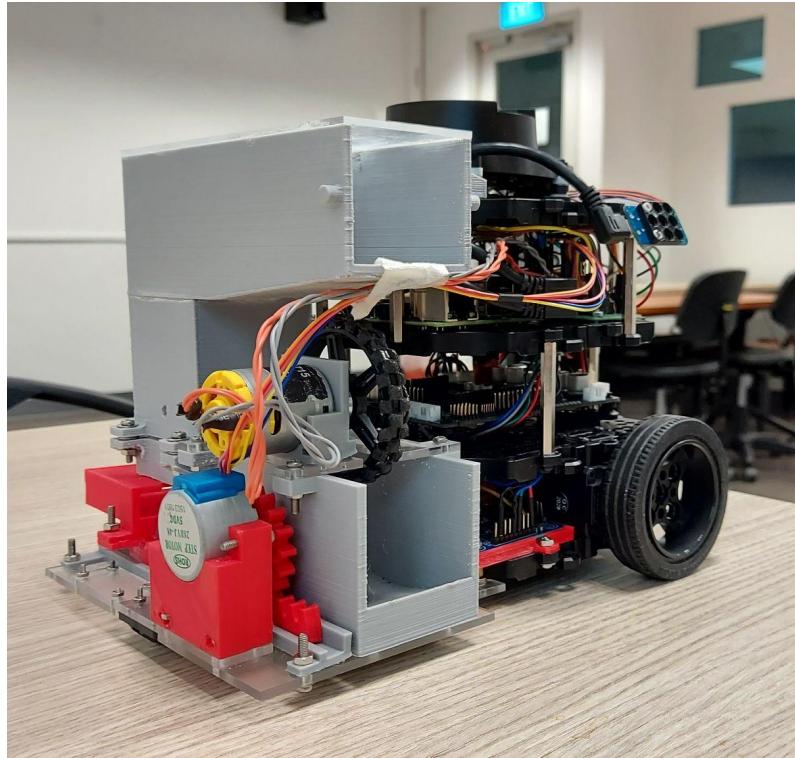


EG2310: Fundamentals of System Design

Assembly Manual



Group 8

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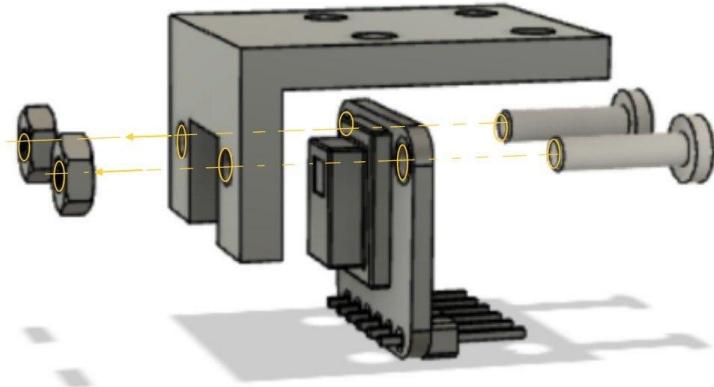
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Safety Precautions

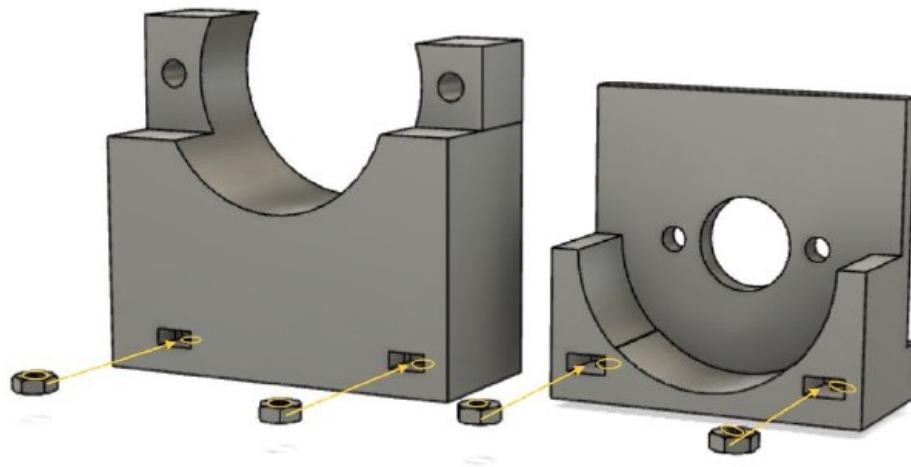
1. Read through the manual carefully before assembly.
2. Keep a safe distance from the robot during its activation.
3. Be careful not to get fingers stuck between the robot joints and wheels.
4. Do not store or operate the robot under direct sunlight.
5. This product is not waterproof. Do not use the robot near water.
6. Do not use the robot near heat or fire.
7. Keep all parts out of reach of infants.
8. Do not drop or use sharp objects with the parts.
9. Do not soak or place the electrical components in or near water.
10. Do not connect or let the Li-Po battery come in contact with hair pins, clips, or any metal objects.
11. Do not bend, twist, or modify the Li-Po battery and its connector.
12. Do not place the Li-Po battery in the microwave.
13. Do not eat any part of this product.
14. Do not use excessive force on nuts, bolts, or robot parts.
15. Avoid activating the robot on a desk or table to avoid falling.
16. Moving components are subject to wear.

General Instructions

1. Handle all parts with care.
2. All screws used are Philips pan head screws, e.g. - 3. Use Phillips screwdriver to insert screws.
- 4. Screws are inserted in the direction of the arrow ► (i.e. from the flat base of the triangle to the tip).



5. For steps marked with “ * ”, please refer to the TurtleBot3 assembly document. Click [here](#) to download the document.
6. When mounting the DC Motor Mount and Stepper Motor Mount, nuts are inserted this way:



The centre of the circles are along the same line and the nuts will reside in the groove.
Repeat the same steps with the other side. Screws are inserted from below.

7. The Layers of Turtlebot3 are referred to as the First, Second, Third and Fourth Layers, from bottom to top.

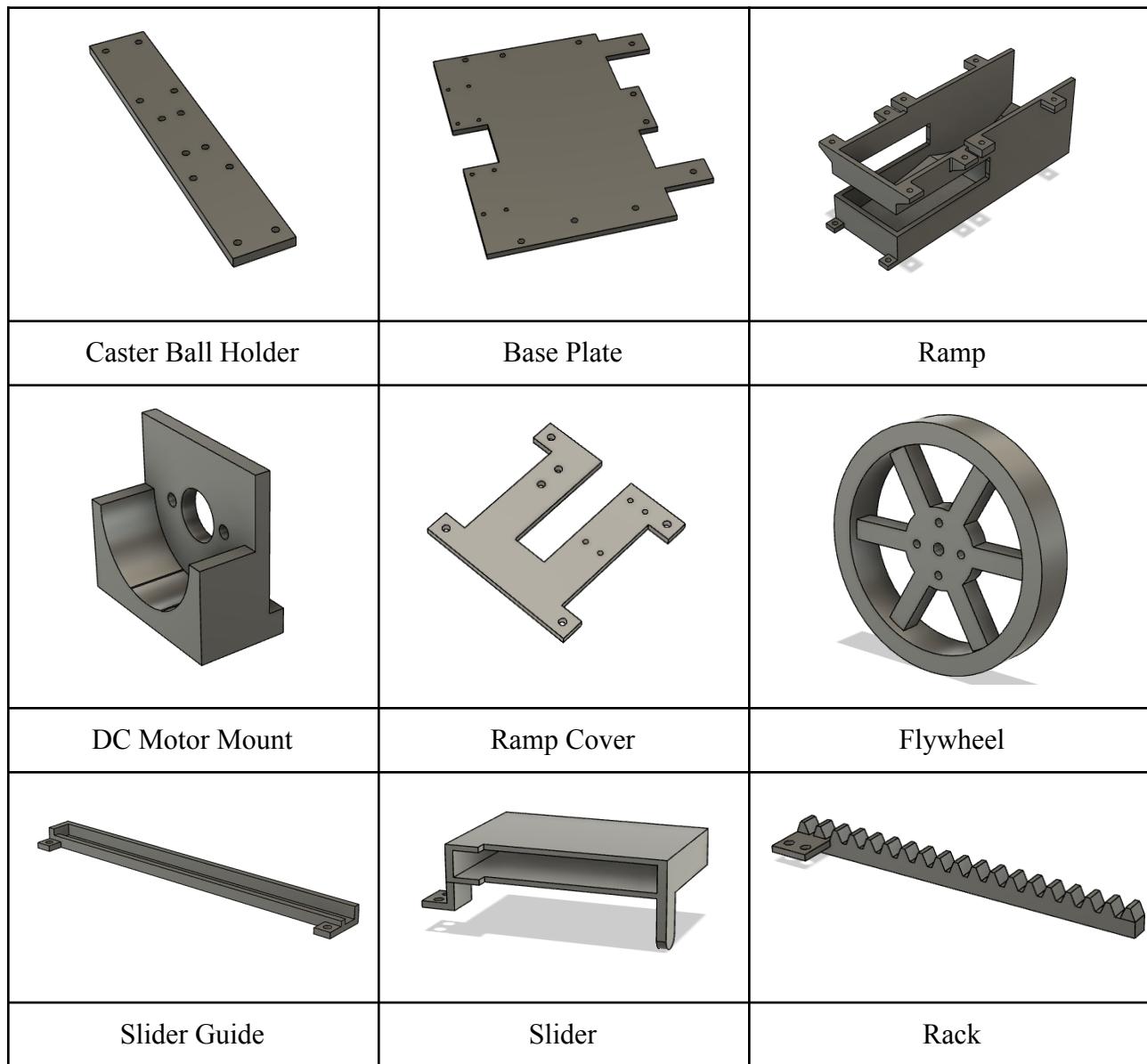
Bill of Materials

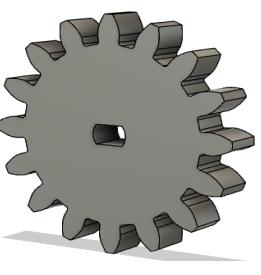
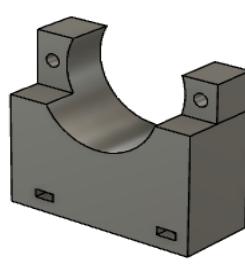
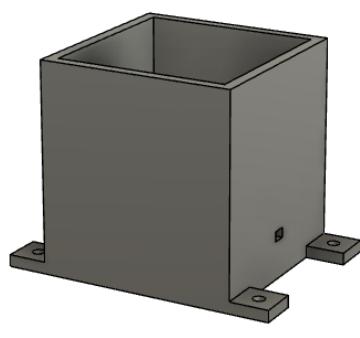
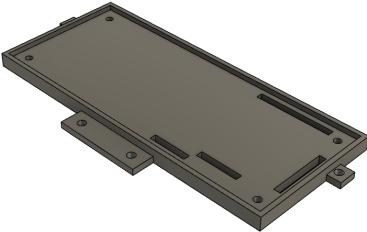
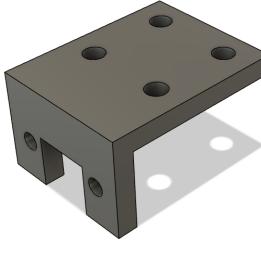
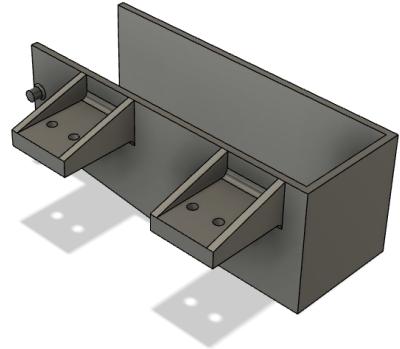
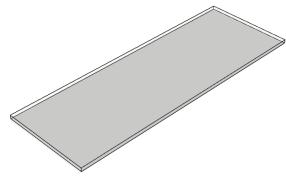
Components

This list does not include the components that come with TurtleBot3.

Component	Quantity
Caster Ball Holder	1
Base Plate	1
Ramp	1
RS Pro DC Motor 238-9715	1
DC Motor Mount	1
Ramp Cover	1
3mm Mounting Hub	1
Strip of Anti-Slip Mat	1
Flywheel	1
Slider Guide	1
Slider	1
Rack	1
Pinion	1
Stepper Motor-24BJY48	1
Stepper Motor Mount	1
Funnel Bottom	1
NFC Mount	1
PN532 Breakout Board	1
AMG8833	1
AMG Mount	1
Perfboard	1

DC Motor Driver (Cytron MDD3A DC Motor Driver Board) and Stepper Motor Driver (ULN2003A Breakout Board)	1
Funnel Top	1
Funnel Lid	1
Rubber Band	1



		
Pinion	Stepper Motor Mount	Funnel Bottom
		
NFC Mount	AMG Mount	Funnel Top
		
Funnel Lid		

Fasteners

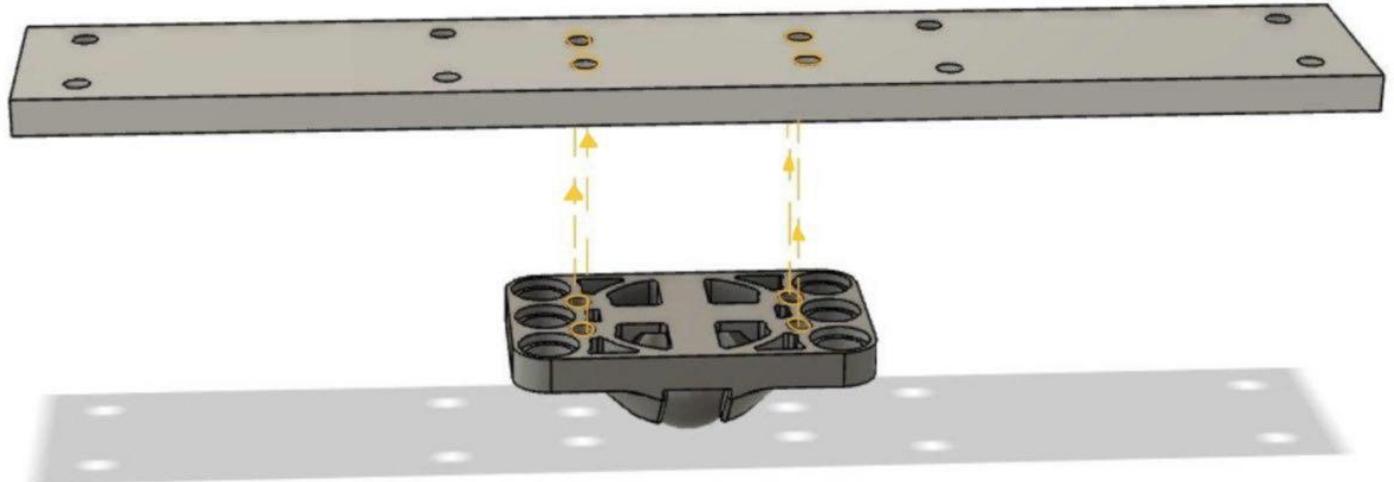
This list does not include the fasteners that come with TurtleBot3.

Fasteners	Quantity
M3 Nuts	30
M2.5 Nuts	2
M2 Nuts	28
M3x30	2
M3x20	4
M3x15	24
M3x10	6
M2.5x15	2
M2x15	8
M2x10	18
M2x5	2
M2 Washers	12
M3 Washers	6
M3x10 F to F Standoffs	2
Yamayo Elephant Super Glue	1
3M Scotch Heavy Duty Mounting Tape	1

Assembly of Launcher

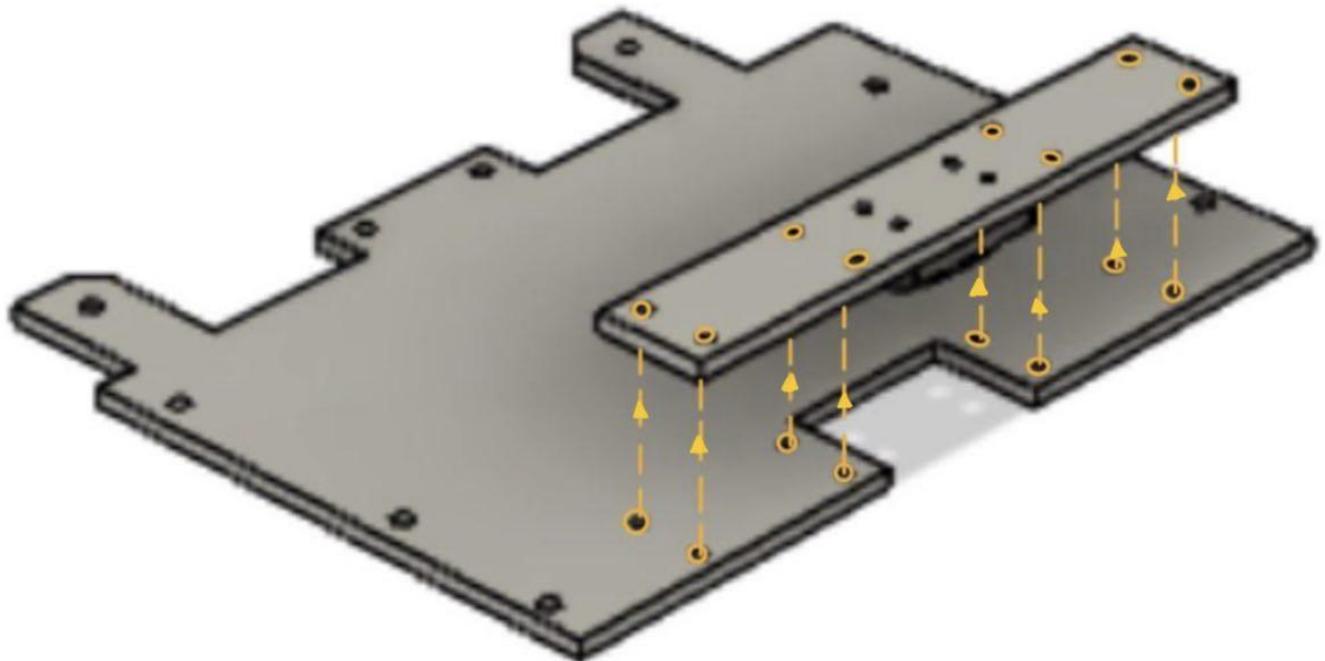
1. Attach Casterball (from Turtlebot3) to Casterball Holder.

Fasteners used: 4 sets of M2x10 screws, M2 washers and M2 nuts



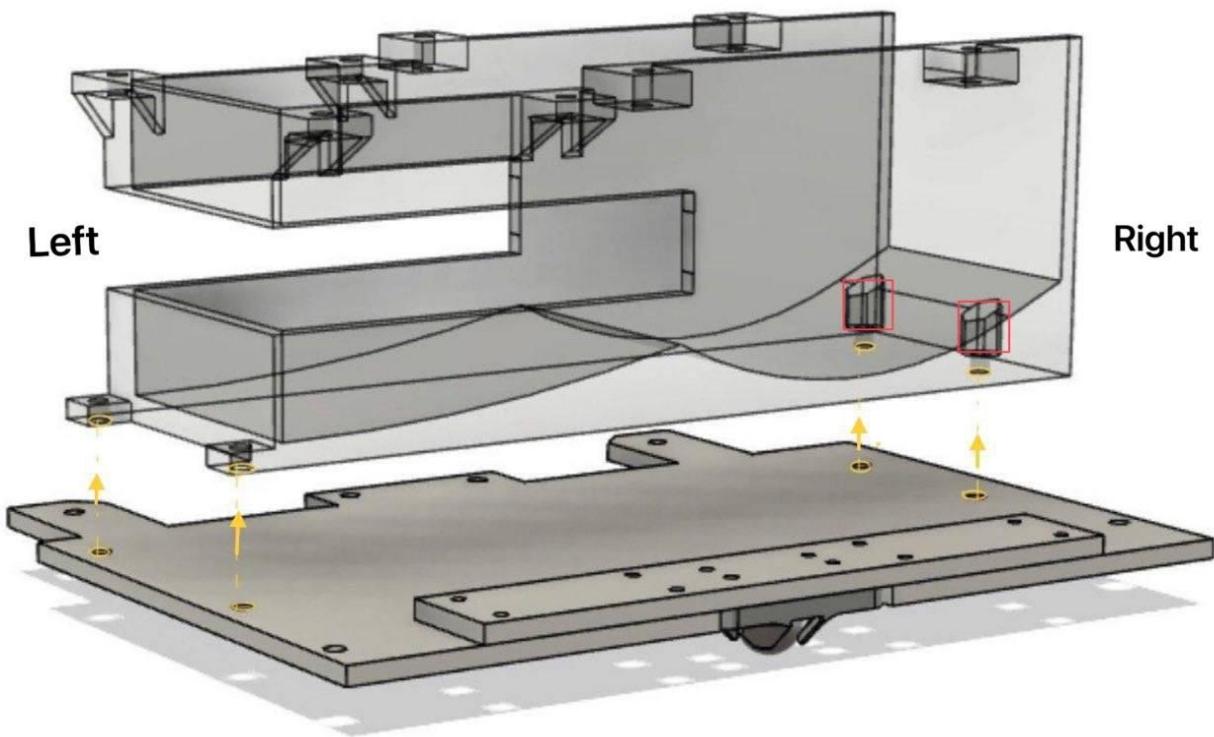
2. Attach Casterball Holder to Base Plate.

Fasteners used: 8 sets of M2x10 screws, M2 washers and M2 nuts



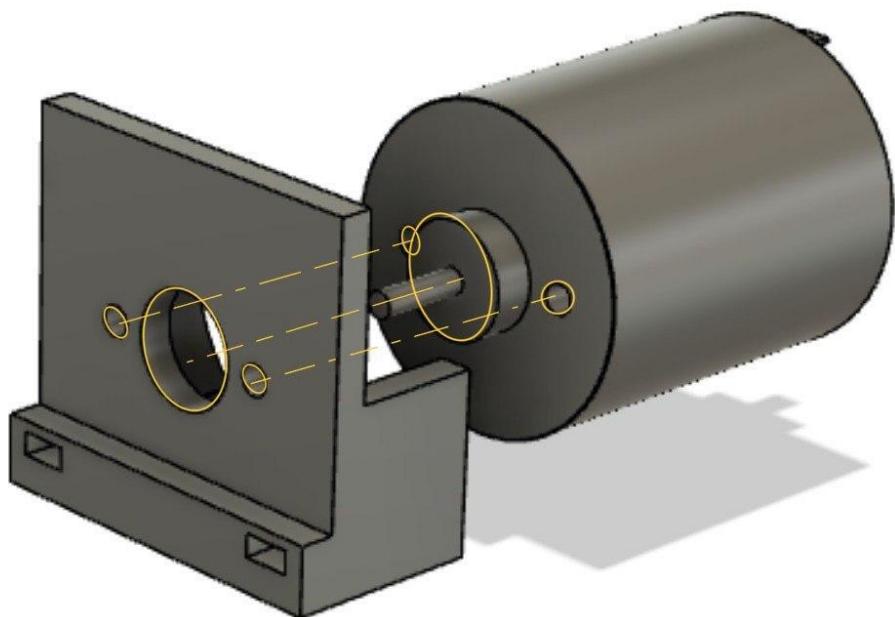
3. Attach Ramp to Base Plate.

Fasteners used: 2 sets of M2x15 screws and M2 nuts for left two holes and 2 sets of M3x15 screws and M3 nuts for right two holes (M3 nuts are placed in cavities highlighted in red)



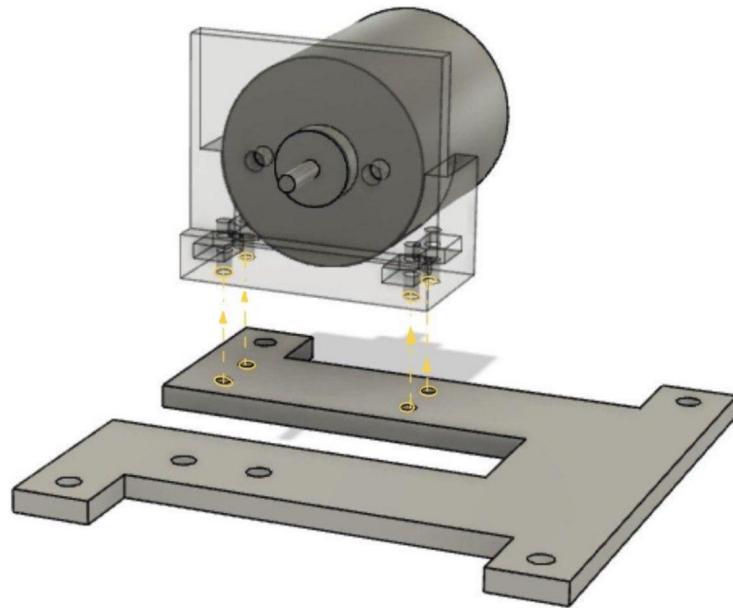
4. Attach DC Motor to DC Motor Mount.

Fasteners used: 2 M3x10 screws



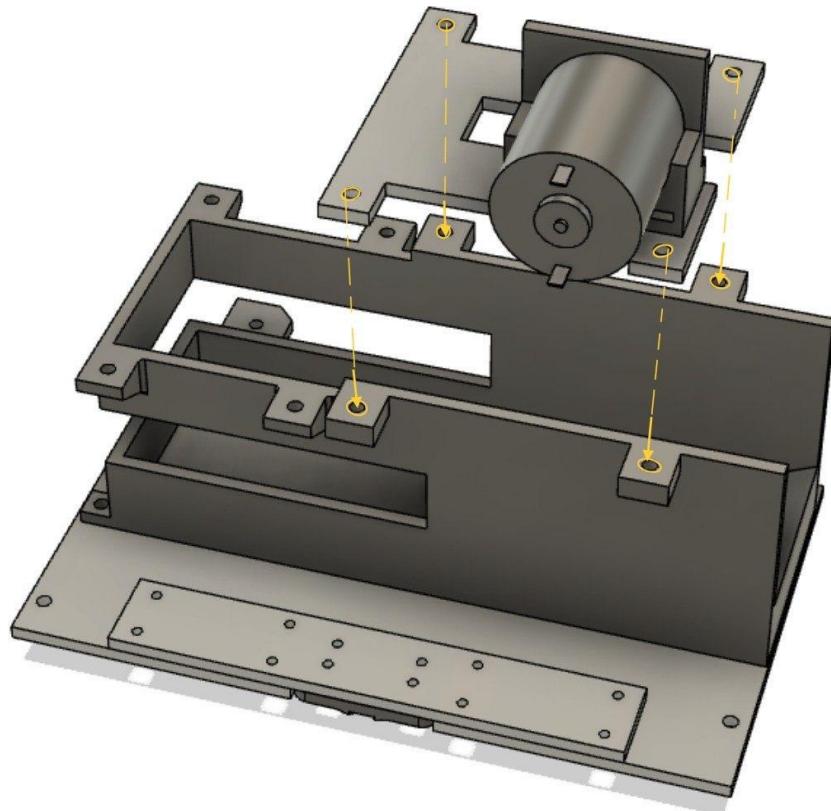
5. Attach DC Motor Mount to Ramp Cover (refer to 6. of General Instructions for more information).

Fasteners used: 4 sets of M3x15 screws and M3 nuts



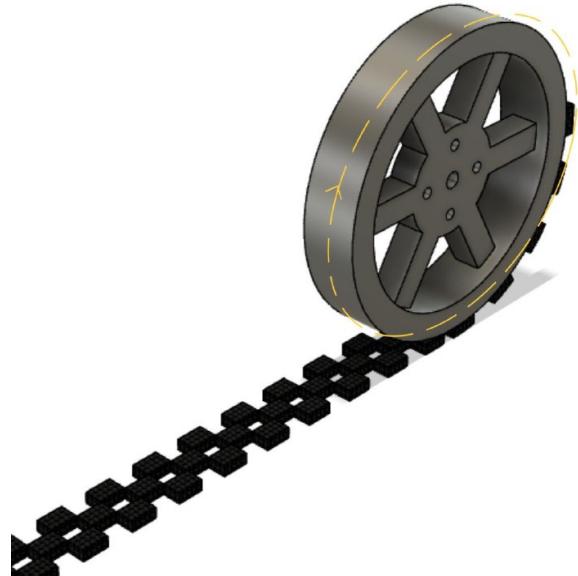
6. Mount Ramp Lid onto Ramp.

Fasteners used: 4 sets of M3x15 screws, M3 washers and M3 nuts



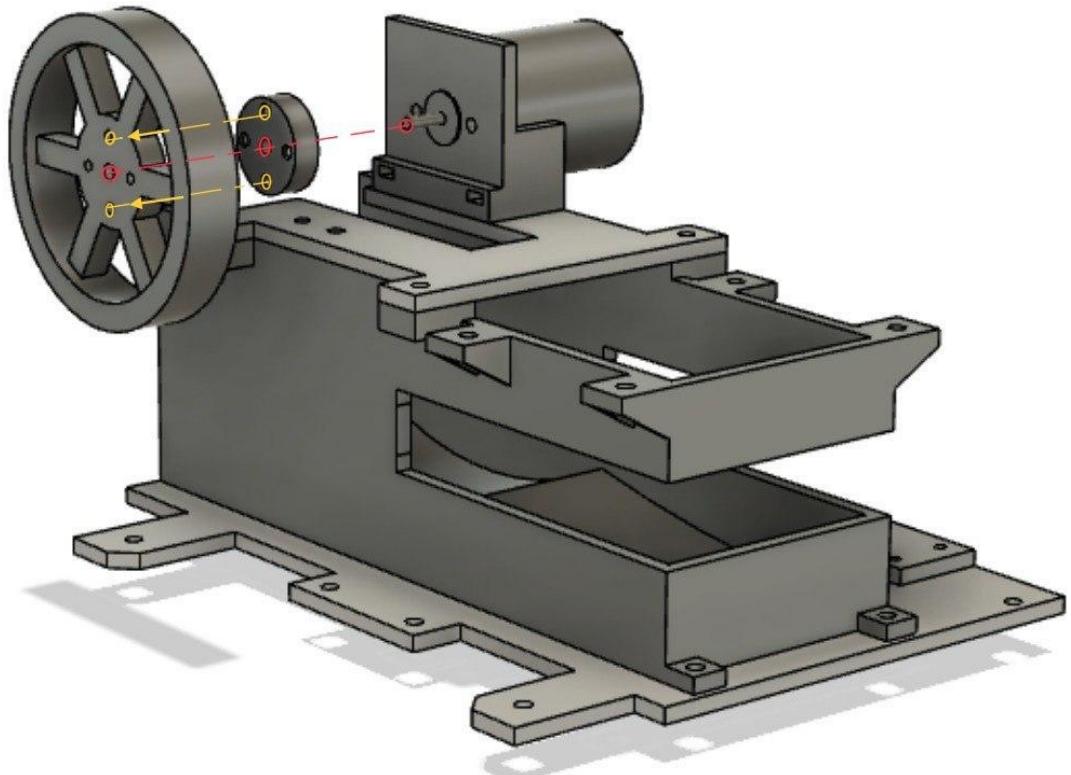
7. Super glue Anti-Slip Mat around the Flywheel.

Fastener used: Super Glue



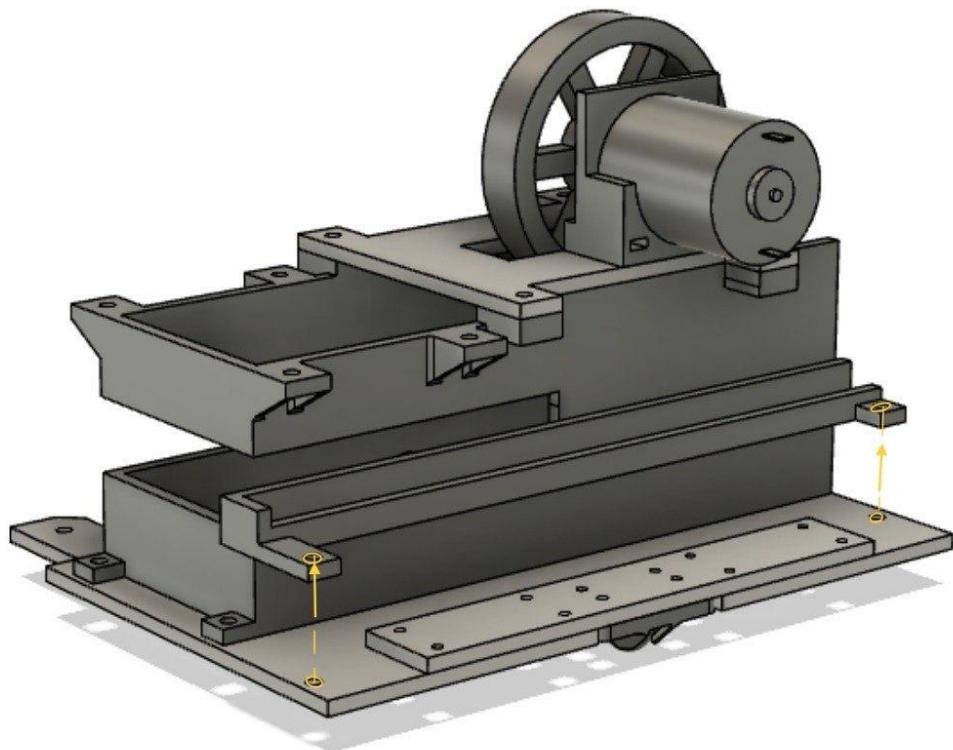
8. Flywheel to Mounting Hub to DC Motor. Shaft of the DC Motor is inserted into the Flywheel's central hole.

Fasteners used: 2 sets of M3x15 screws and M3 nuts



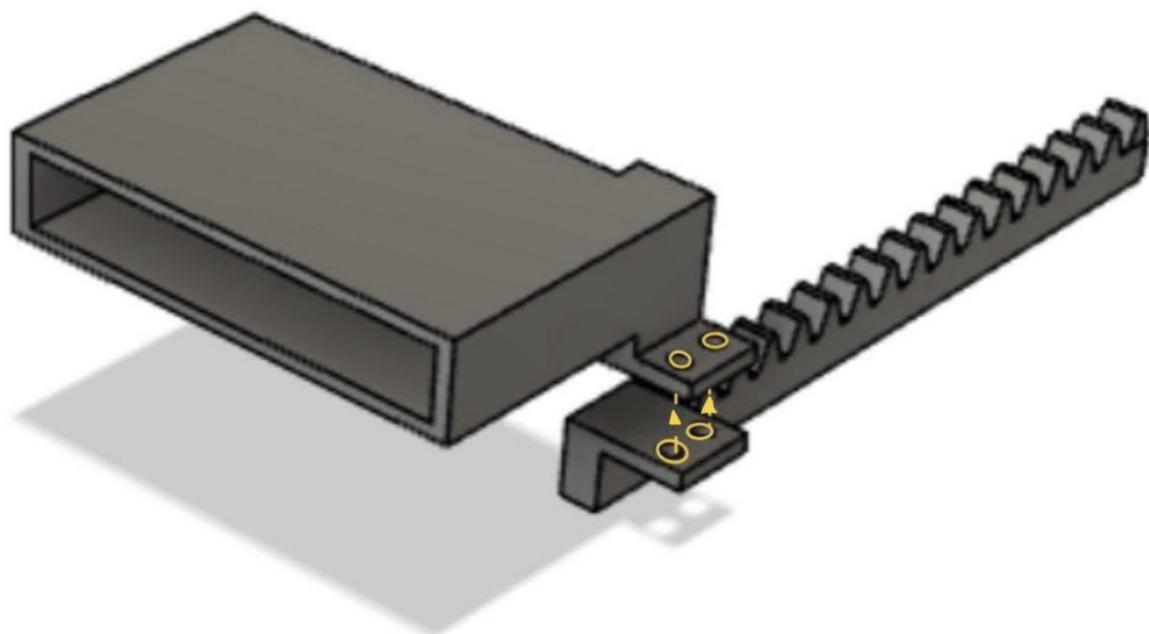
9. Attach Slide Guide to Base Plate.

Fasteners used: 2 sets of M3x15 screws and M3 nuts



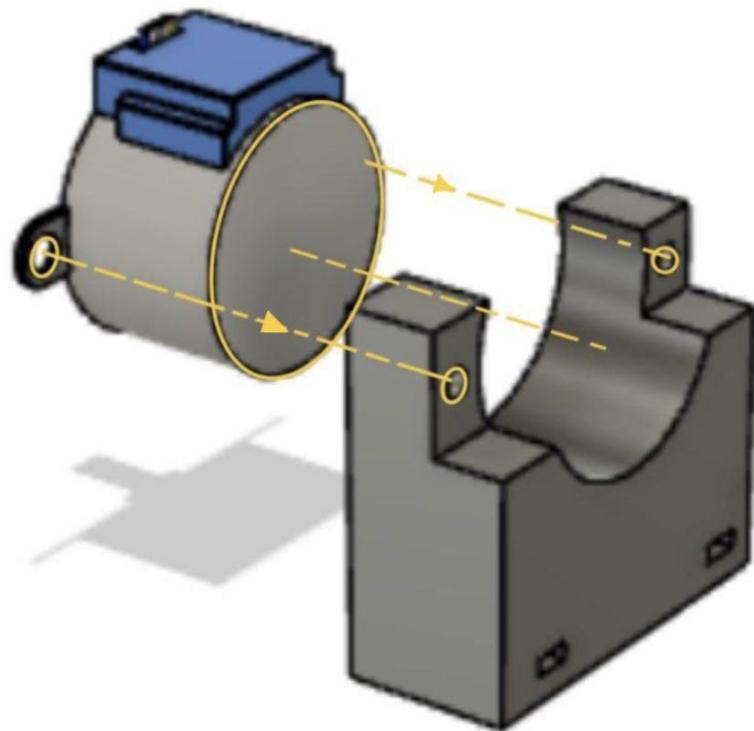
10. Attach Slider to Rack.

Fasteners used: 2 sets of M3x15 screws and M3 nuts

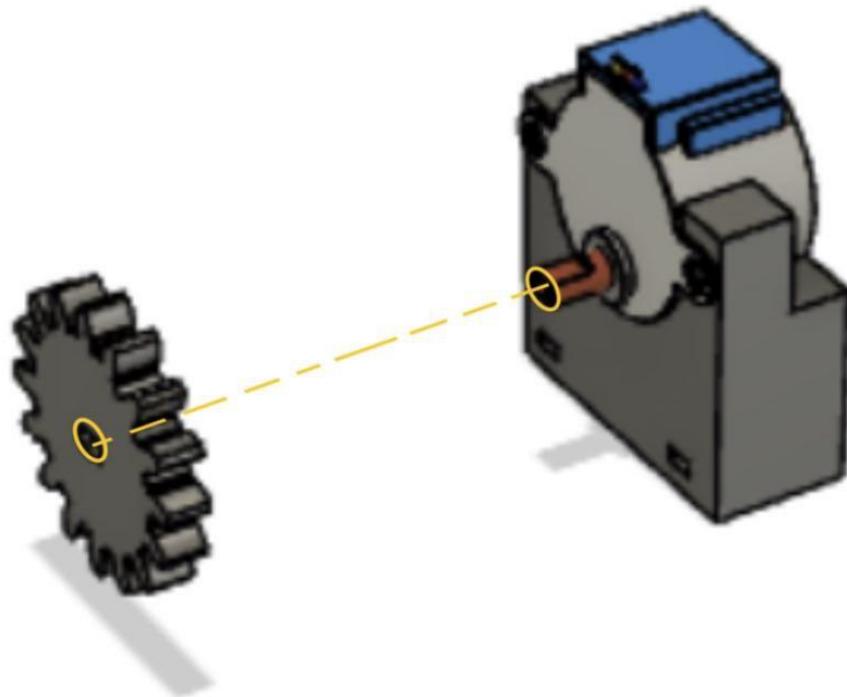


11. Stepper Motor to Stepper Motor Mount.

Fasteners used: 2 sets of M3x15 screws and M3 nuts



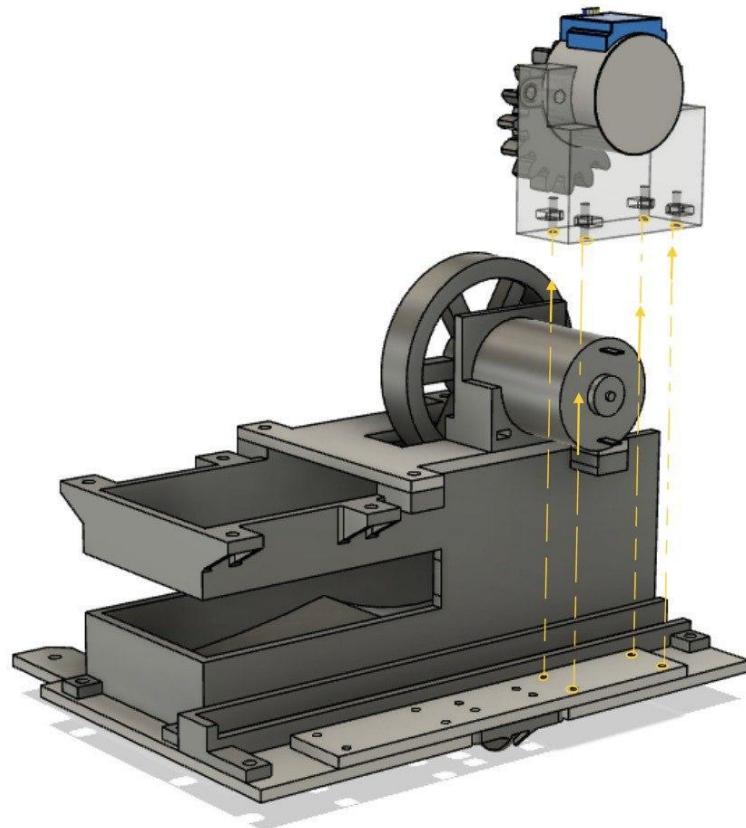
12. Attach pinion onto stepper motor.



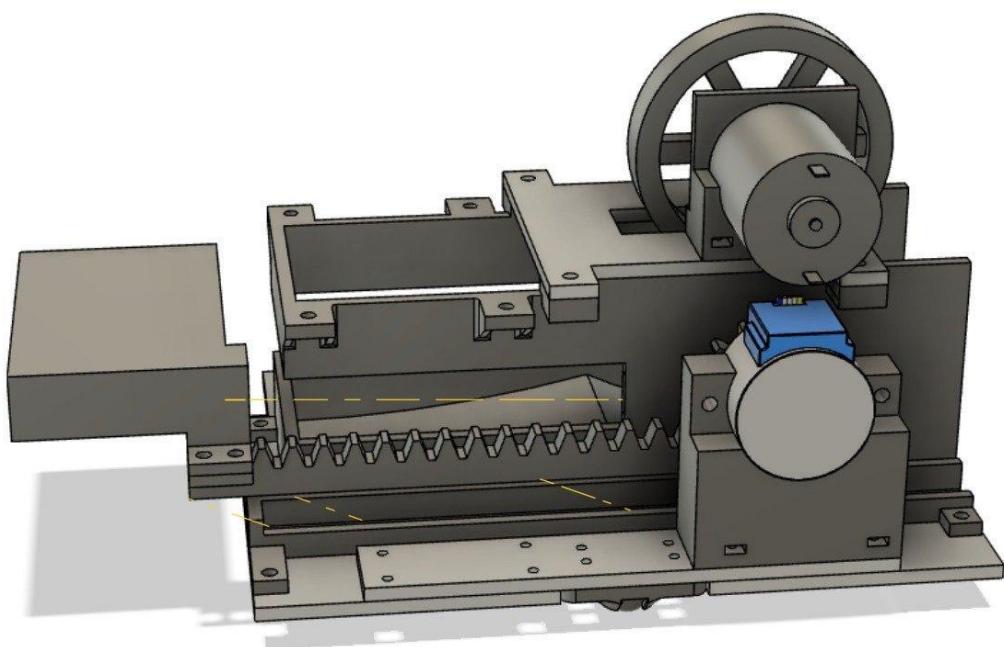
12.

13. Attach Stepper Motor Mount to Base Plate (refer to 6. of General Instructions for more information).

Fasteners used: 4 sets of M2x15 screws and M2 nuts

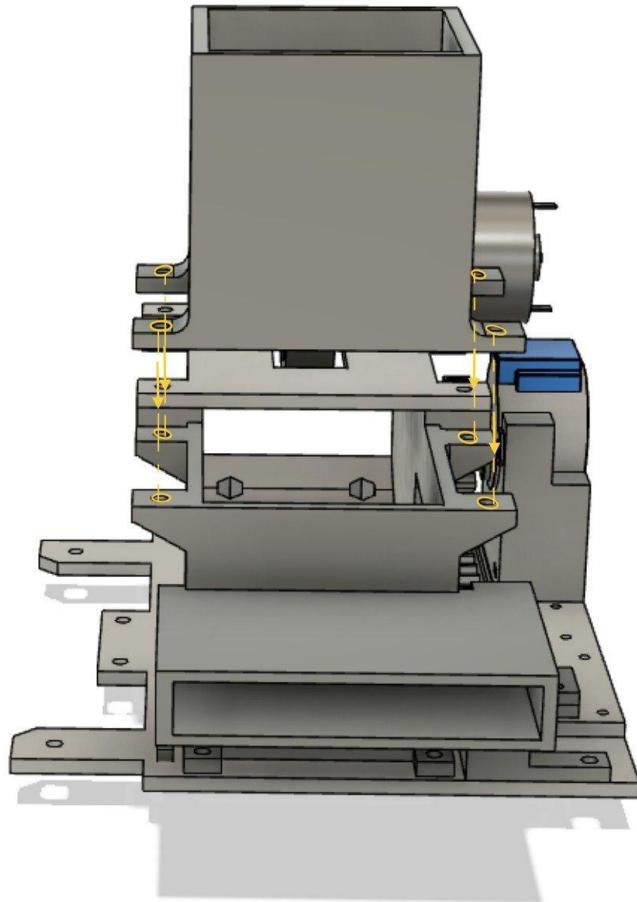


14. Attach Rack and Pinion.



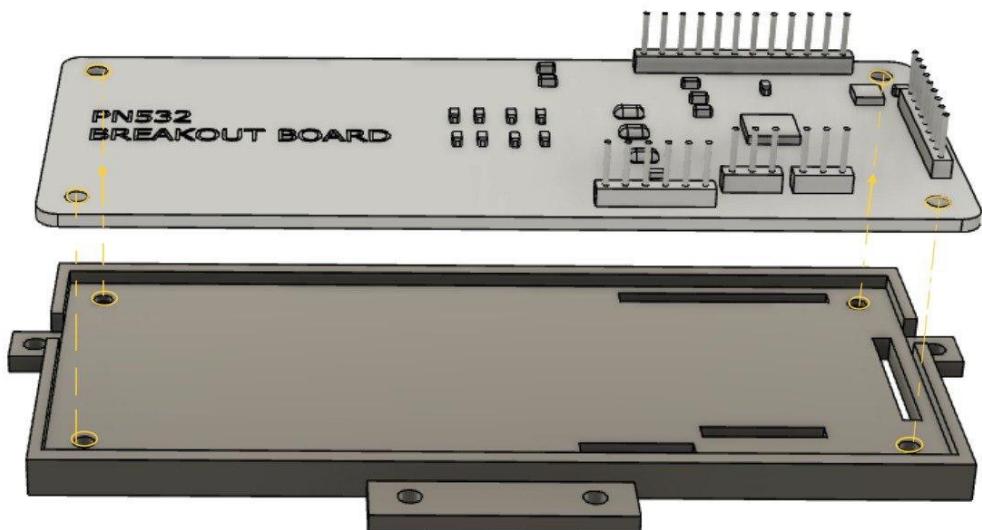
15. Funnel Bottom to Ramp

Fasteners used: 4 sets of M3x15 screws and M3 nuts



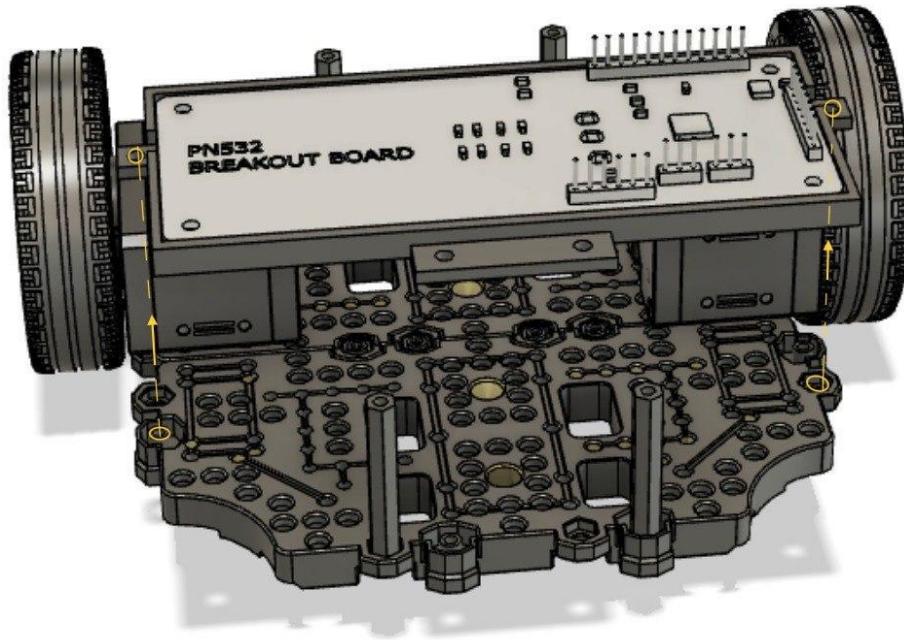
16. Assembly of NFC Tag and Mount.

Fasteners used: 2 sets of M2x10 screws and M2 nuts



17. NFC Mount to First Layer of TurtleBot3.

Fasteners used: 2 sets of M2x15 screws and M2 nuts

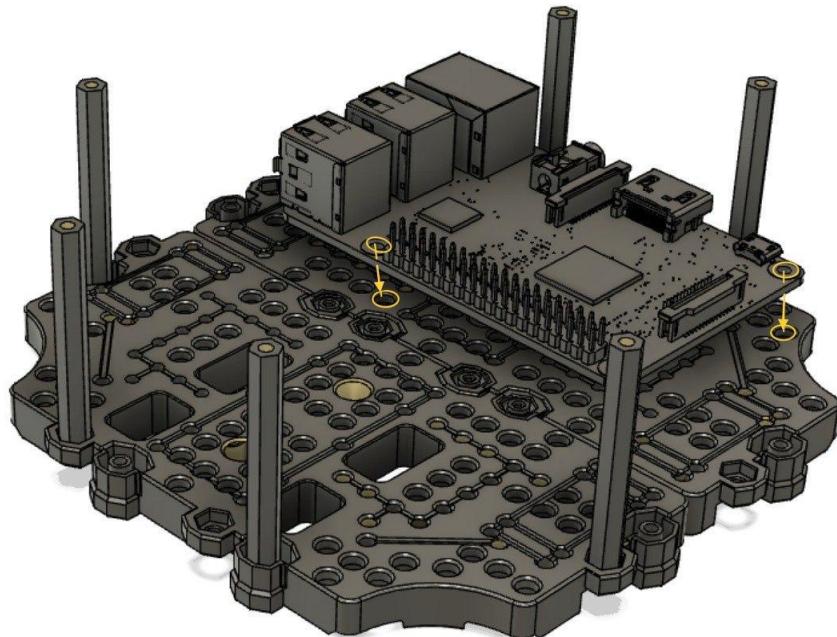


18. Mount Second Layer of TurtleBot3*.

19. Mount Open CR to Second Layer*.

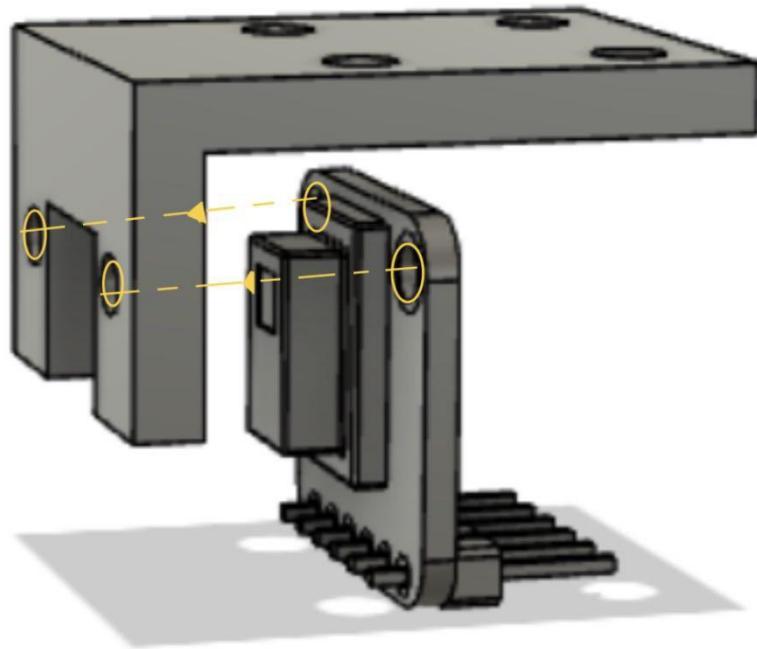
20. Mount Raspberry Pi to the Third Layer.

Fasteners used: 2 sets of M2.5x15 screws and M2.5 nuts



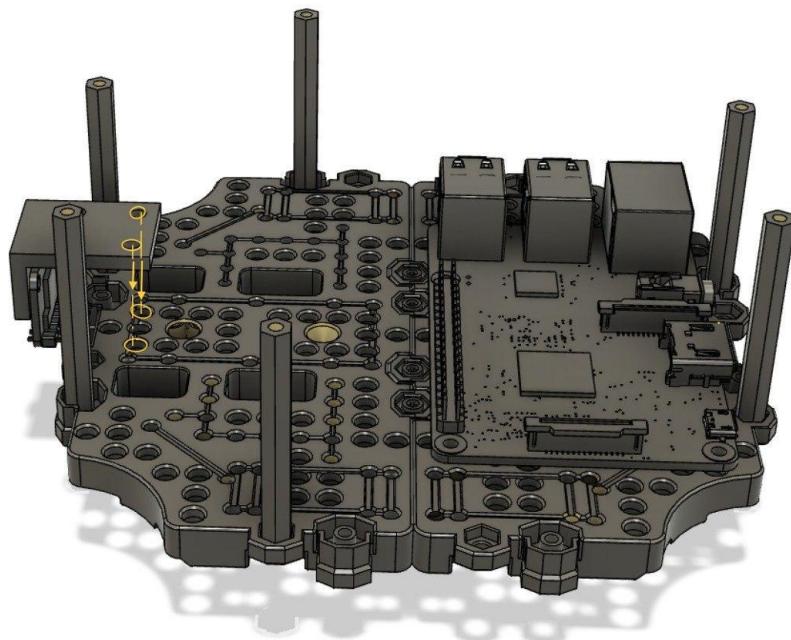
21. Mount AMG8833 Sensor to AMG Mount.

Fasteners used: 2 sets of M2x5 screws and M2 nuts



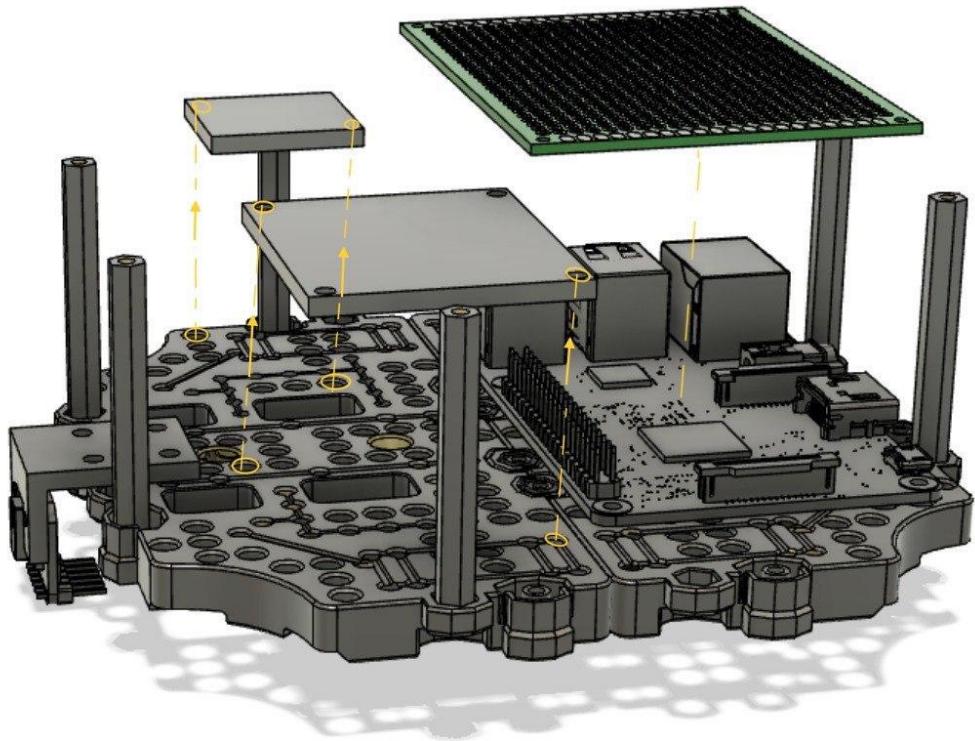
22. Attach the AMG mount to the Third Layer.

Fasteners used: 2 sets of M3x15 screws and M3 nuts



23. Mount Third Layer onto Second Layer*.

24. Mount DC Motor Driver and Stepper Motor Driver onto the Third Layer using the screws.
Attach Perfboard onto Raspberry Pi with Mounting Tape.
Fasteners used: 4 sets of M2x10 screws and M2 nuts, Mounting Tape

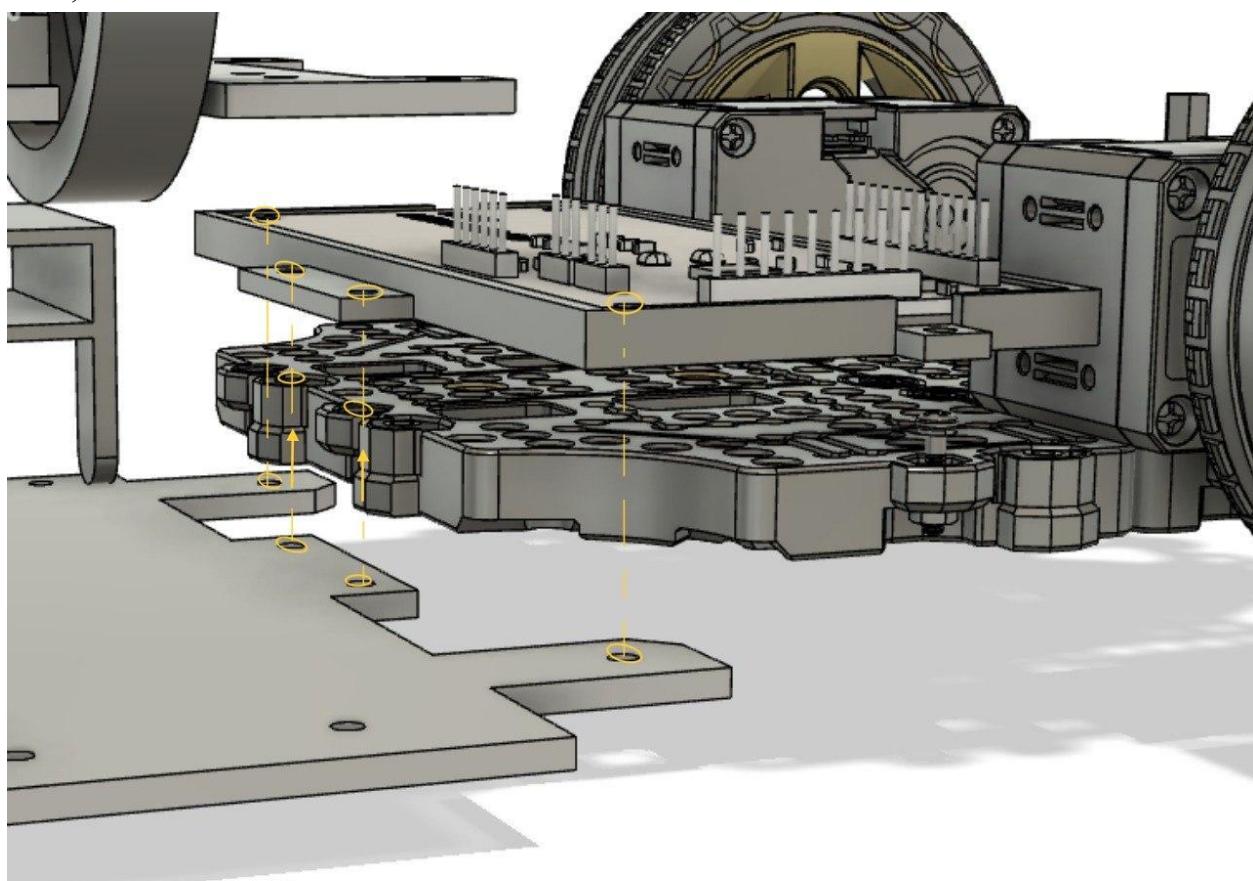


25. Mount Fourth Layer*.

26. Mount Lidar and Lidar controller onto Fourth Layer*.

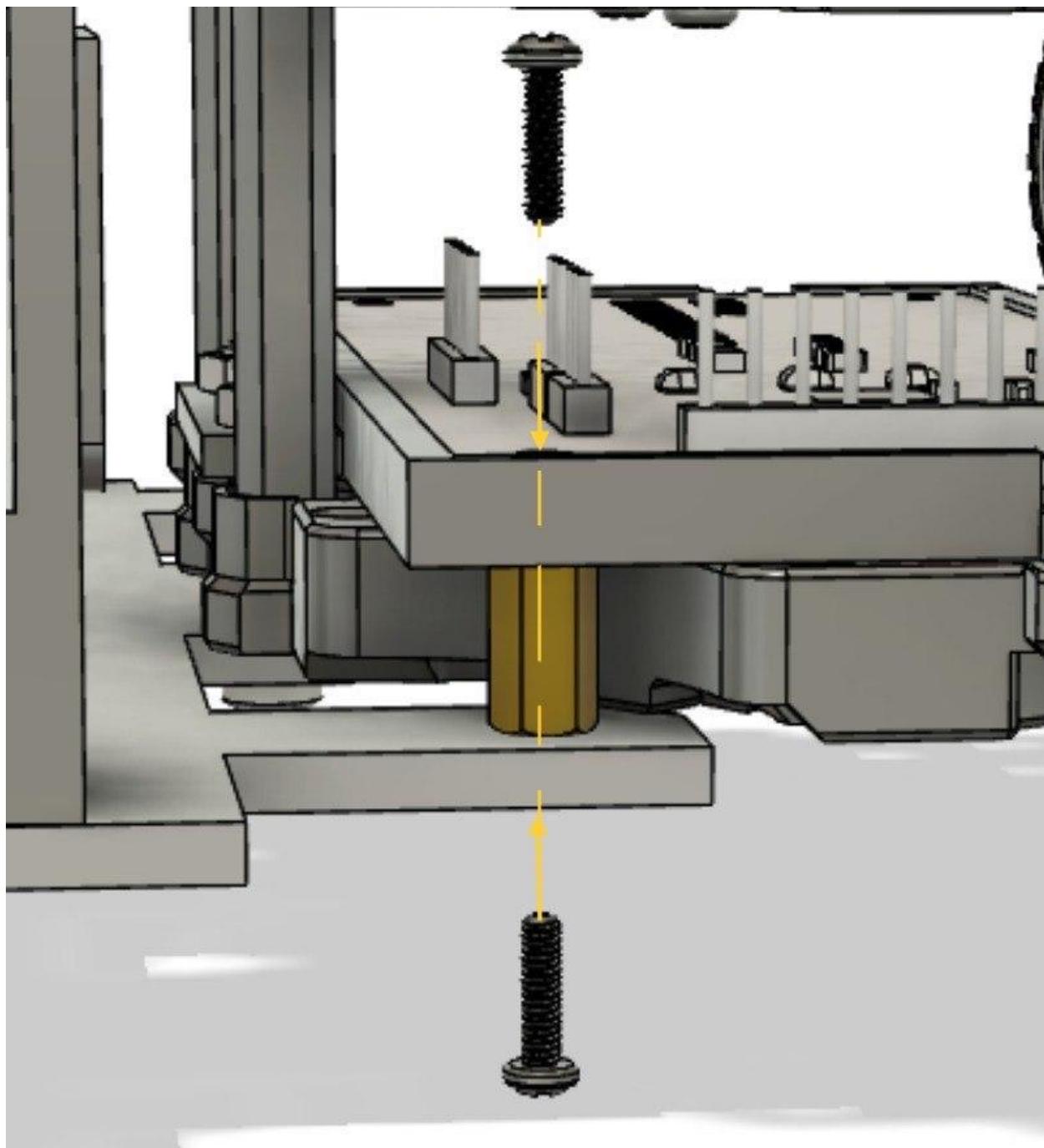
27. Mount Base Plate onto the First Layer of TurtleBot3.

Fasteners used: 2 M3x10 F to F Standoffs, 4 M3x10 screws and 2 M3 washers for the outer two holes, 2 sets of M3x30 and M3 nuts for the inner two holes



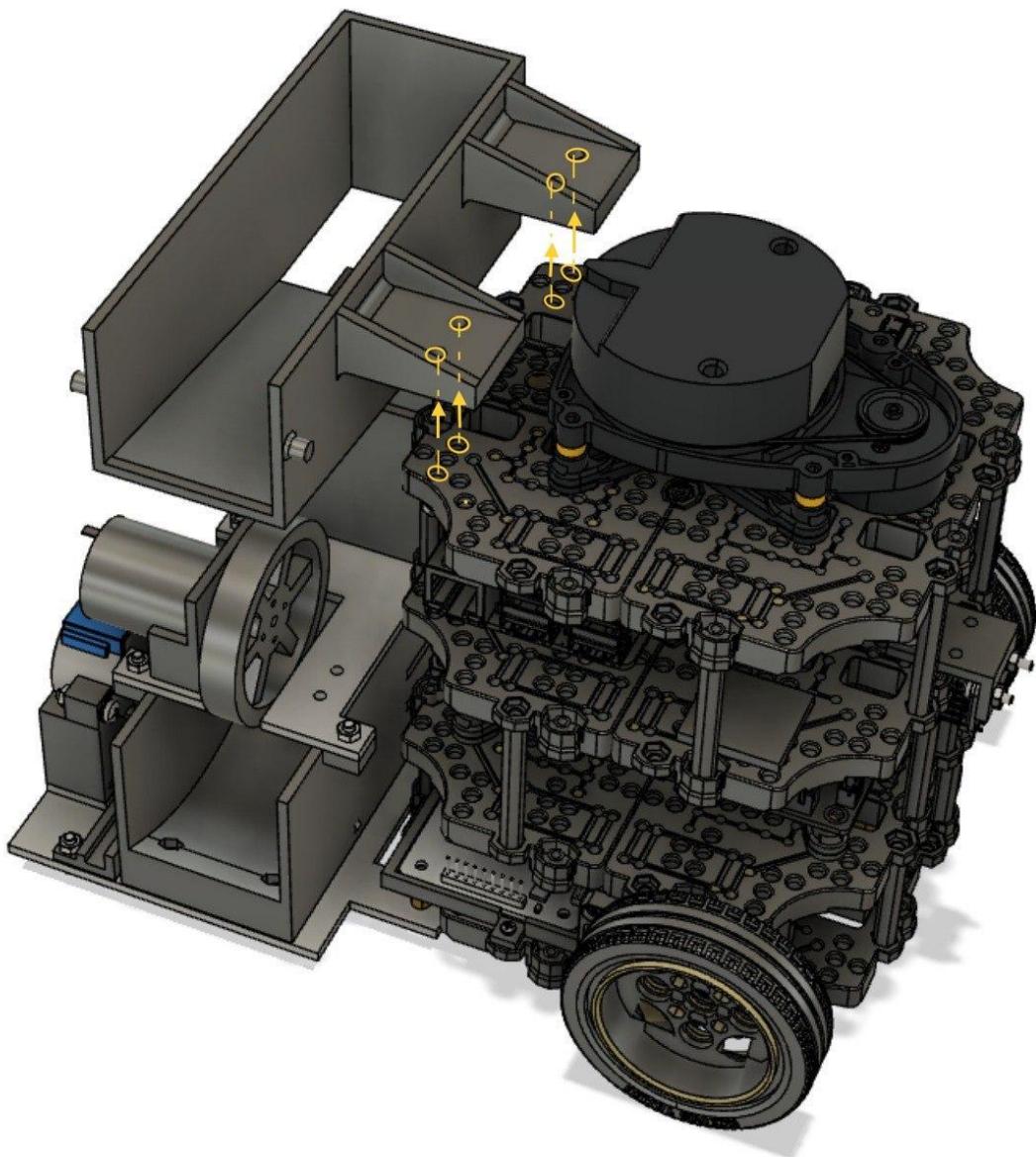
(Refer to the next page for information on how to insert the Standoffs.)

Insert Standoffs and screws as per picture:



28. Mount Funnel Top onto TurtleBot3.

Fasteners used: 4 sets of M3x20 screws and M3 nuts

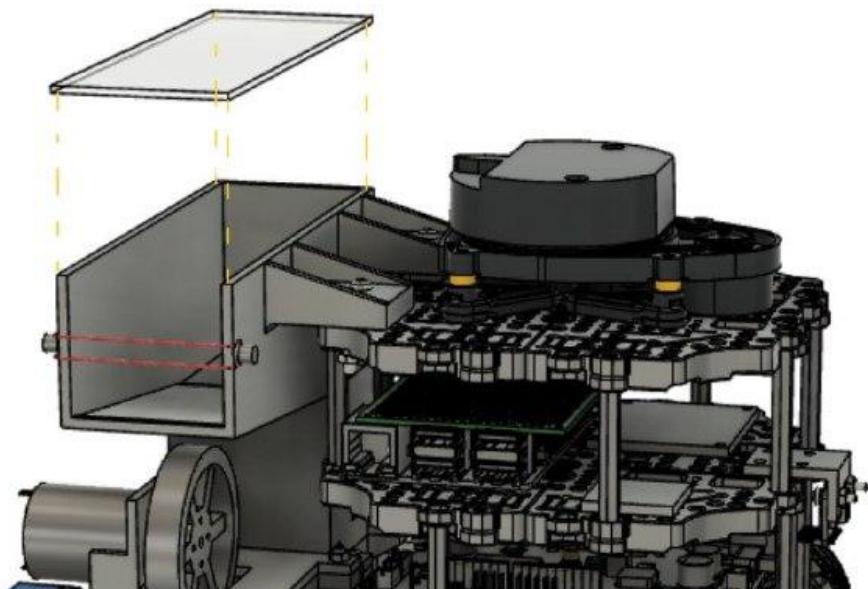


29. Super glue Funnel Bottom to Funnel Top.

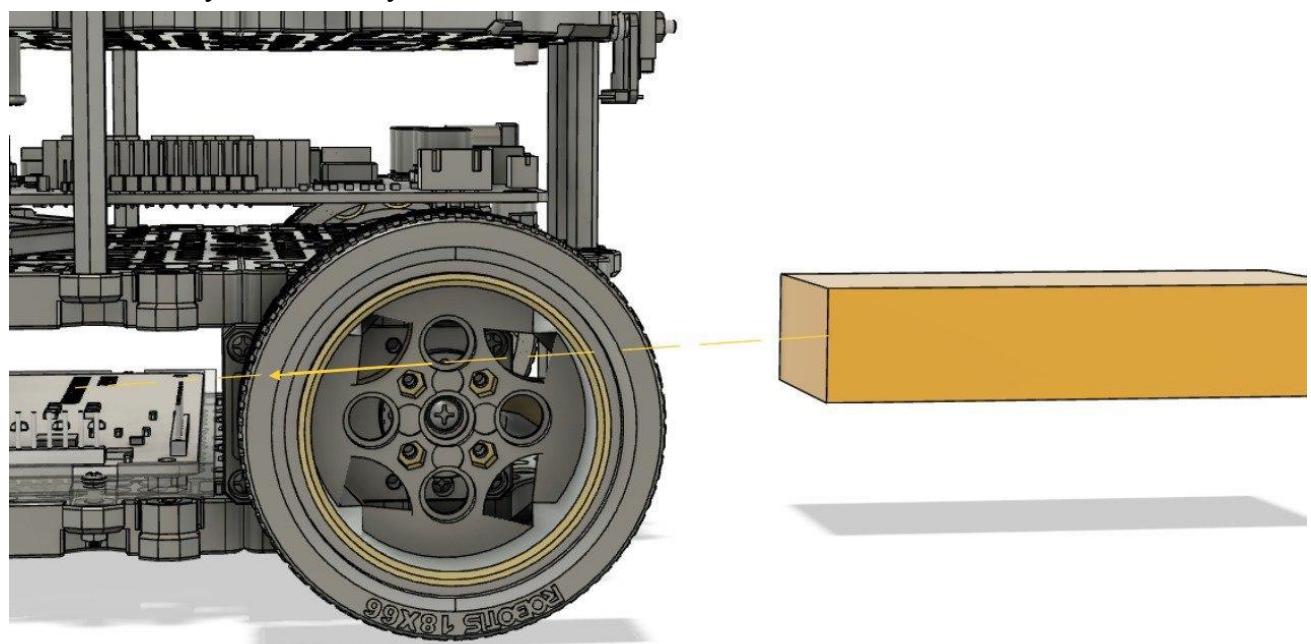
Fasteners used: Super Glue

30. Super glue Funnel Lid to Funnel Top.

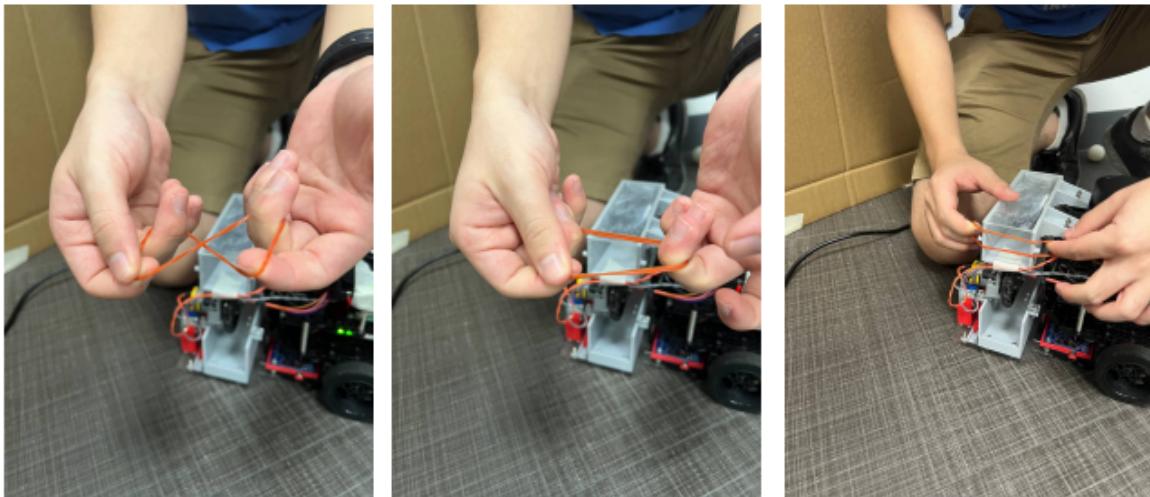
Fasteners used: Super Glue



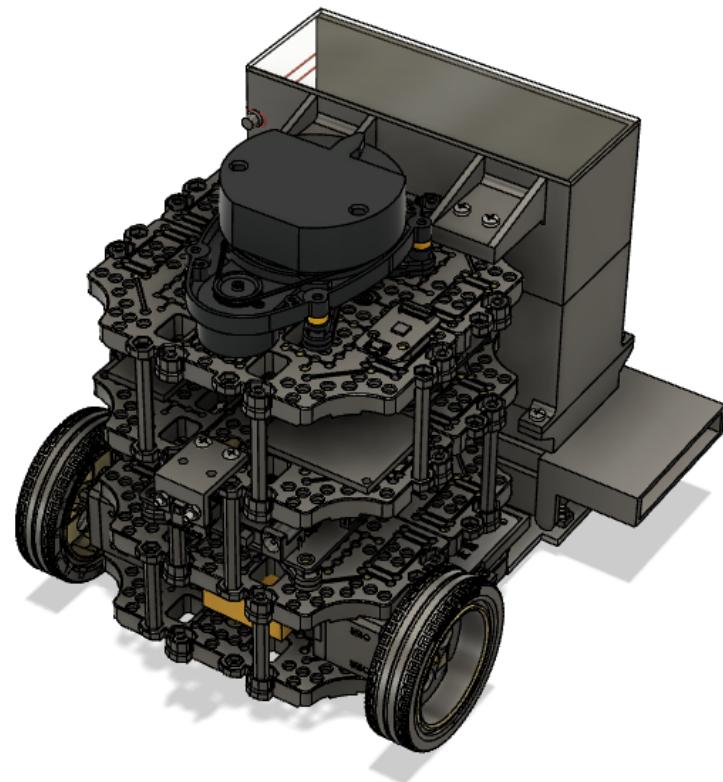
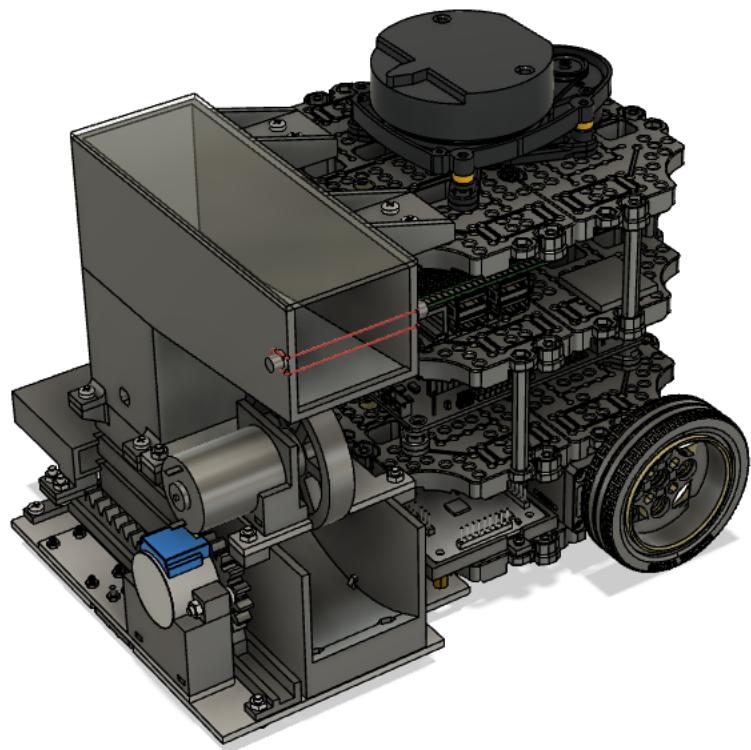
31. Slide Battery into First Layer.

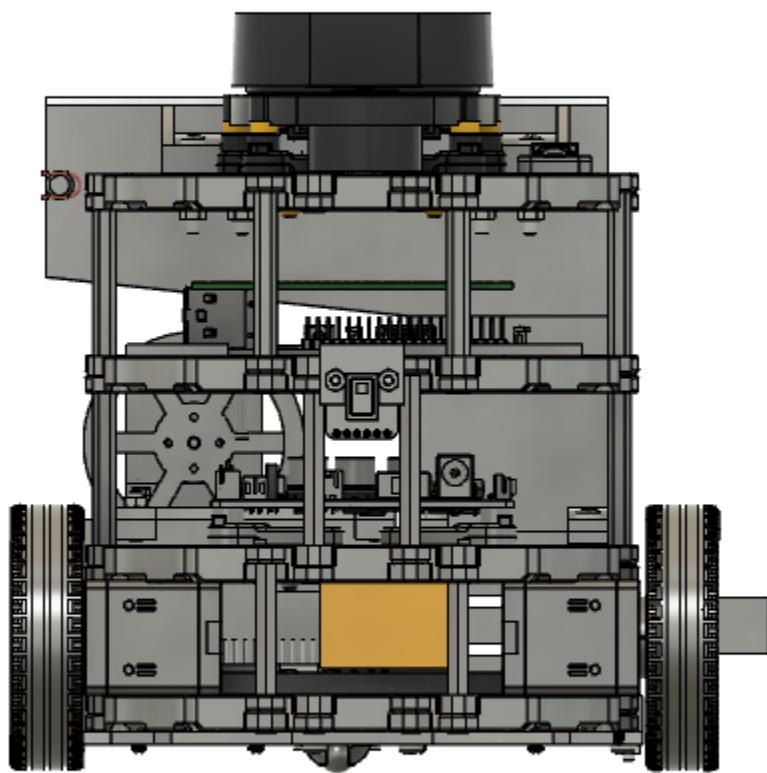
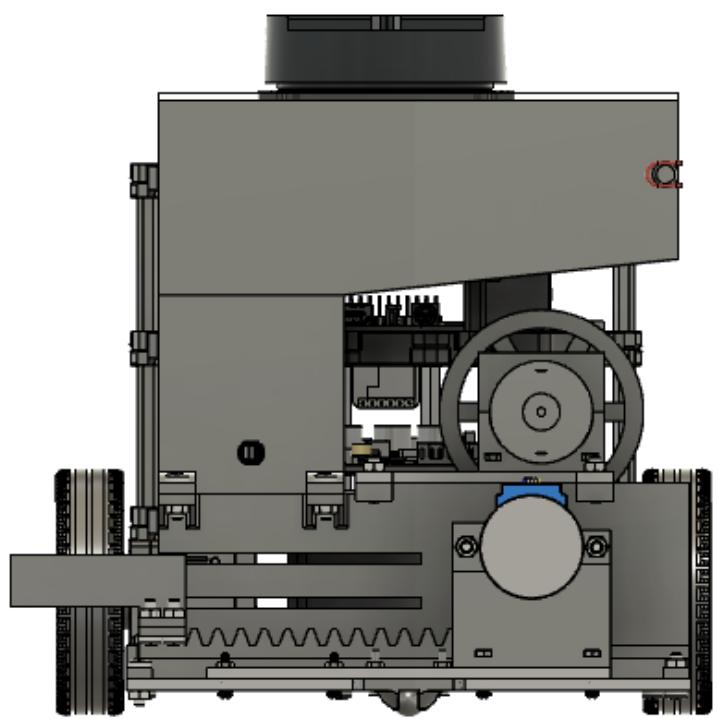


32. Attach Rubber Band to the extrusions on Funnel Top



Completed McTruck





More Information

For more information please refer to the TurtleBot and TurtleBot3 websites.

TurtleBot Brand Page
<http://www.turtlebot.com>



TurtleBot3 Wiki Page
<http://turtlebot3.robotis.com>

