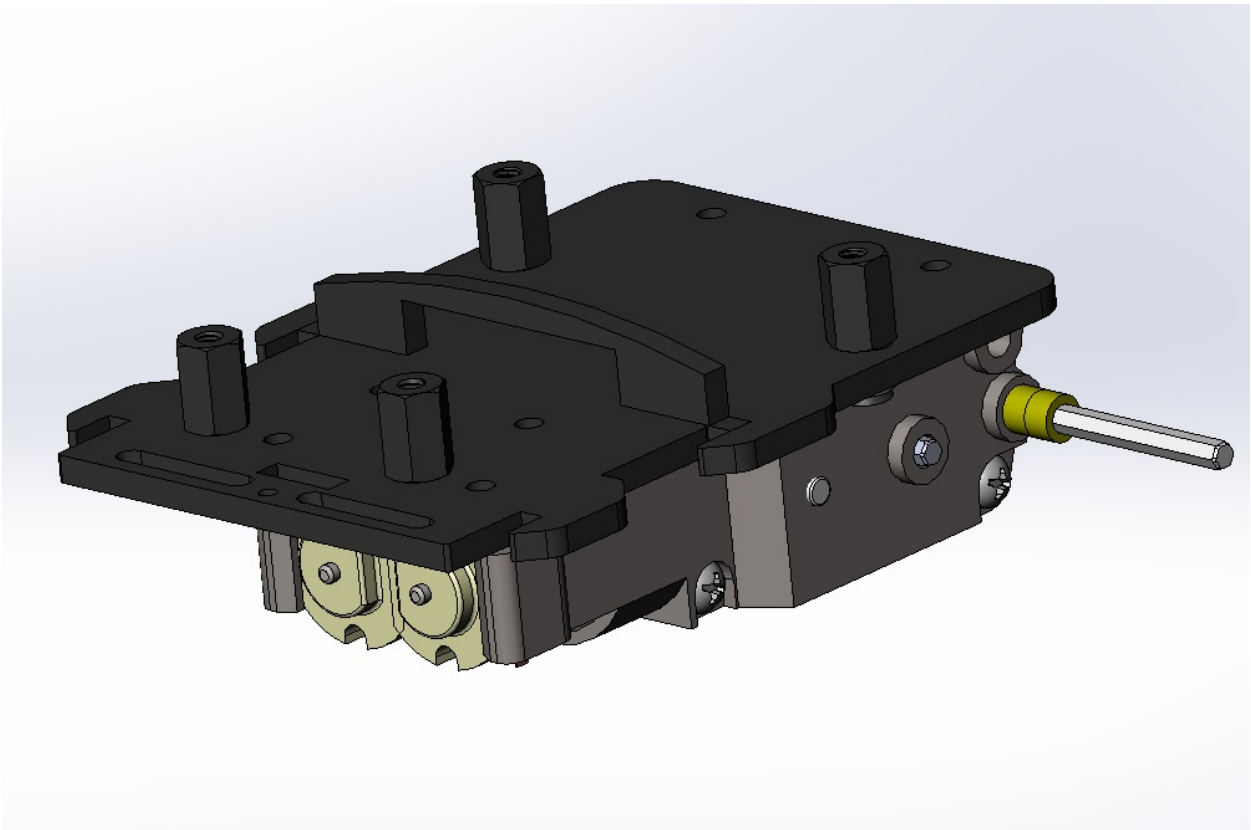
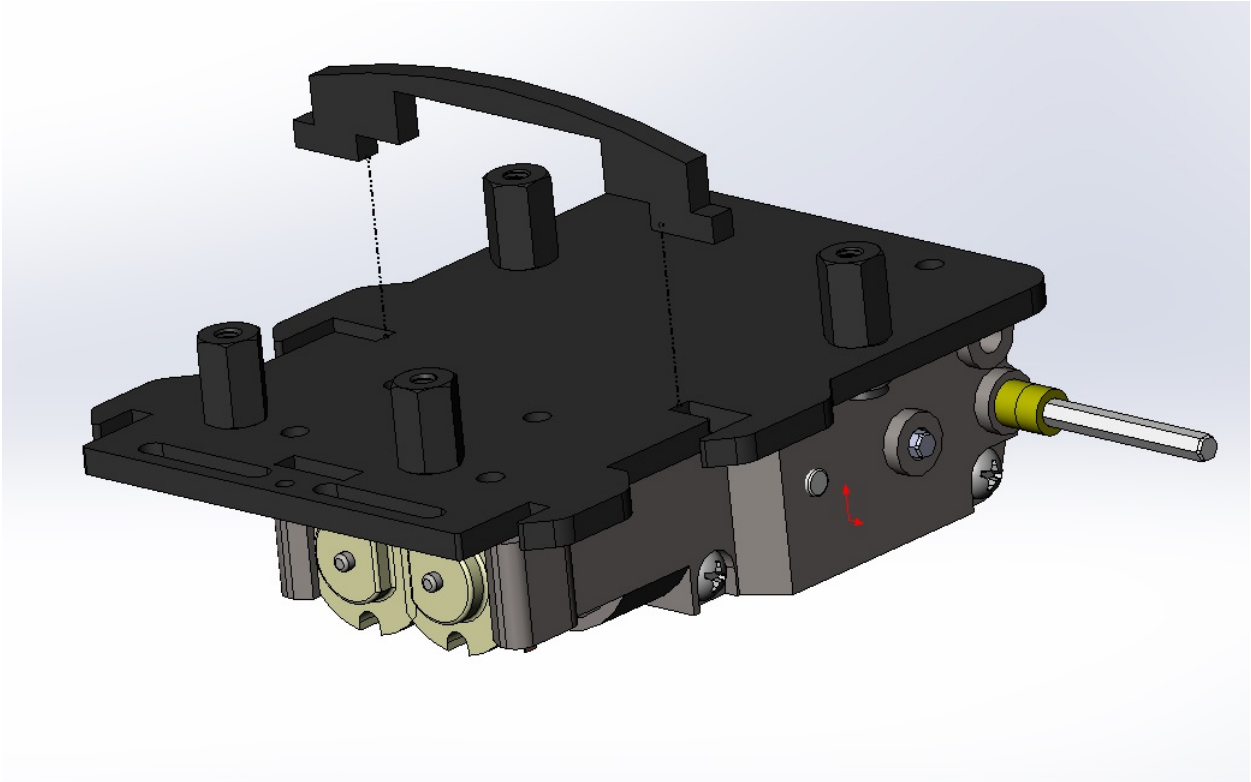


**STEP 21: Base Plate to Gear Box**

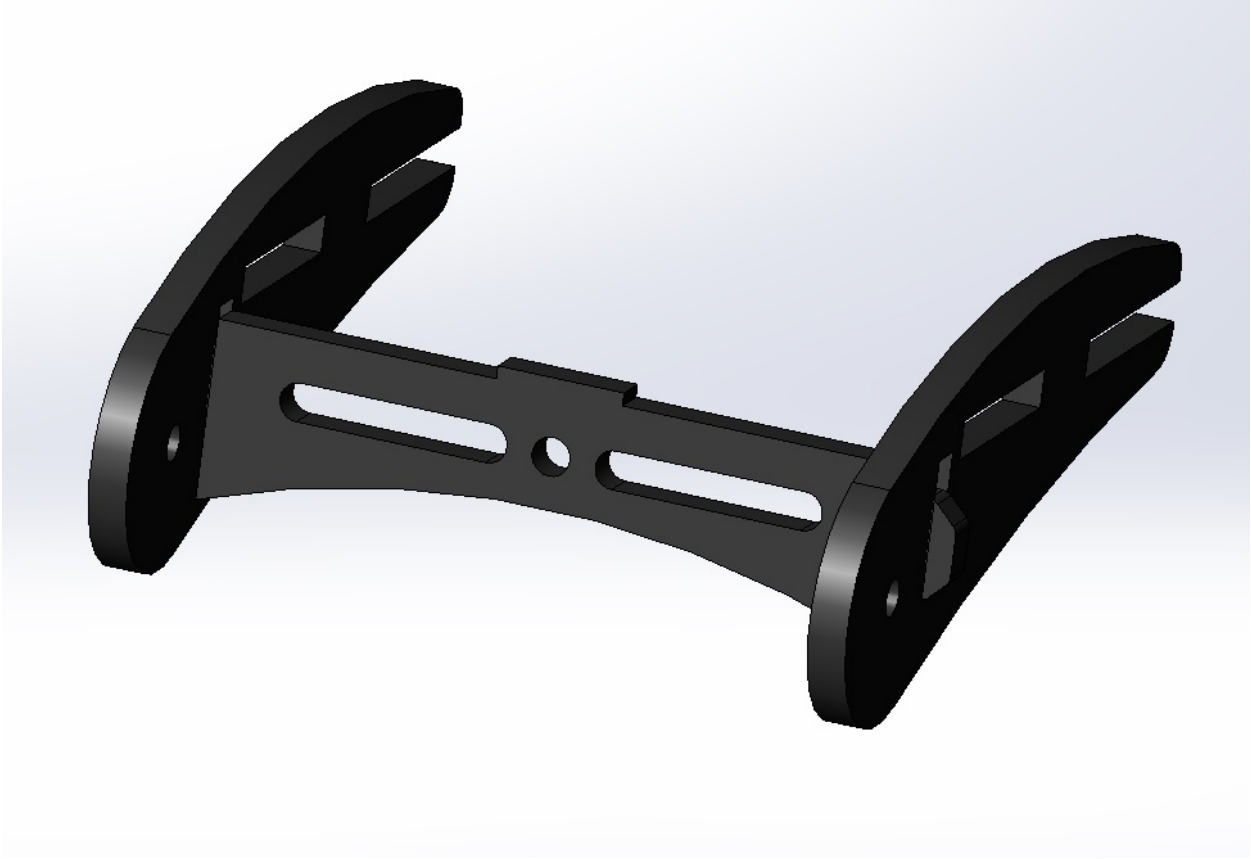
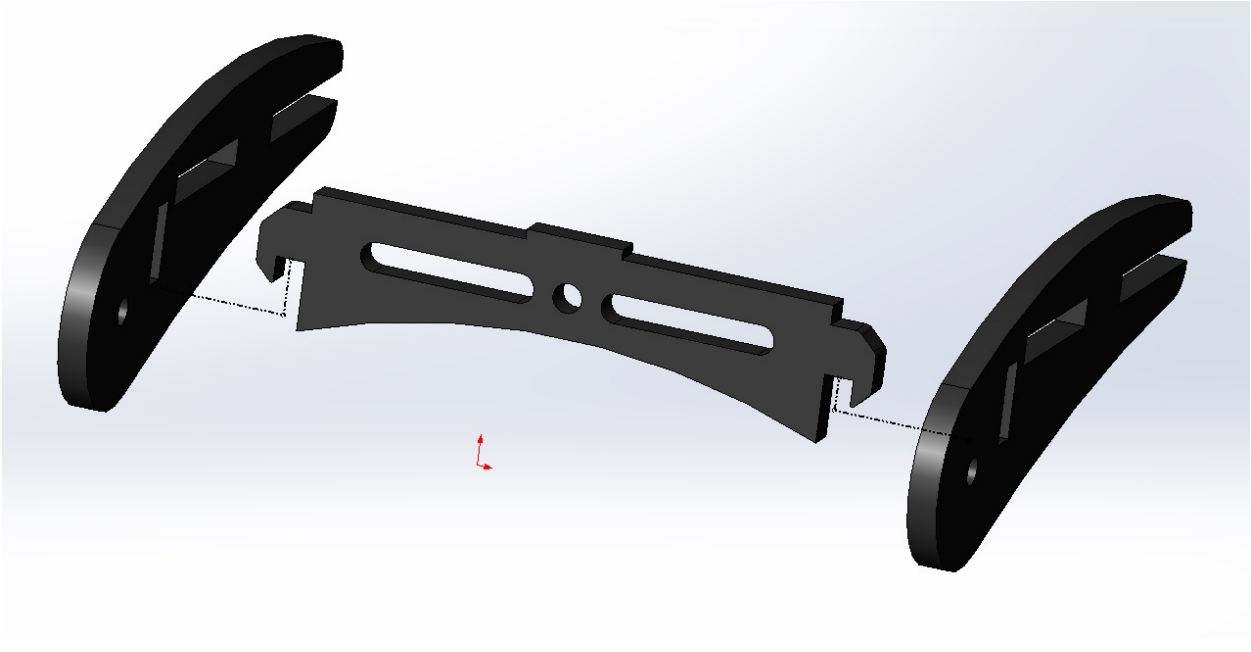




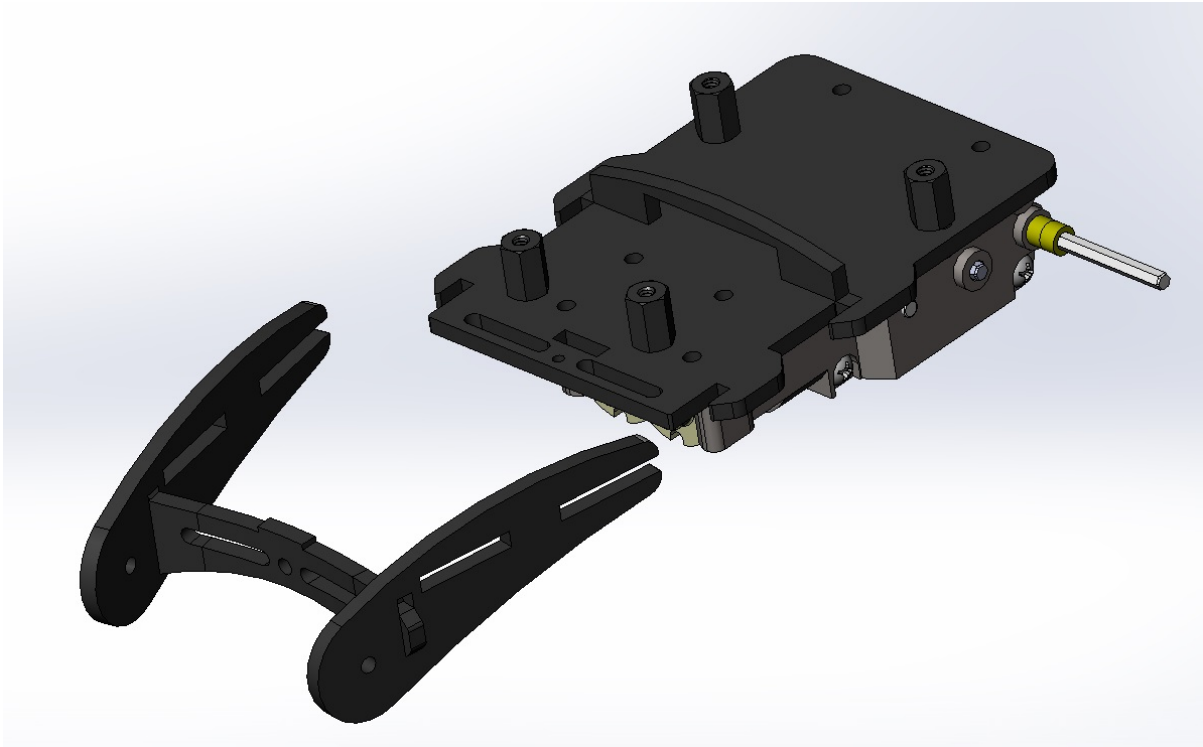
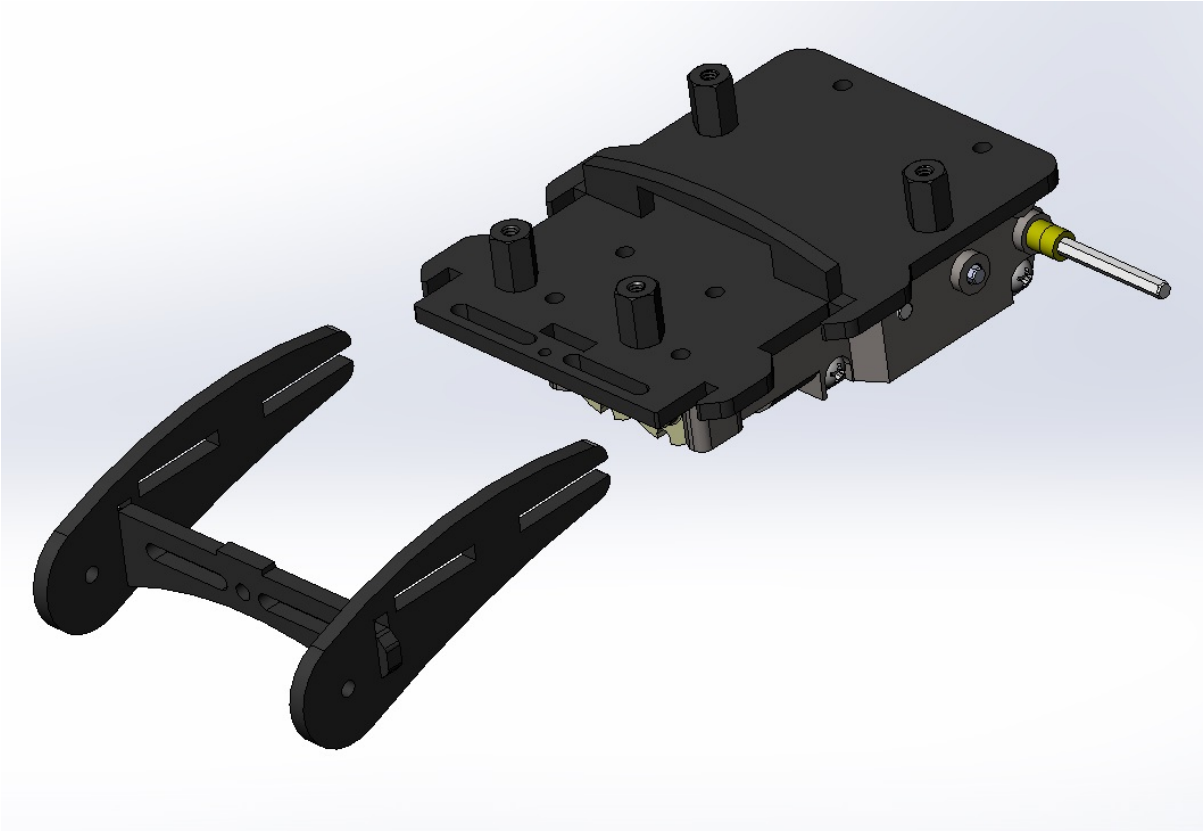
**STEP 22: Top Support Plate (Optional)**



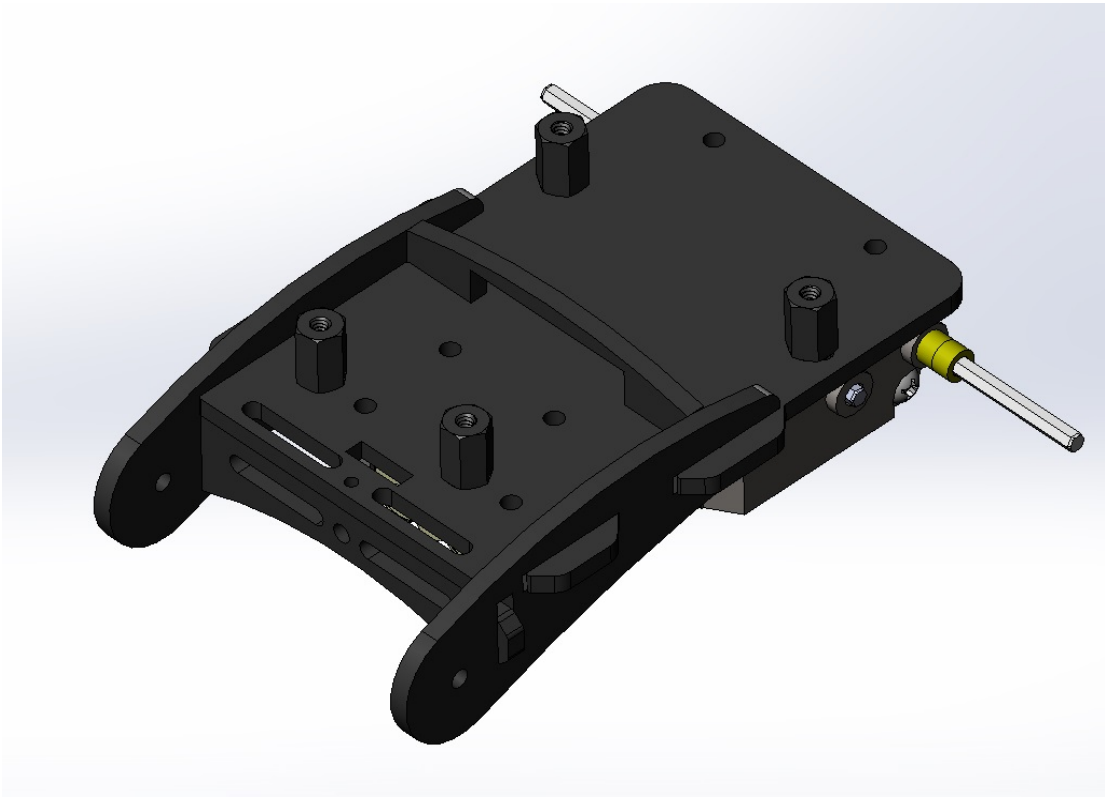
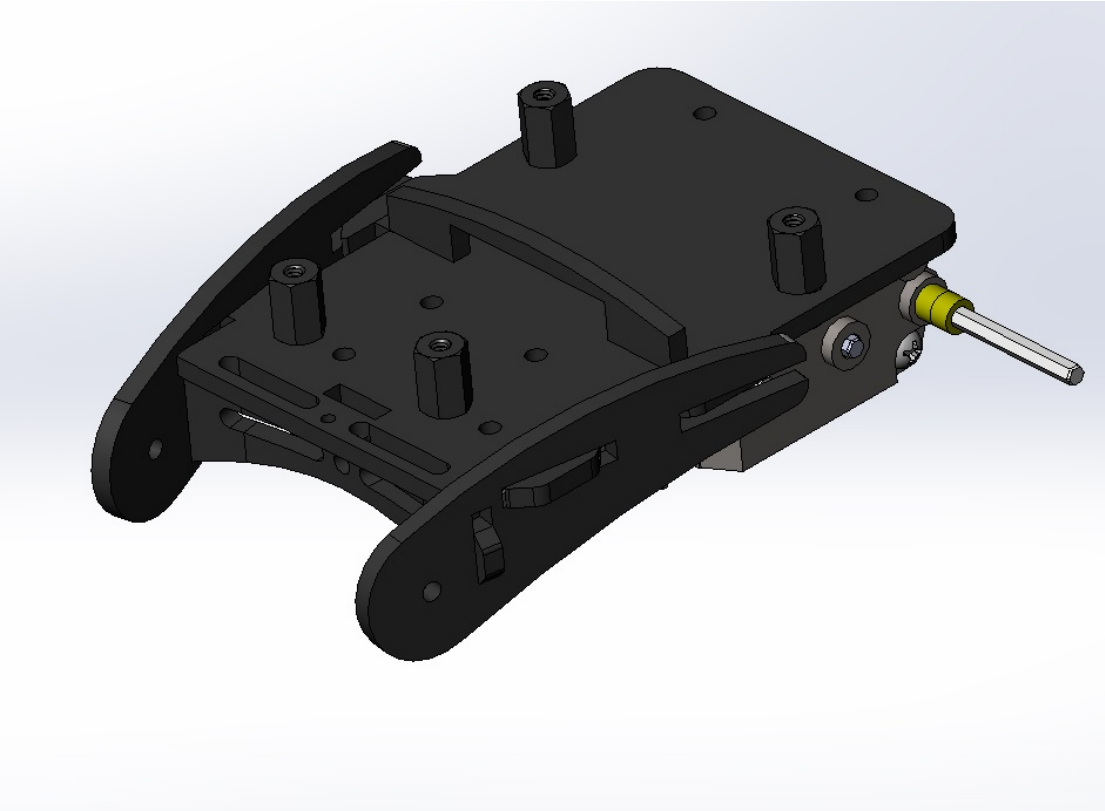
STEP 23: Supports



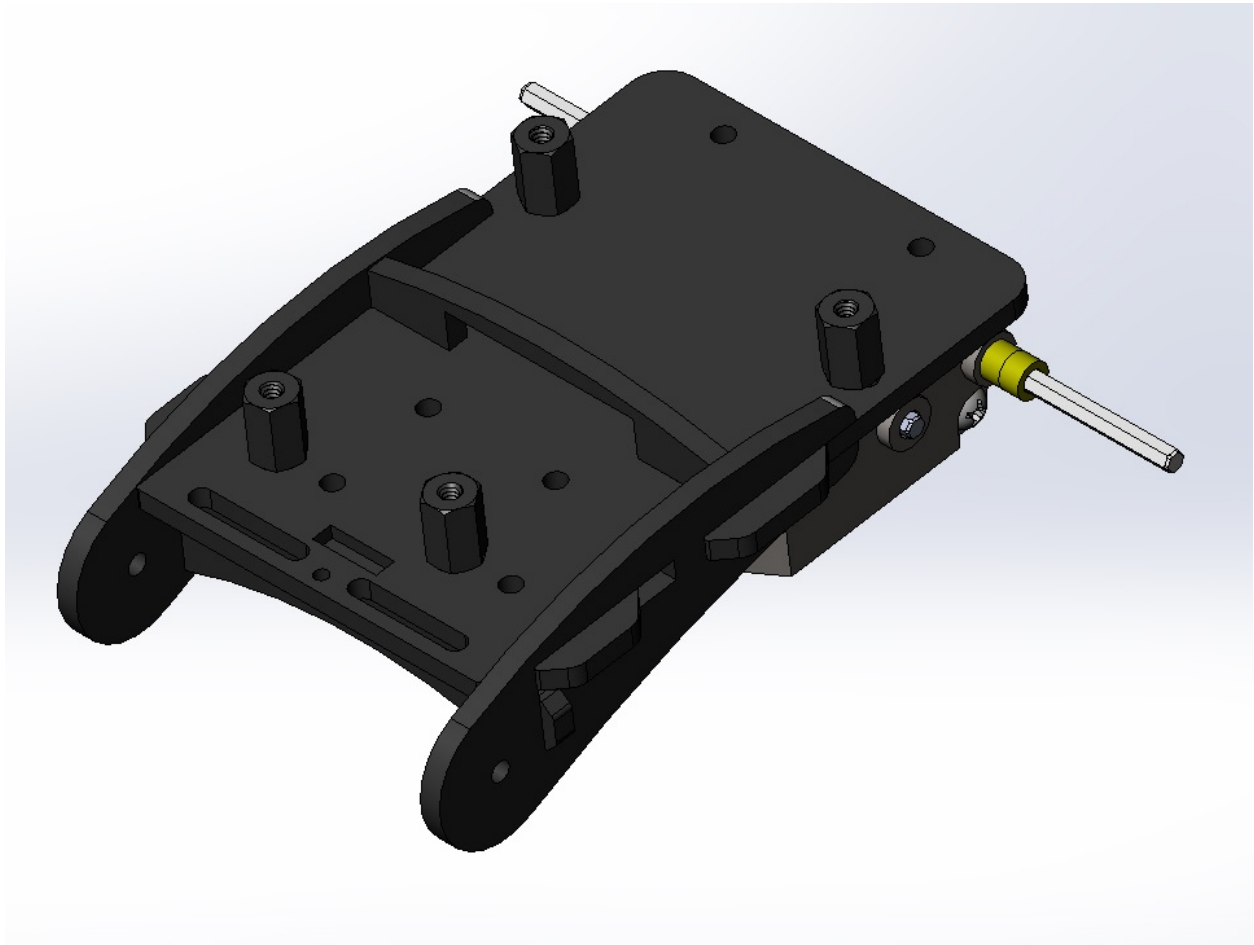
**STEP 24A: Flex Side Panels Outward**



**STEP 24B: Slide Side Panels Over Front “Locks” Then Straighten**

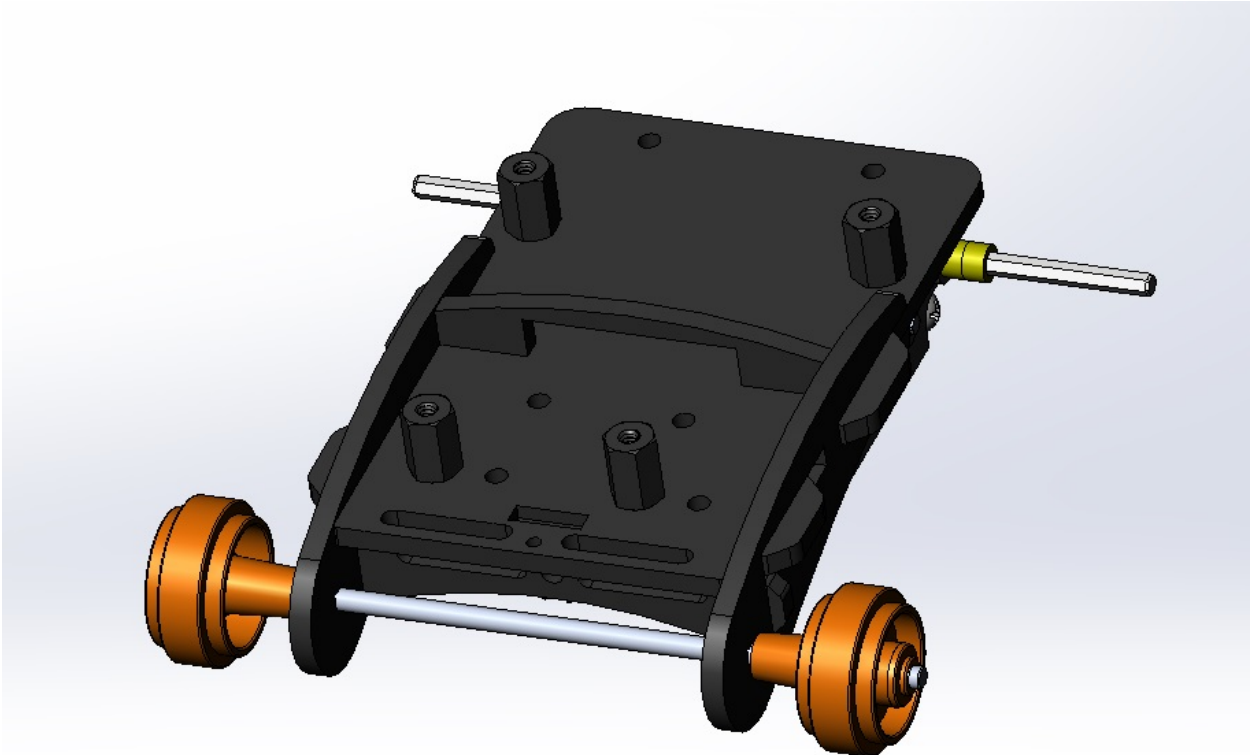
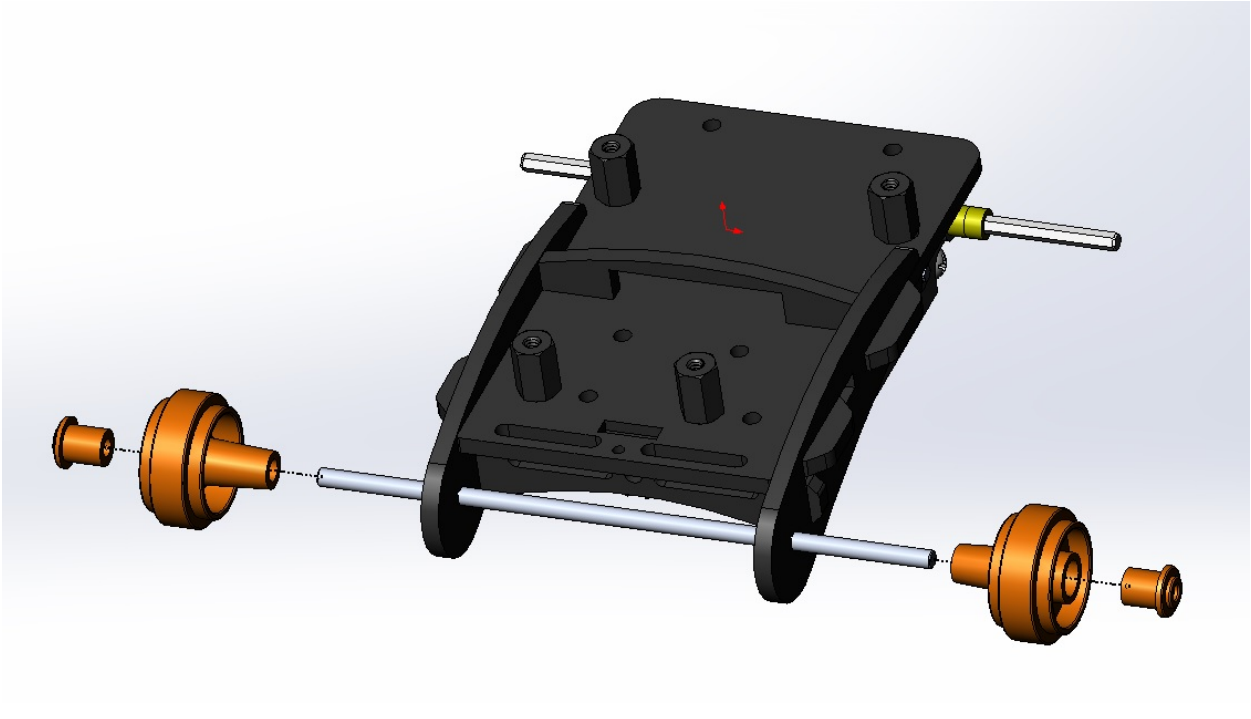


**STEP 24C Push Bottom Support Plate Tab Below the Base; Slide Rear to Lock**

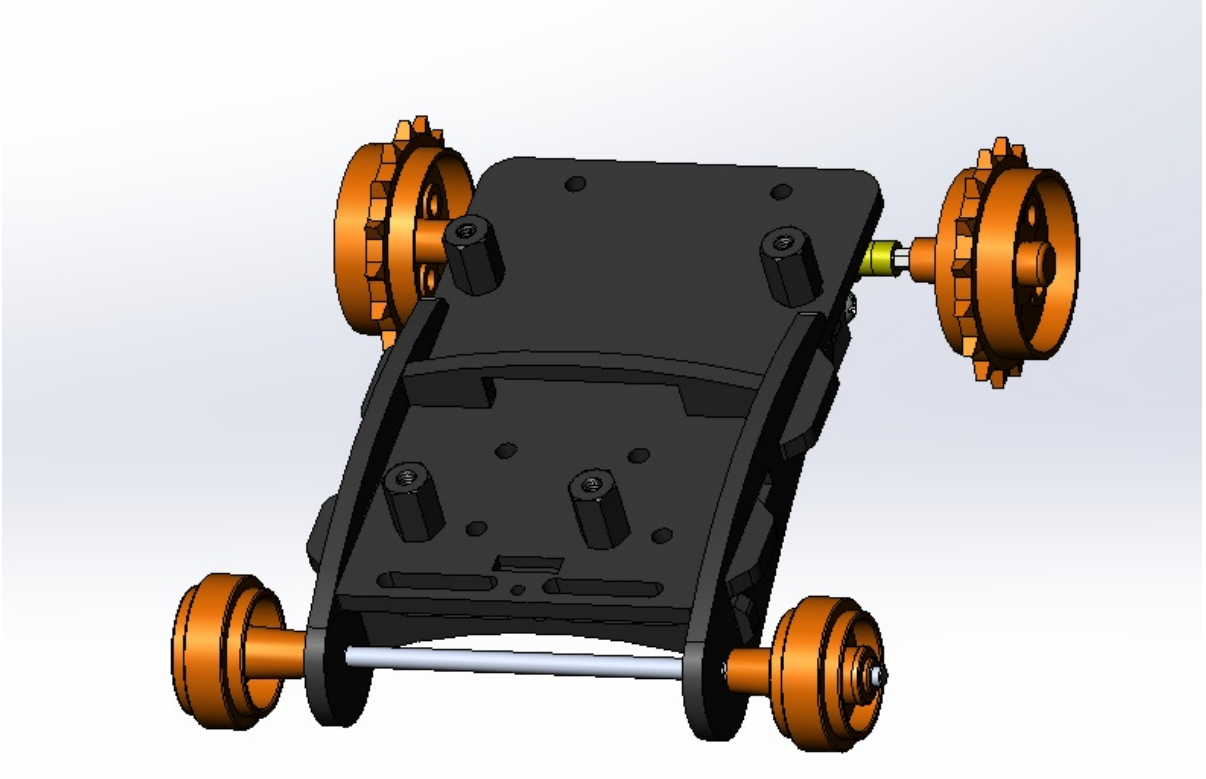
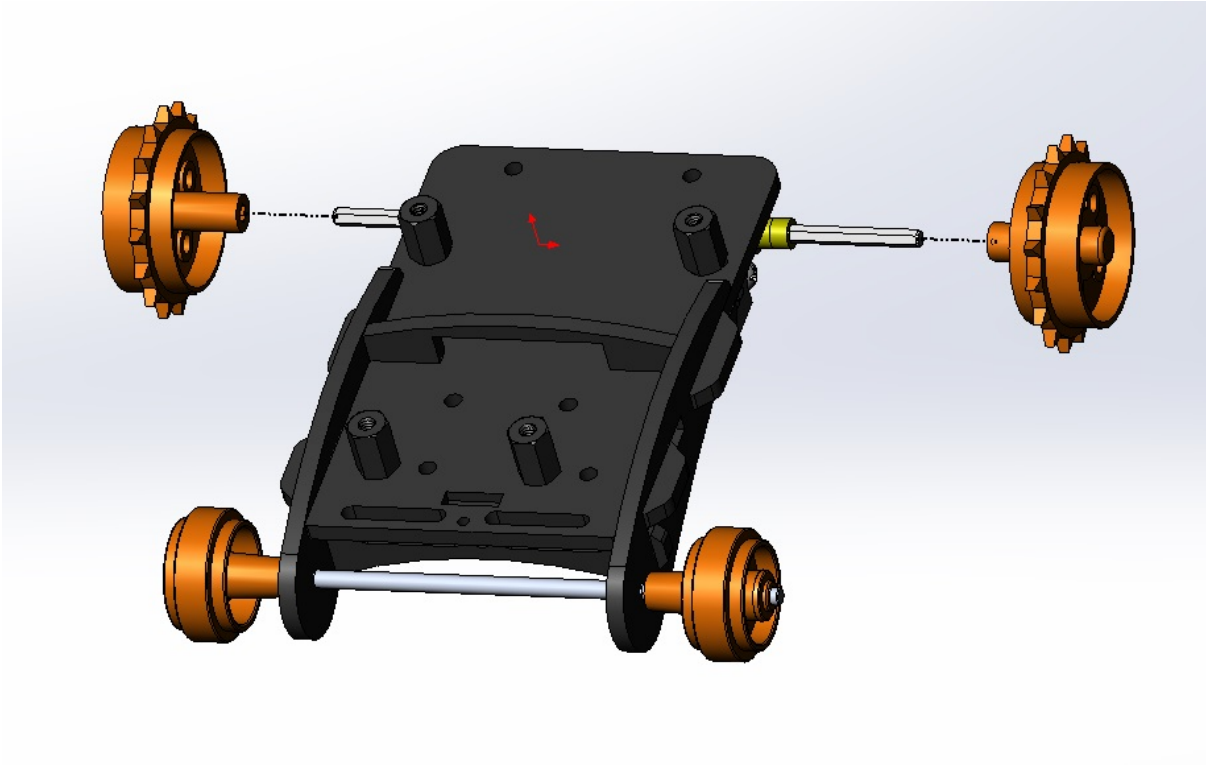


*Note: The lower support plate has a tab at the top. This tab fits into the slot in the base and keeps all lexan parts in place without using screws.*

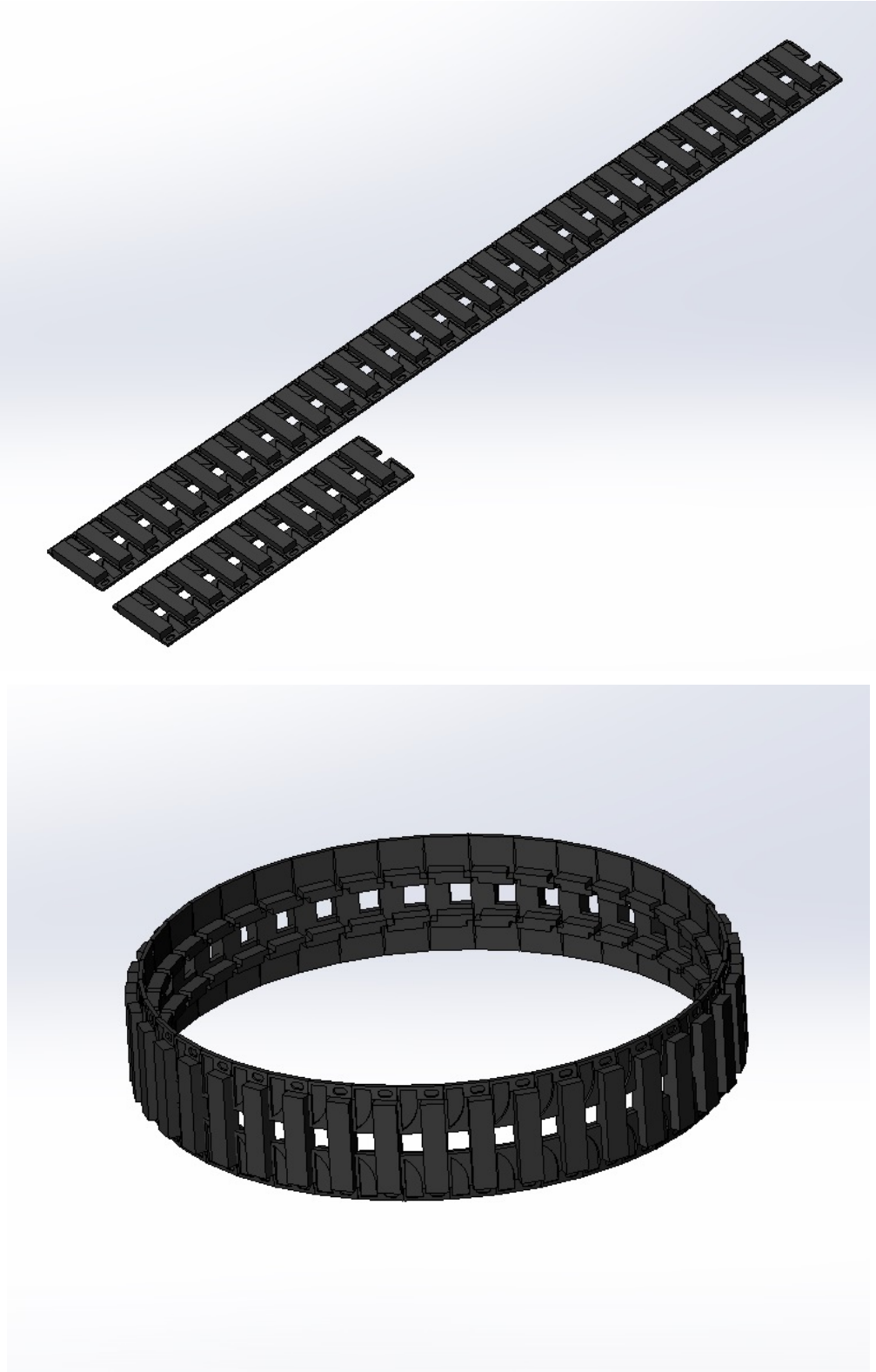
**STEP 25: Idler Sprockets**



STEP 26: Drive Sprockets

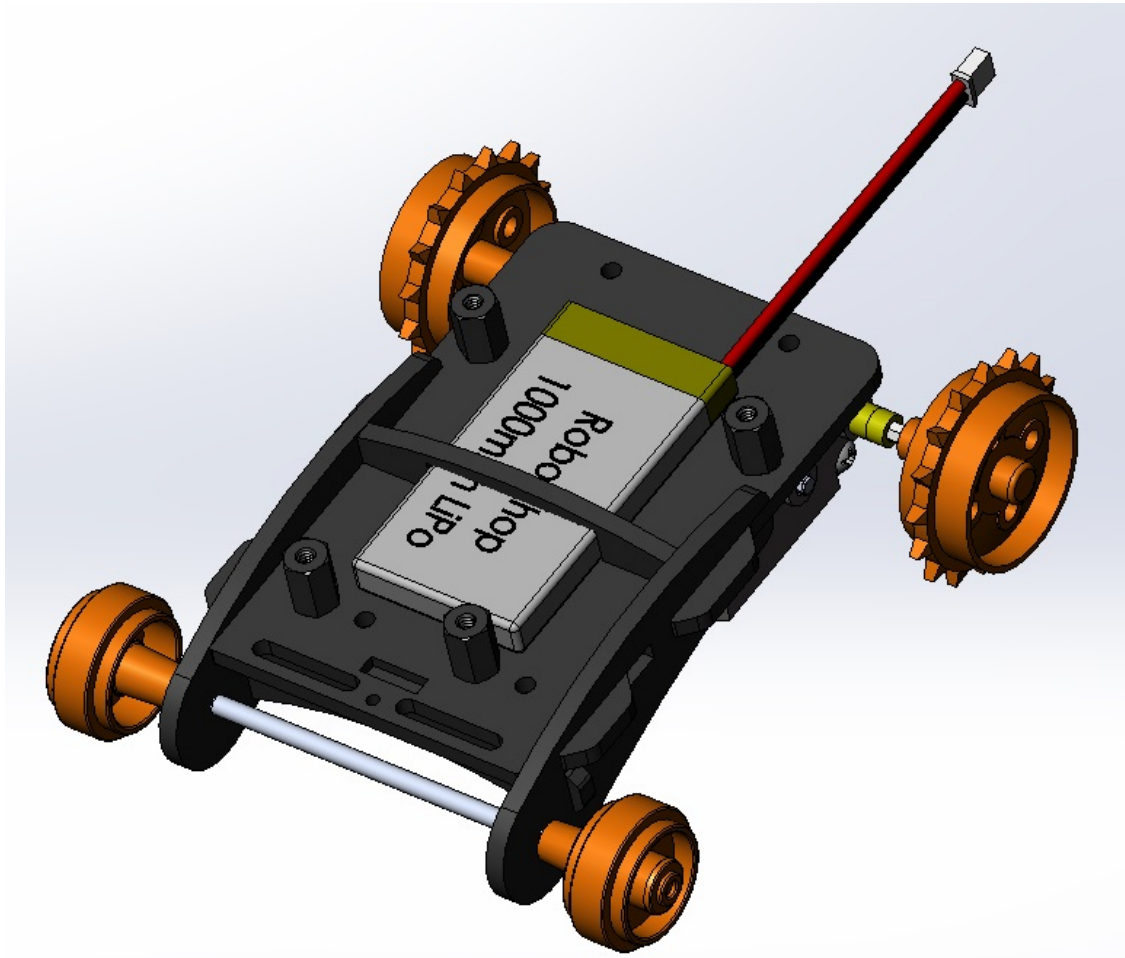


**STEP 27 (2x) Connect Only 1x Long + 1x Medium Track Length Per Side**





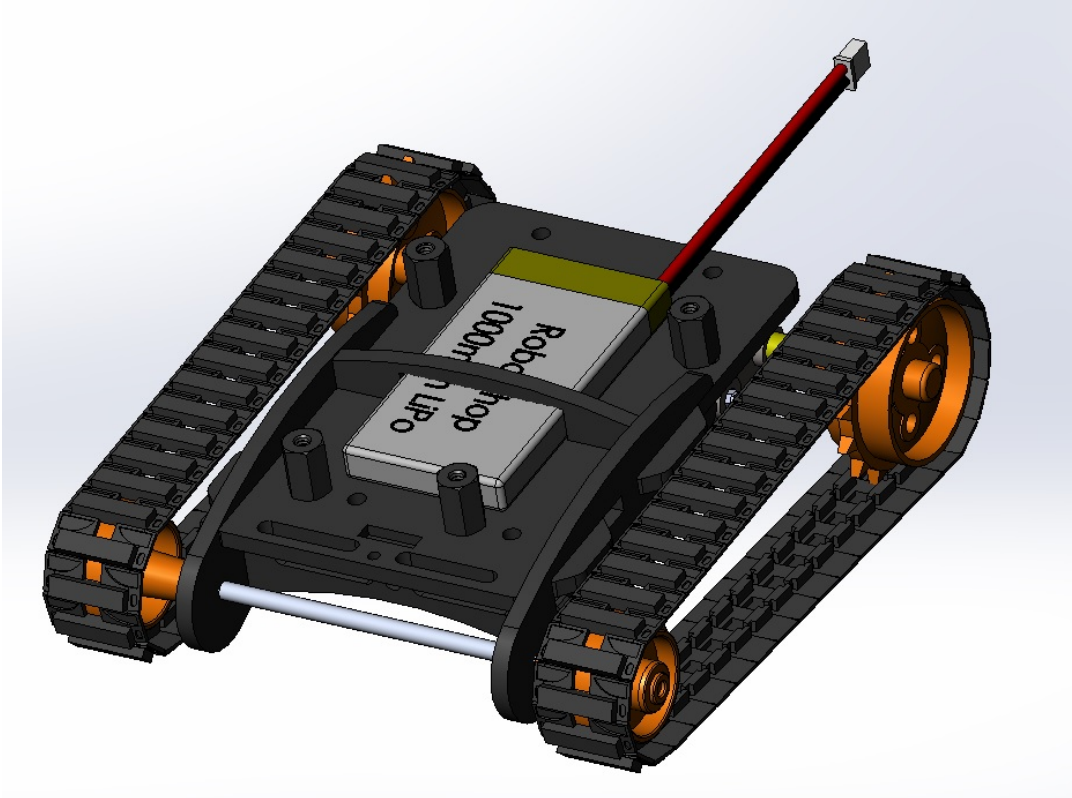
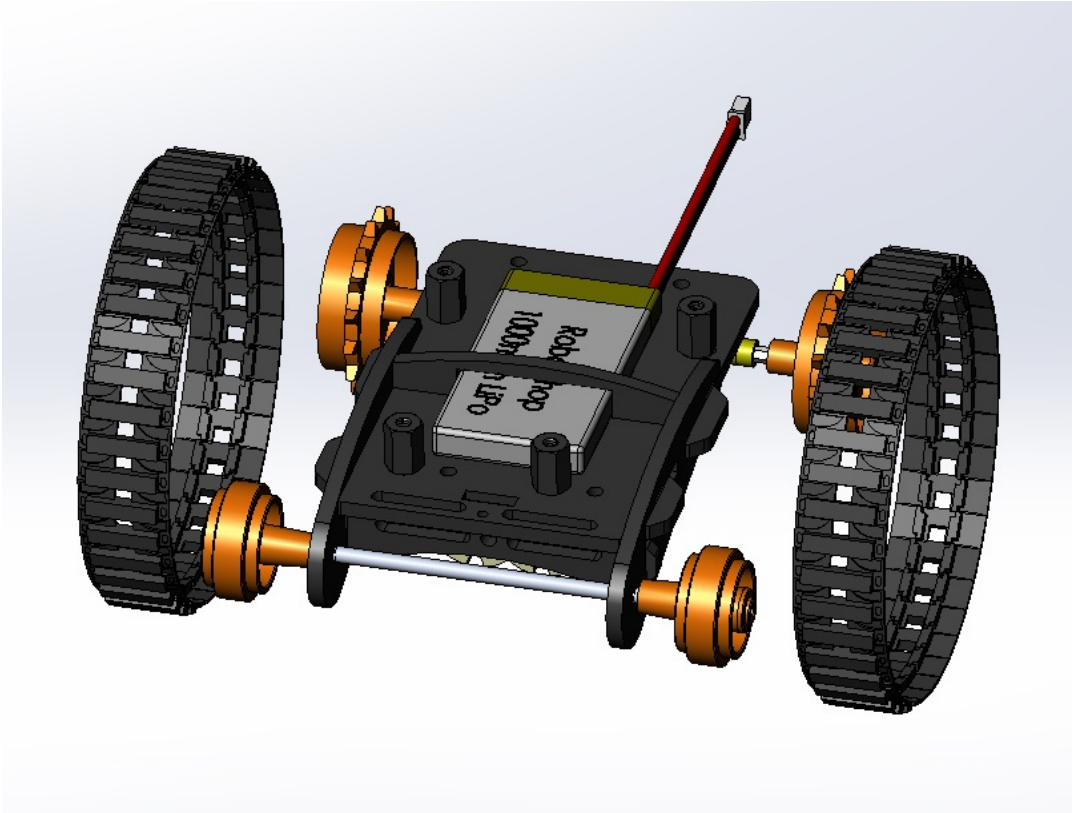
## STEP 28 (Optional) RobotShop 1000mAh, 3.7V LiPo Battery



*Note: Battery is 3cm wide x 0.55cm high x 5.6cm long*

*If your battery is larger or does not fit, remove the top support plate and use the double-sided tape or your own method to secure your battery in place. There is foam provided to provide a tighter fit should your battery fit between the top support plate and frame.*

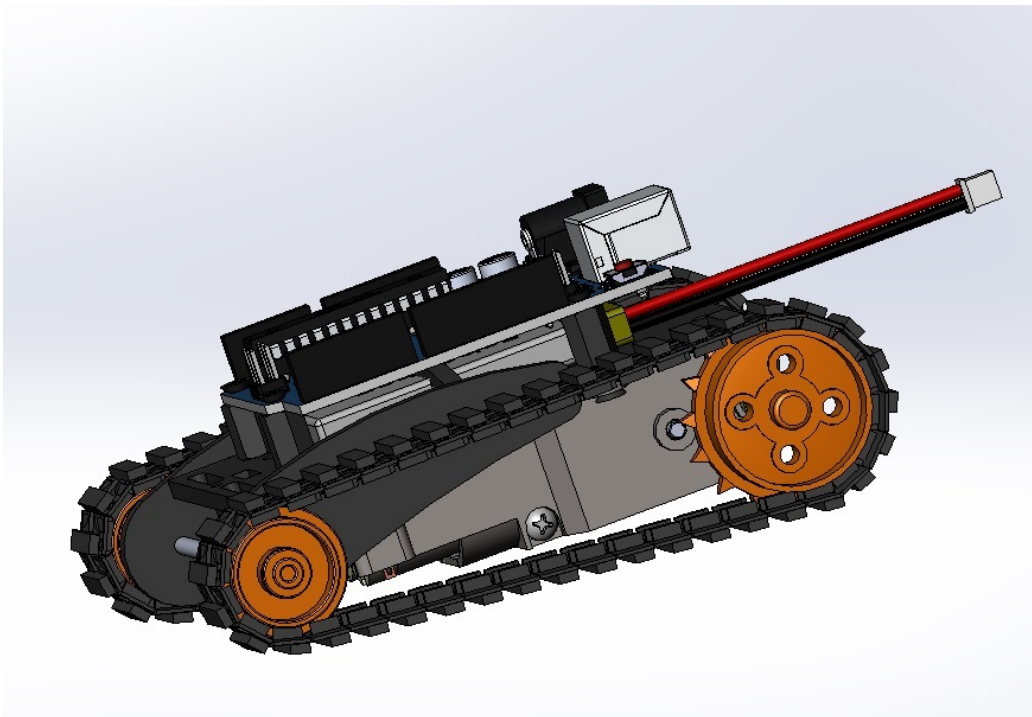
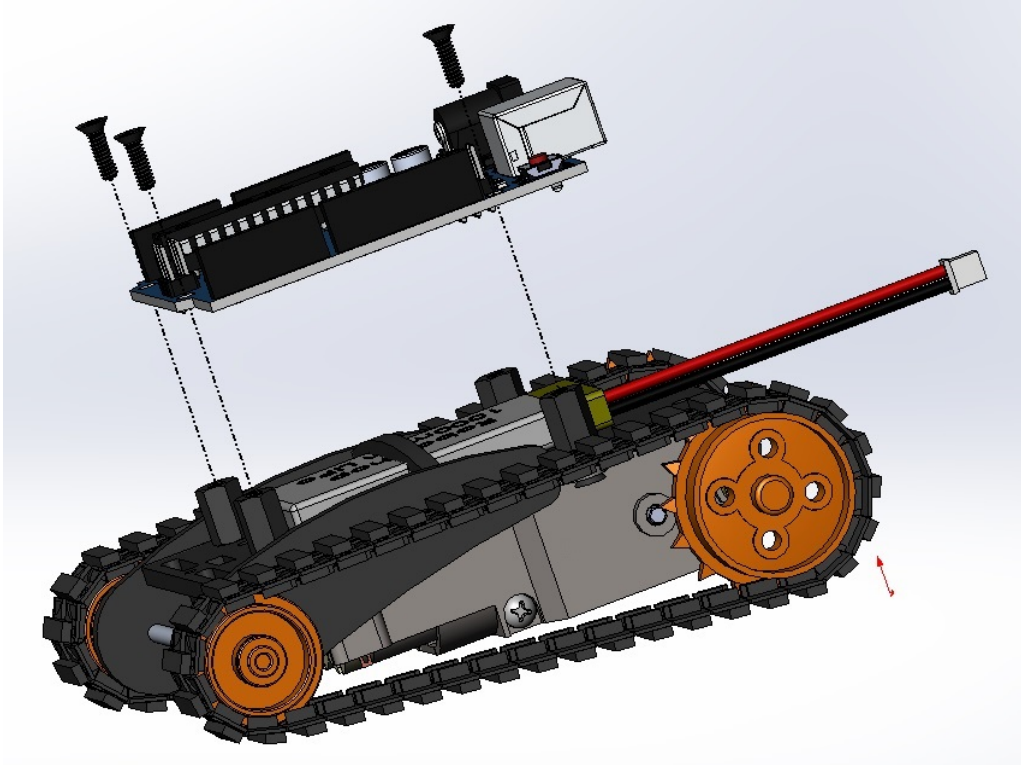
STEP 29: Tracks



### STEP 30: Microcontroller (Arduino Uno as example)

A Microcontroller is not included with the basic chassis kit.

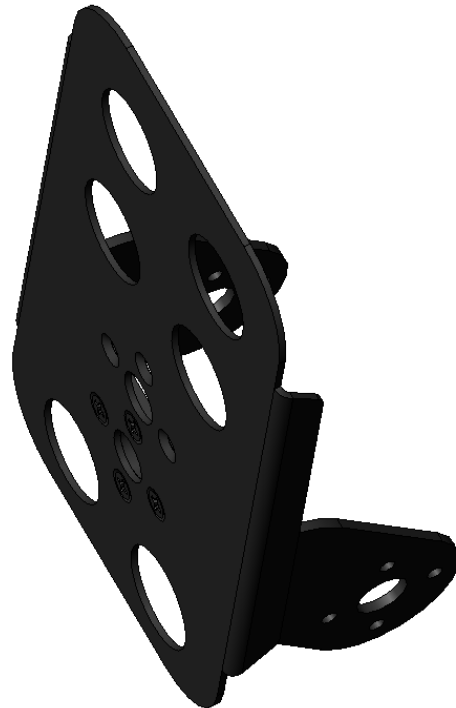
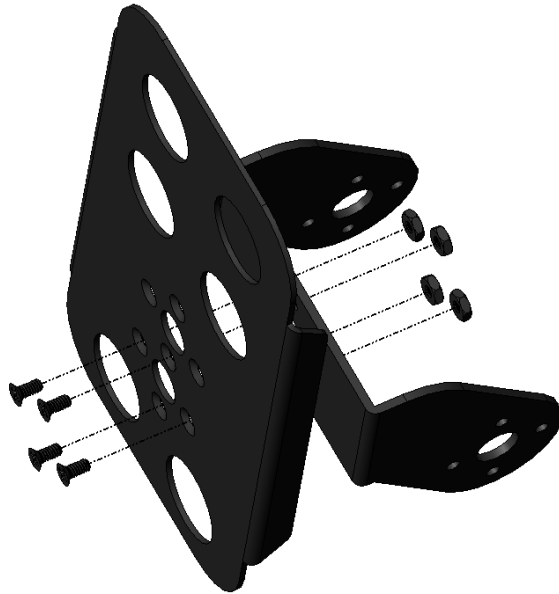
Note that only three out of the four standoffs are used - the fourth simply acts as support.



## Cell Phone Mounting

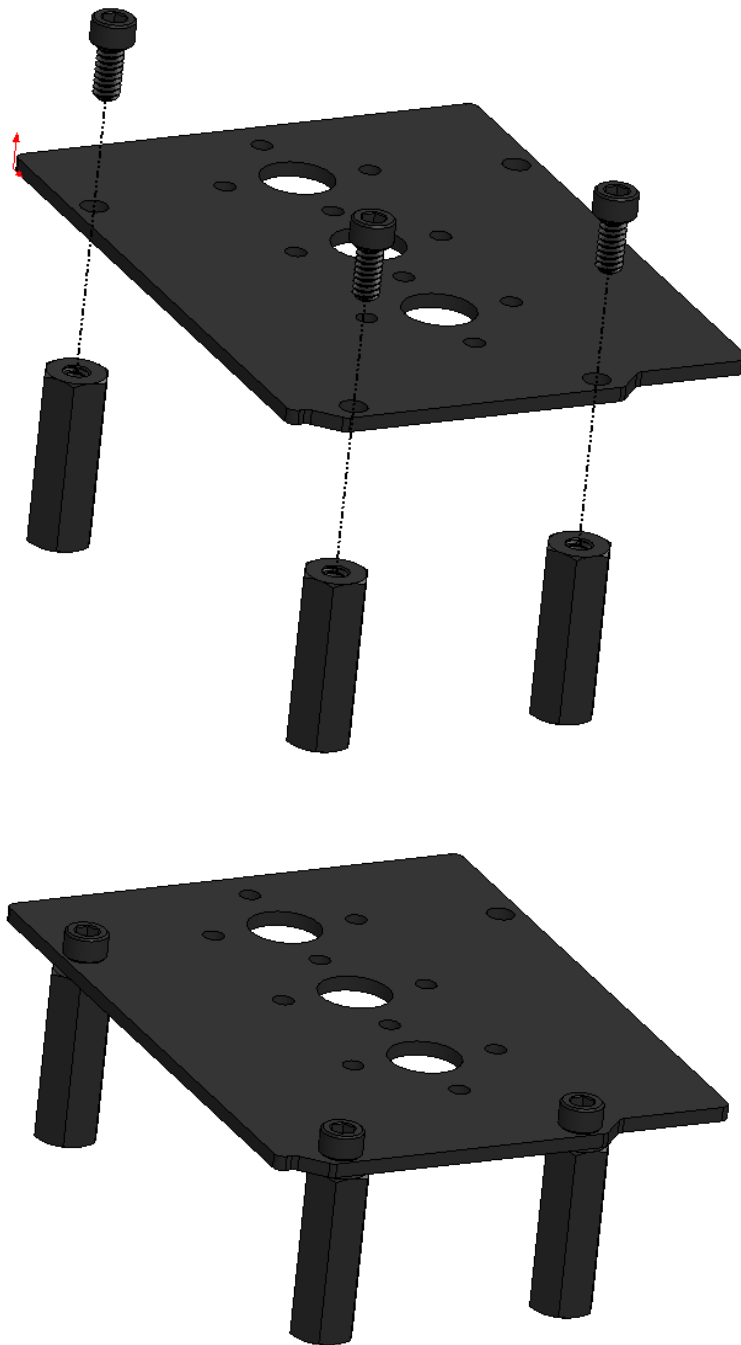
Certain versions of the Mini DFRobotShop Rover include mounting for a smartphone.

### STEP 31: Connect Phone Plate to Angled C-Bracket

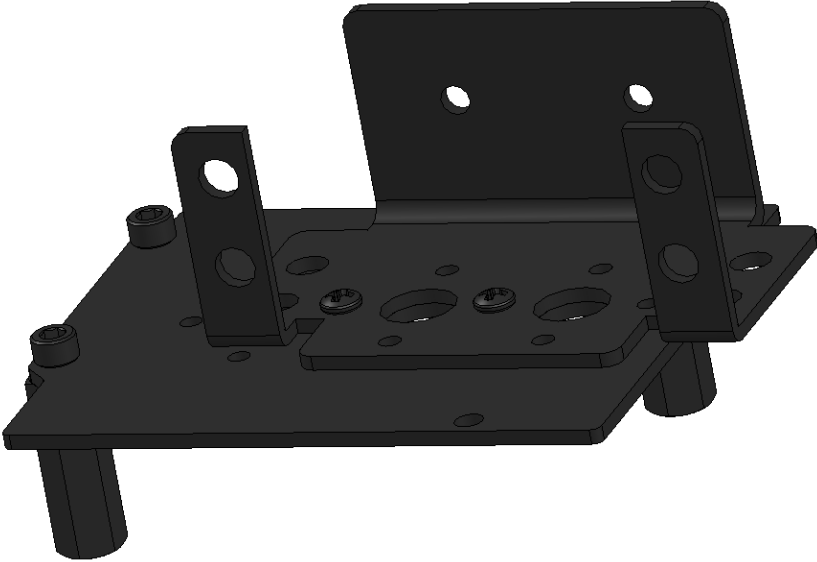
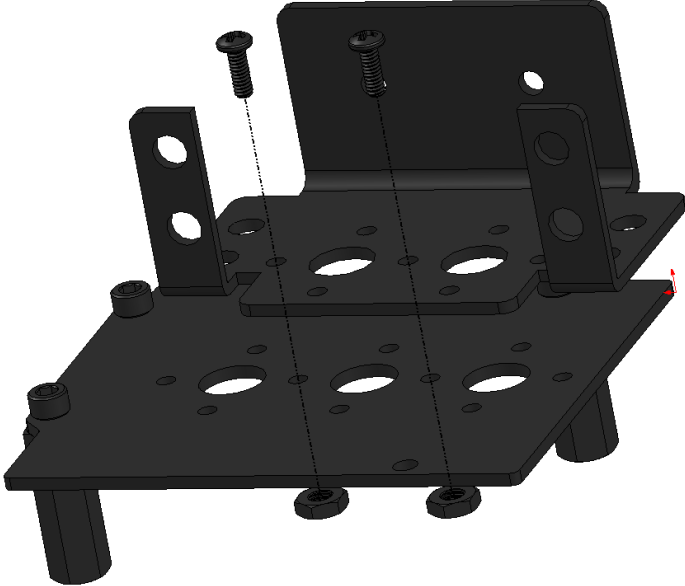


### STEP 32: Connect Plastic Standoffs to SES to Arduino Lexan Plate

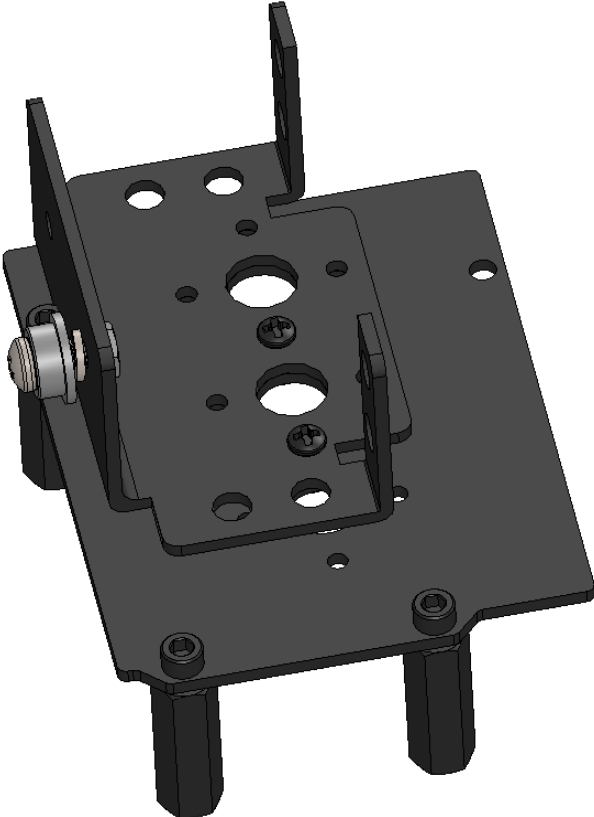
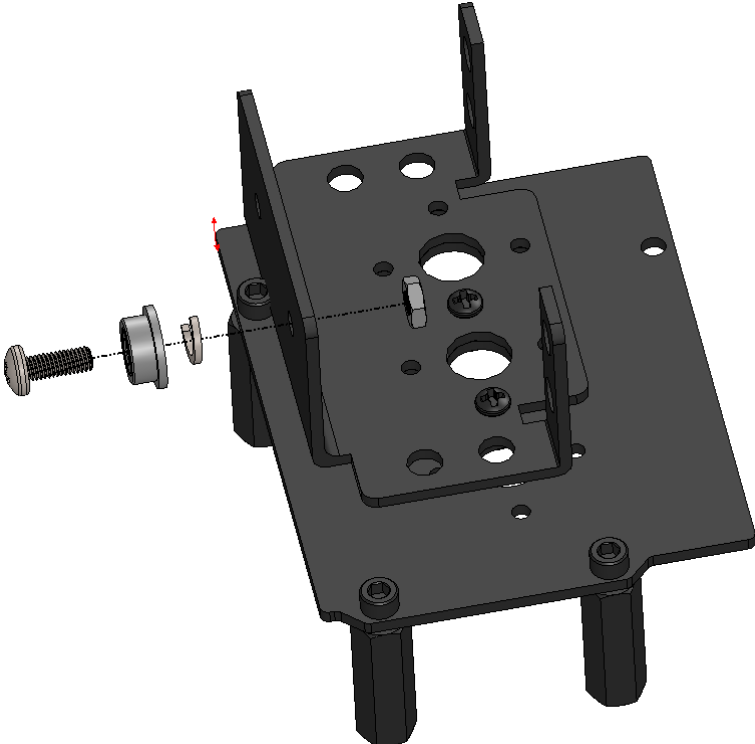
Note that only three holes can be used with the DFRobotShop Rover Motor Shield



**STEP 32: Connect Multipurpose Bracket to SES-Arduino Lexan Plate**



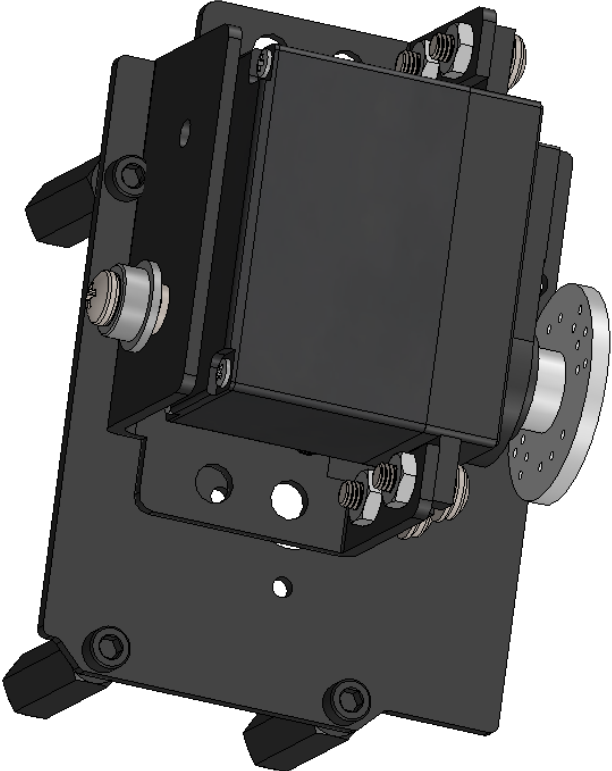
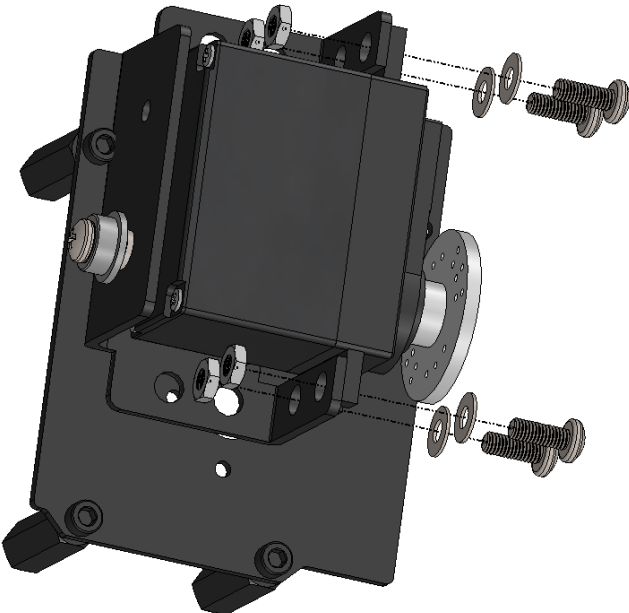
**STEP 33: Attach the Bearing**







**STEP 34: Mount the Servo**



### STEP 35: Position the Servo Horn

The servo horn's orientation is very important. If you moved the horn during assembly, you may need to re-center it via the software to ensure that when you send the servo the "neutral" (1500us) position, the cell phone bracket does not put pressure against the SES-Arduino Lexan plate.

Connect the servo to the DFRobotShop Rover Shield (via an Analog pin) ensuring the black wire from the servo is connected to GND and the yellow wire connects to "S" (signal). Use the code found in the DFRobotShop Rover Mobile Rover Shield to position the servo to 1500us, and leave it there.

### STEP 36: Secure the Bracket to the Servo

Once the servo is positioned, connect the bracket so it does not contact the lexan plate.



### Step 37: Pan Bracket to DFRobotShop Rover Mobile Robot Shield

Secure the tilt system assembled in step 36 to the DFRobotShop Rover Mobile Robot Shield using three 4-40 screws. Mount the shield to the Arduino.

## Motor Controller

For an Arduino, we strongly suggest the DFRobotShop Rover Mobile Robot Shield.

- Standard Arduino Shield Format (with stacking headers)
- Dual motor controller (L298P) with two pairs of screw terminals for motor connections
- LiPo boost (to power the Arduino and shield using only one 3.7V LiPo battery via Vin)
- 3.7V onboard LiPo charger
- Input from 2-pin JST or barrel connector (for single LiPo power)
- A0 to A5 analog pins broken out to 3-pin connectors

No sample code is available with this guide as it does not include electronics. If you purchased the complete Mini DFRobotShop Rover Kit, please refer to the electronics guide for more information.