

Robotroller Assembly Guide

USE ARROW KEYS, OR TAP OR CLICK
EITHER SIDE OF THE SLIDE

Overview

- 3D printing the components
- Adding threaded inserts to the components
- Assembling individual components
- Attaching components to the baseplate
- Wiring the components
- Testing the Robotroller

1. 3D Printing the Components

Most components can be printed without support. Use a high infill for stronger parts—85% with either a grid or cuboid infill pattern works well. The parts that need support are:

- Joystick holder
- Shoulder socket
- Fire finger holder

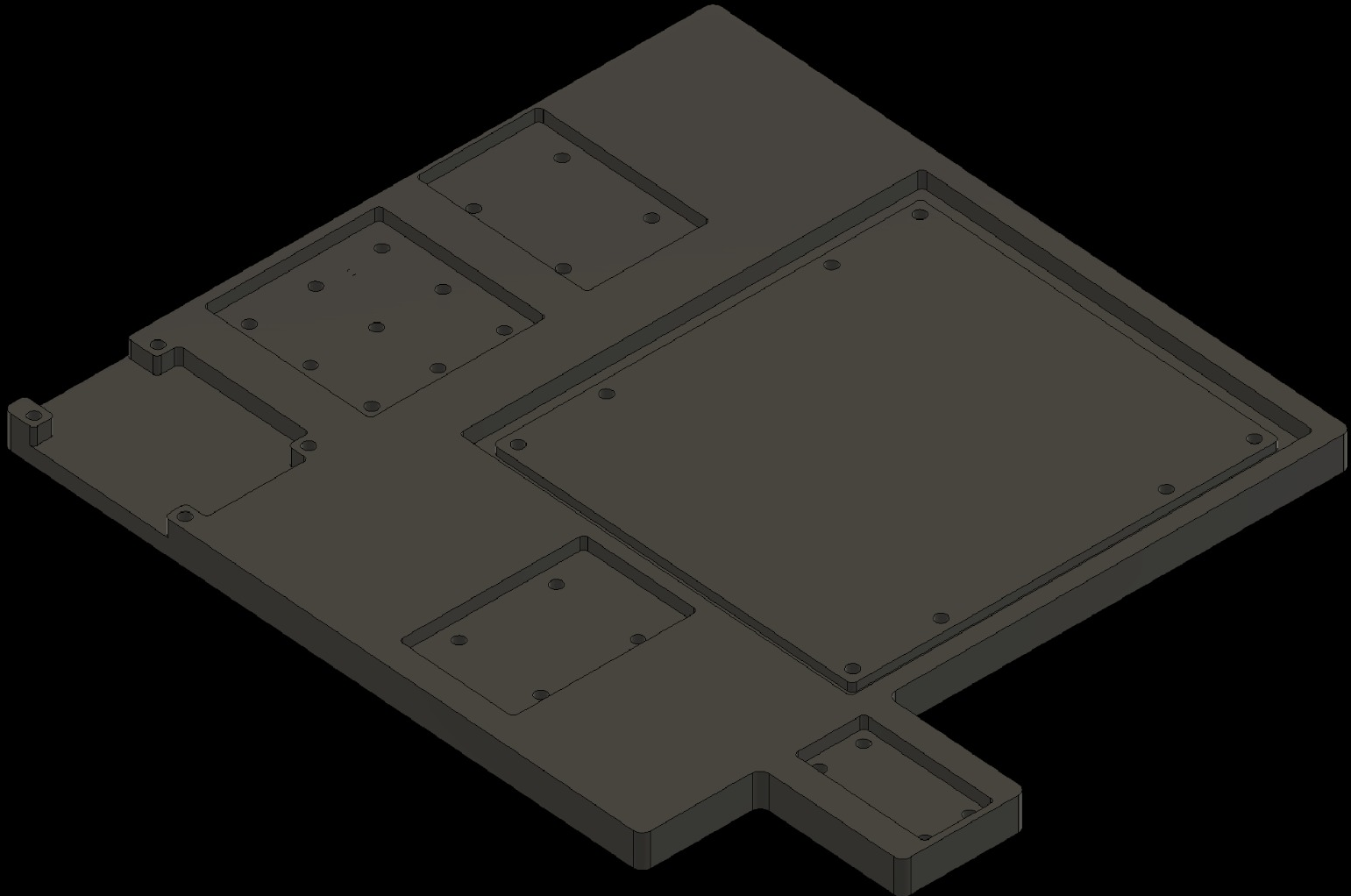
Use tree supports that originate from the build plate. A threshold angle of 35 degrees in Bambu Studio works well.

2. Adding Threaded Inserts to the Components

Heat-set the threaded inserts using a soldering iron. The following slides show which components need inserts and where to place them.

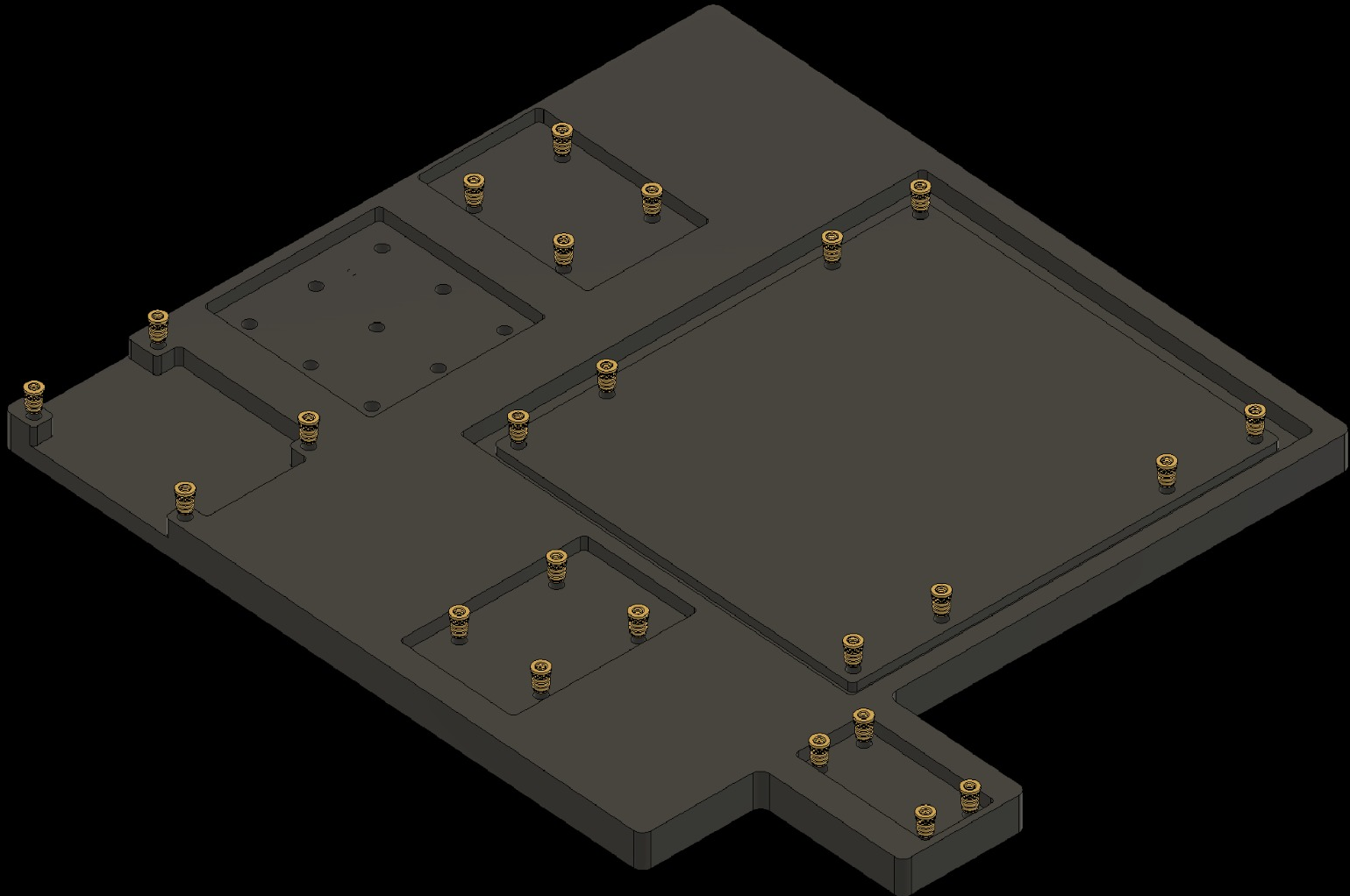
2. Adding Threaded Inserts to the Components

2.1 Add threaded inserts to the baseplate



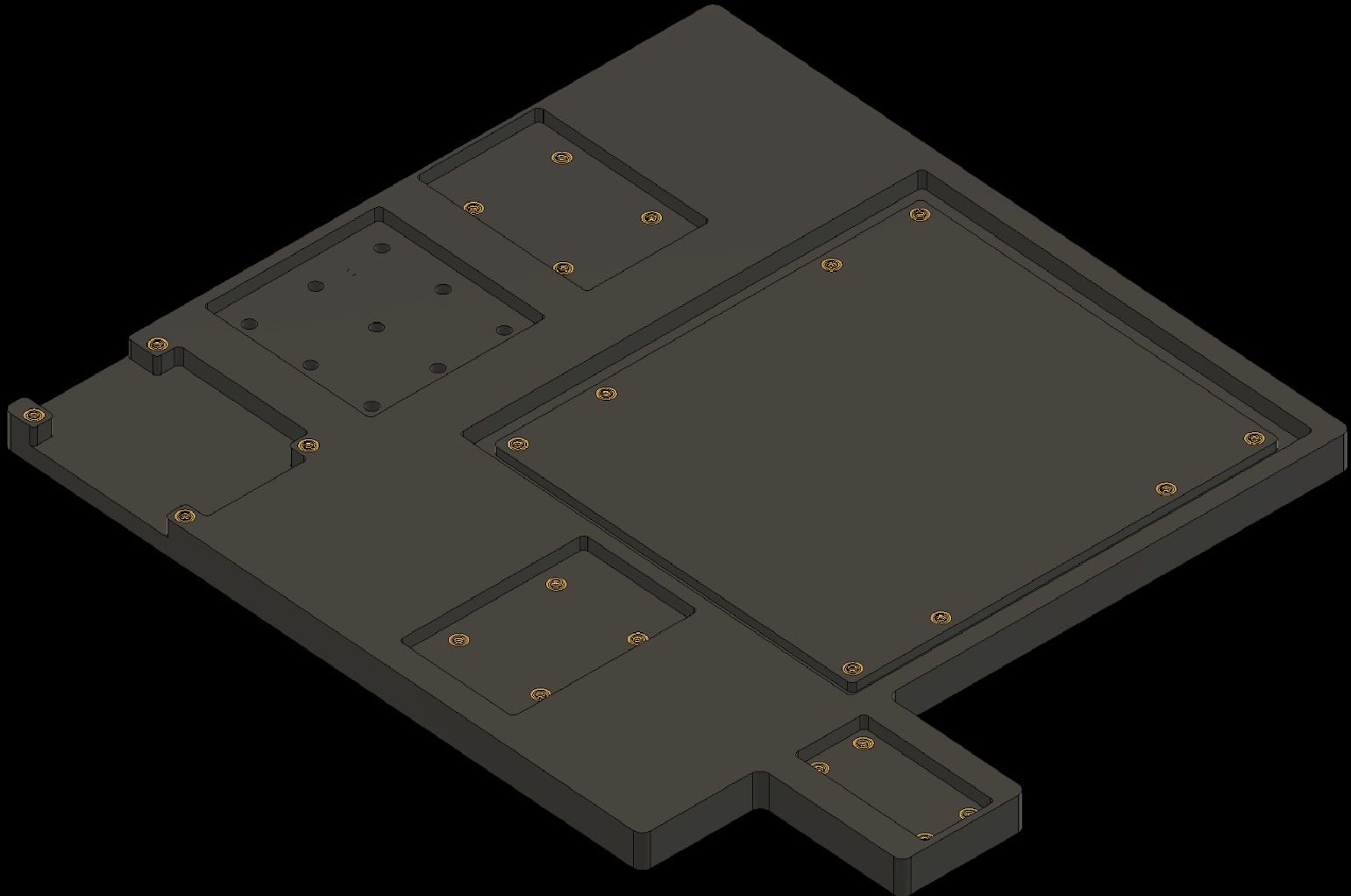
2. Adding Threaded Inserts to the Components

2.1 Add threaded inserts to the baseplate



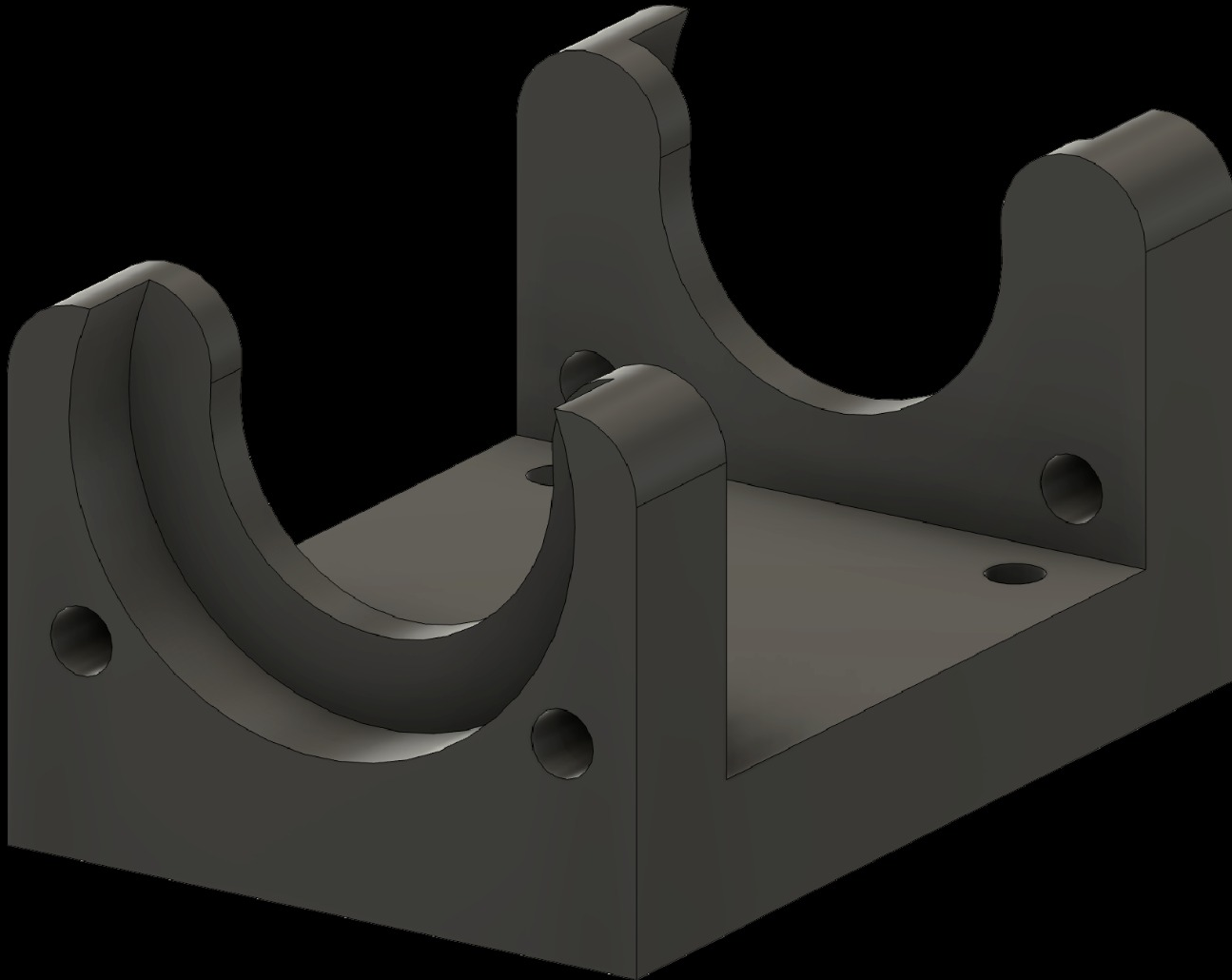
2. Adding Threaded Inserts to the Components

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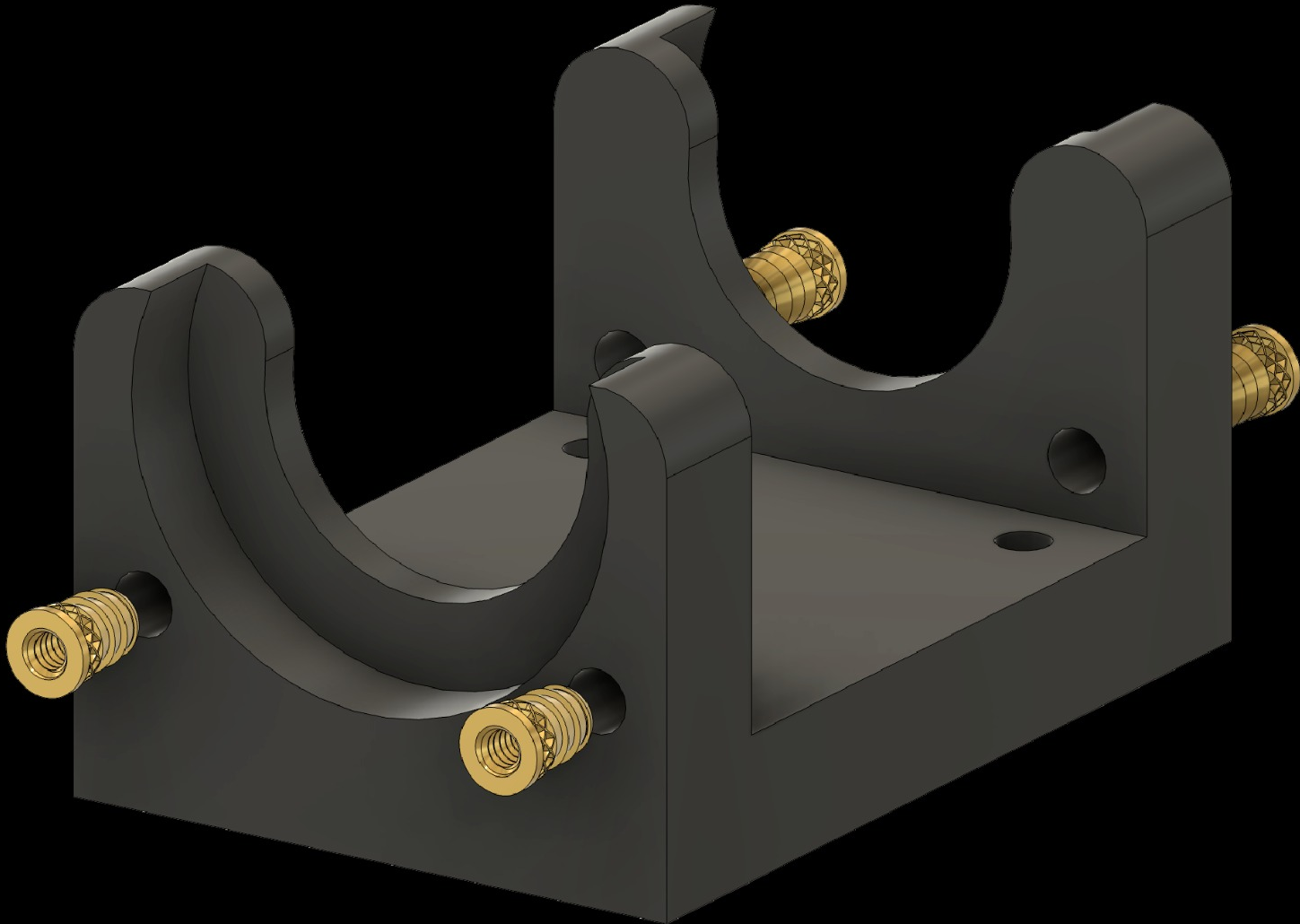
2. Adding Threaded Inserts to the Components

2.2 Add threaded inserts to the Shoulders (2x)



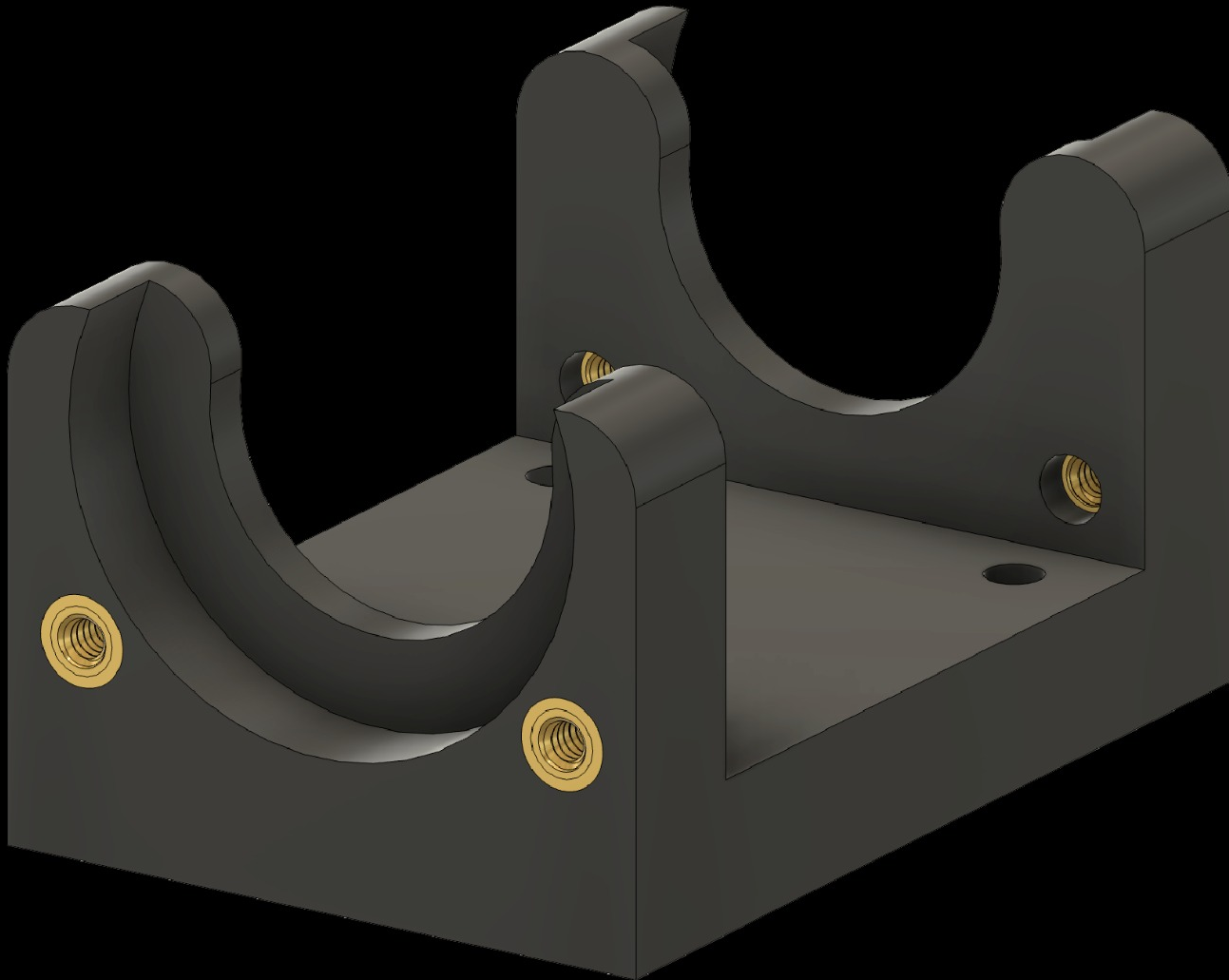
2. Adding Threaded Inserts to the Components

2.2 Add threaded inserts to the Shoulders (2x)



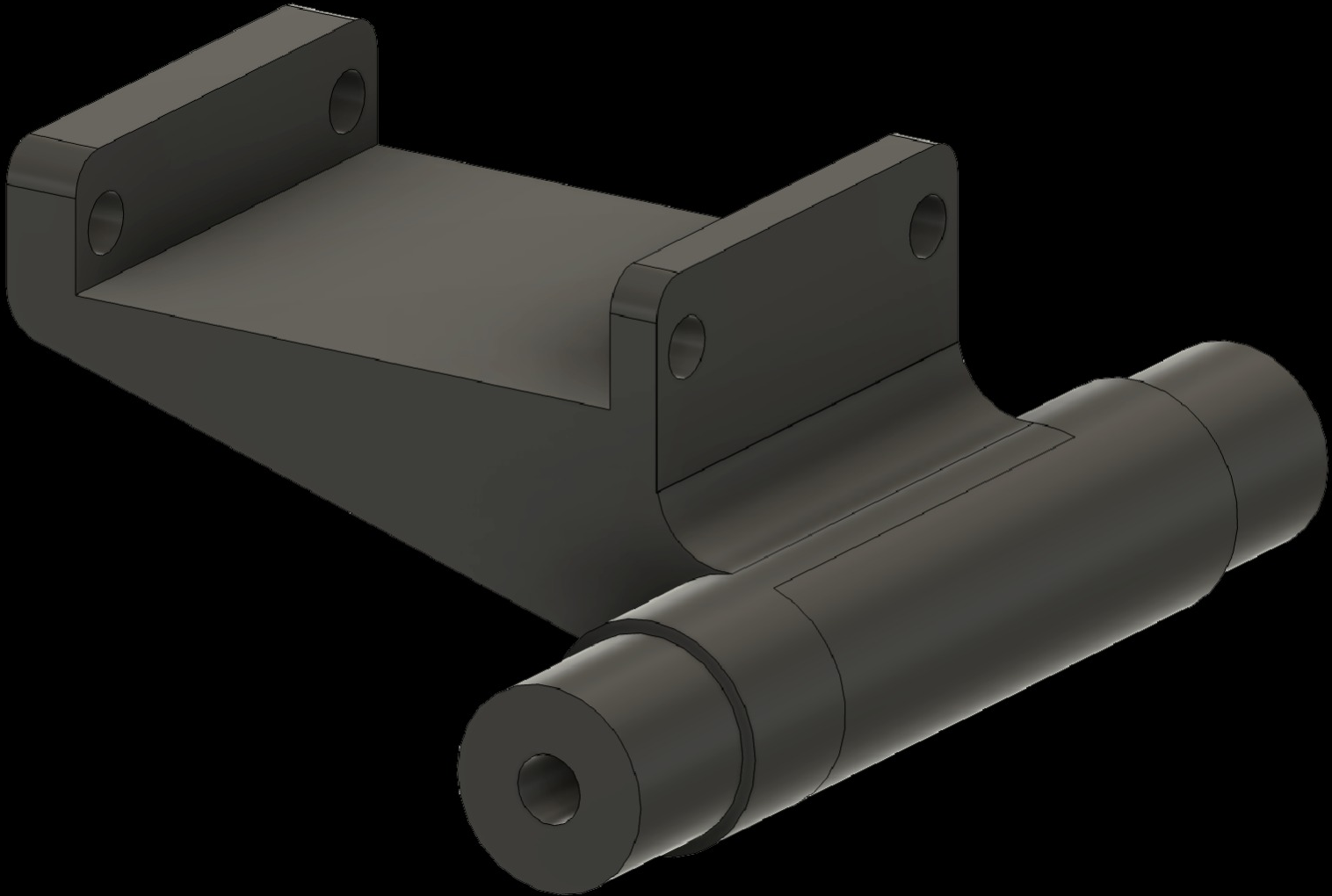
2. Adding Threaded Inserts to the Components

2.2 Add threaded inserts to the Shoulders (2x)



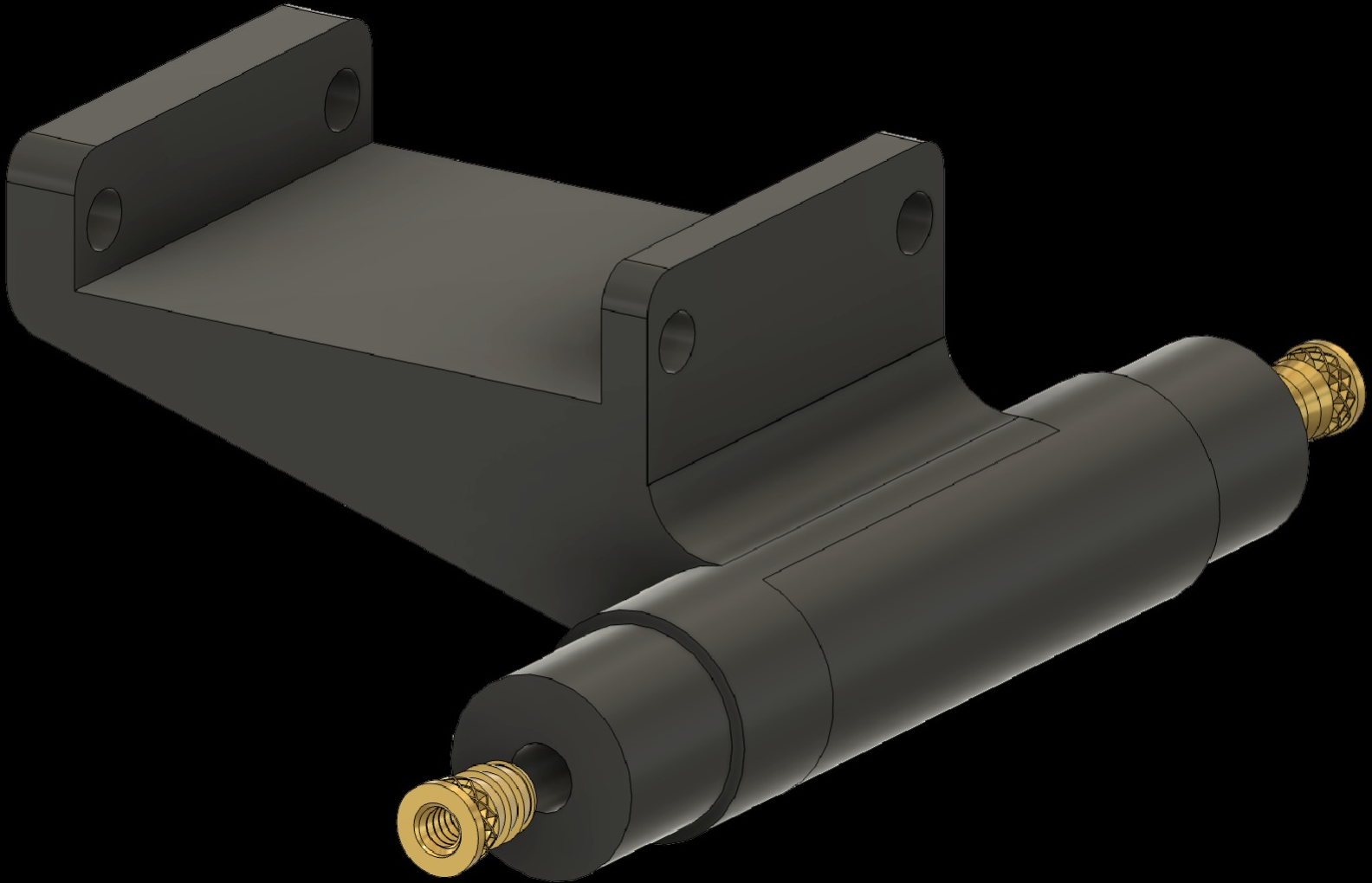
2. Adding Threaded Inserts to the Components

2.3 Add threaded inserts to the Shoulder Joints (2x)



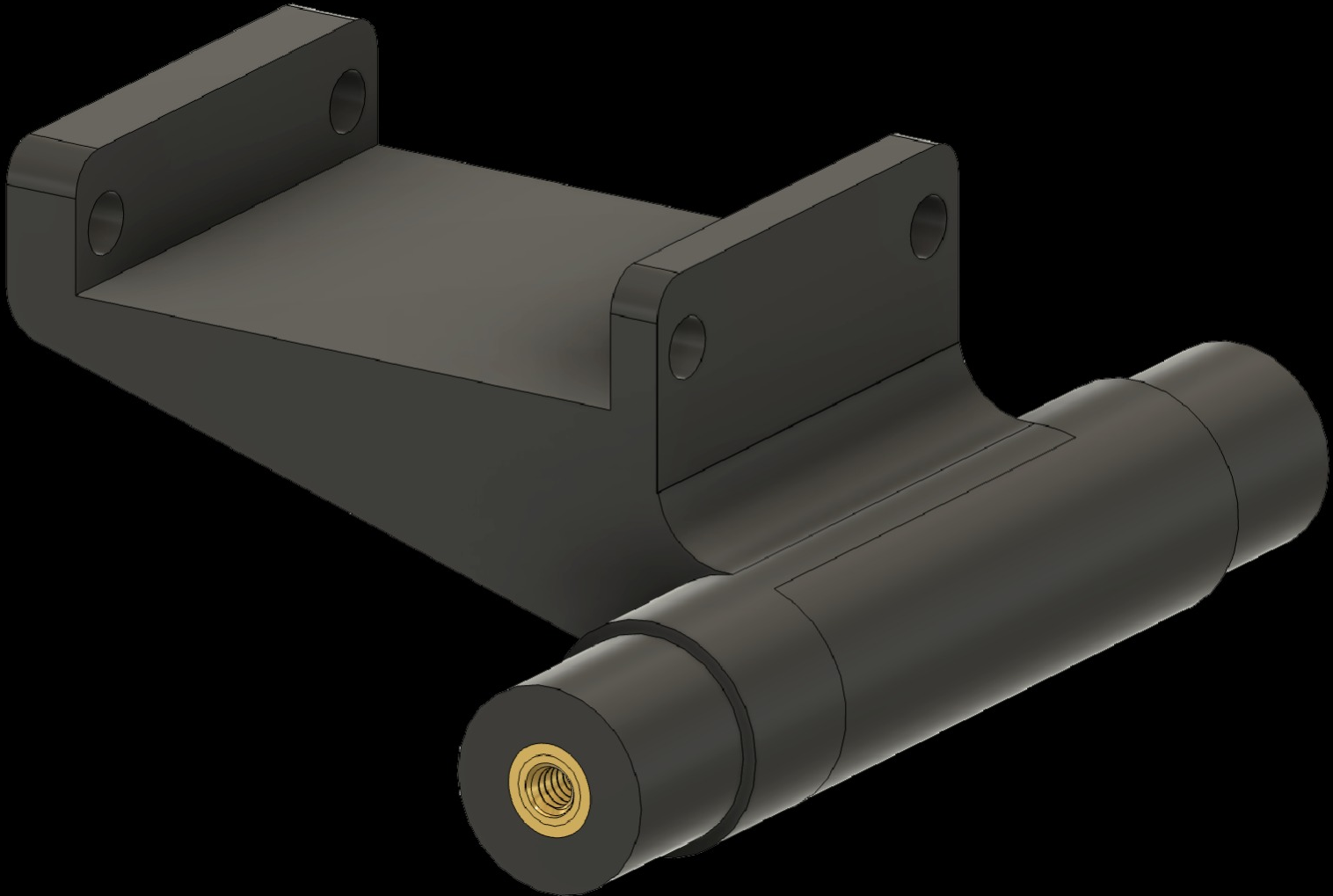
2. Adding Threaded Inserts to the Components

2.3 Add threaded inserts to the Shoulder Joints (2x)



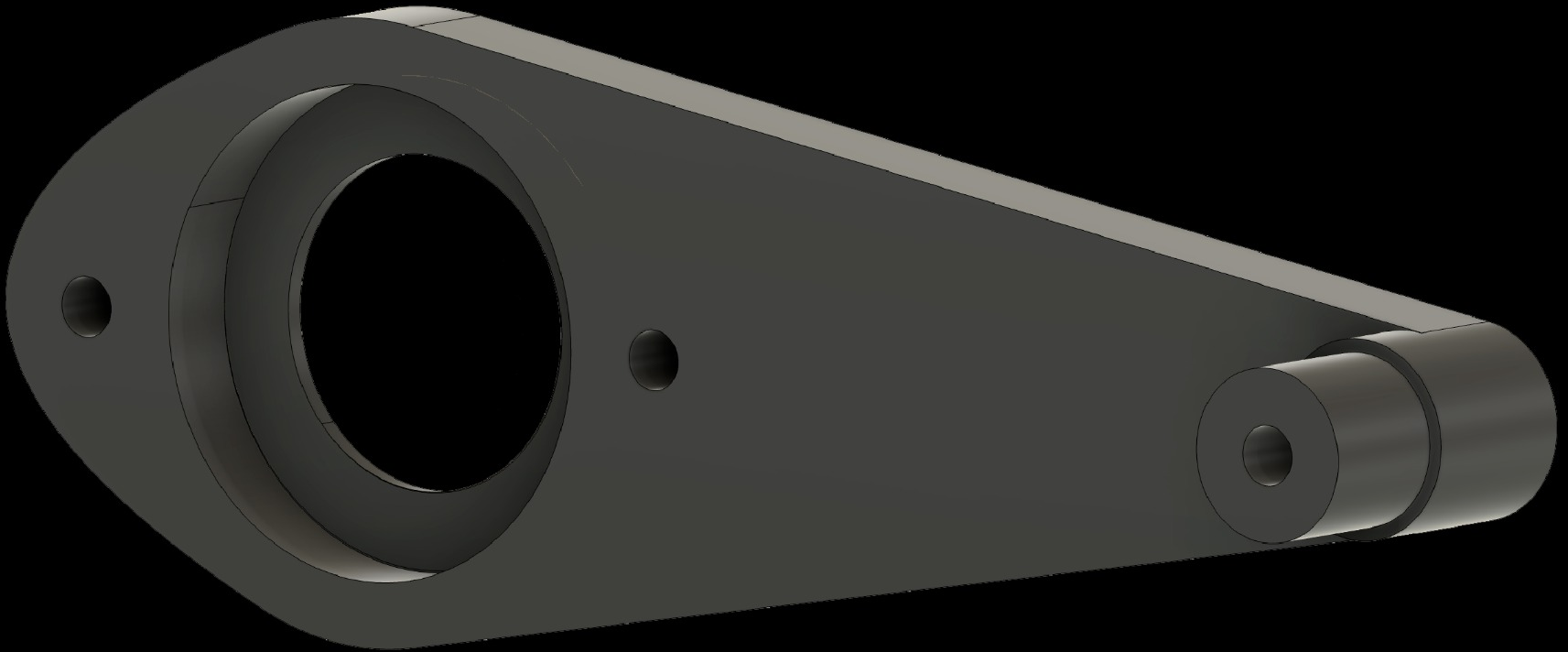
2. Adding Threaded Inserts to the Components

2.3 Add threaded inserts to the Shoulder Joints (2x)



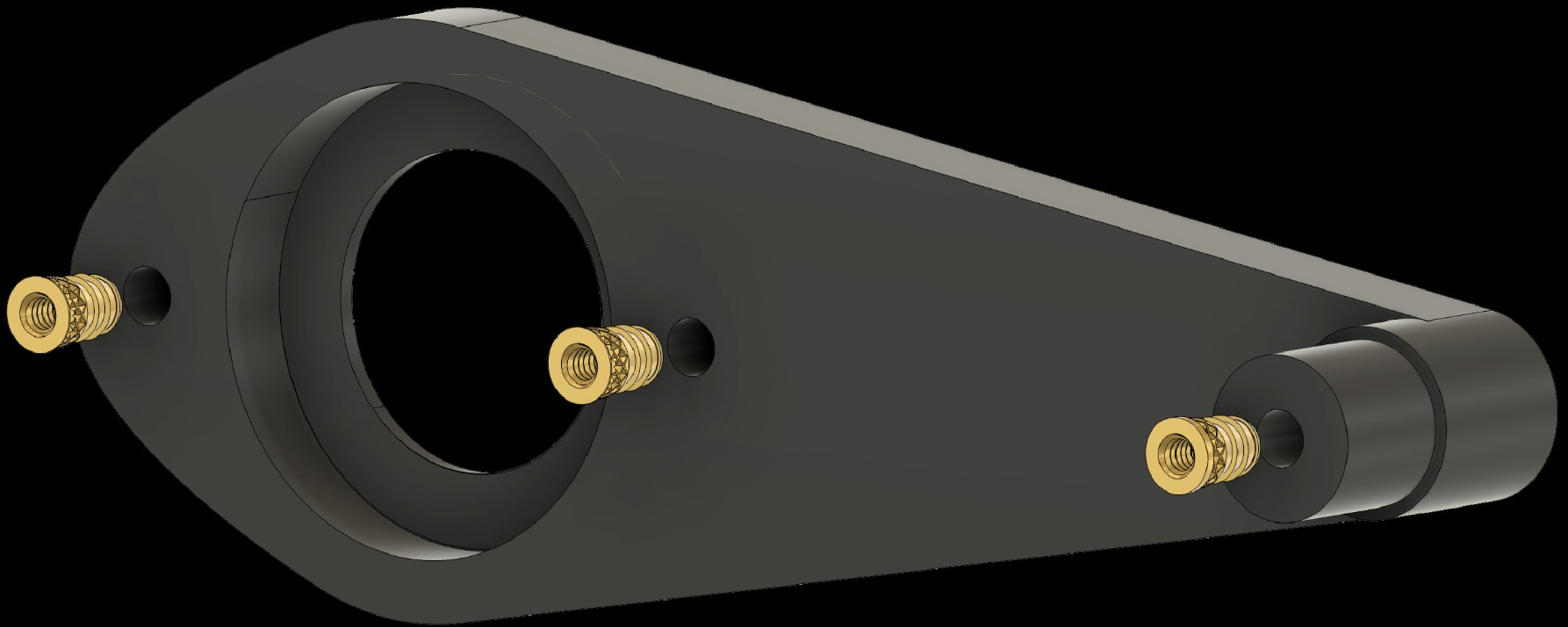
2. Adding Threaded Inserts to the Components

2.4 Add threaded inserts to the Elbow-to-Finger components (2x)



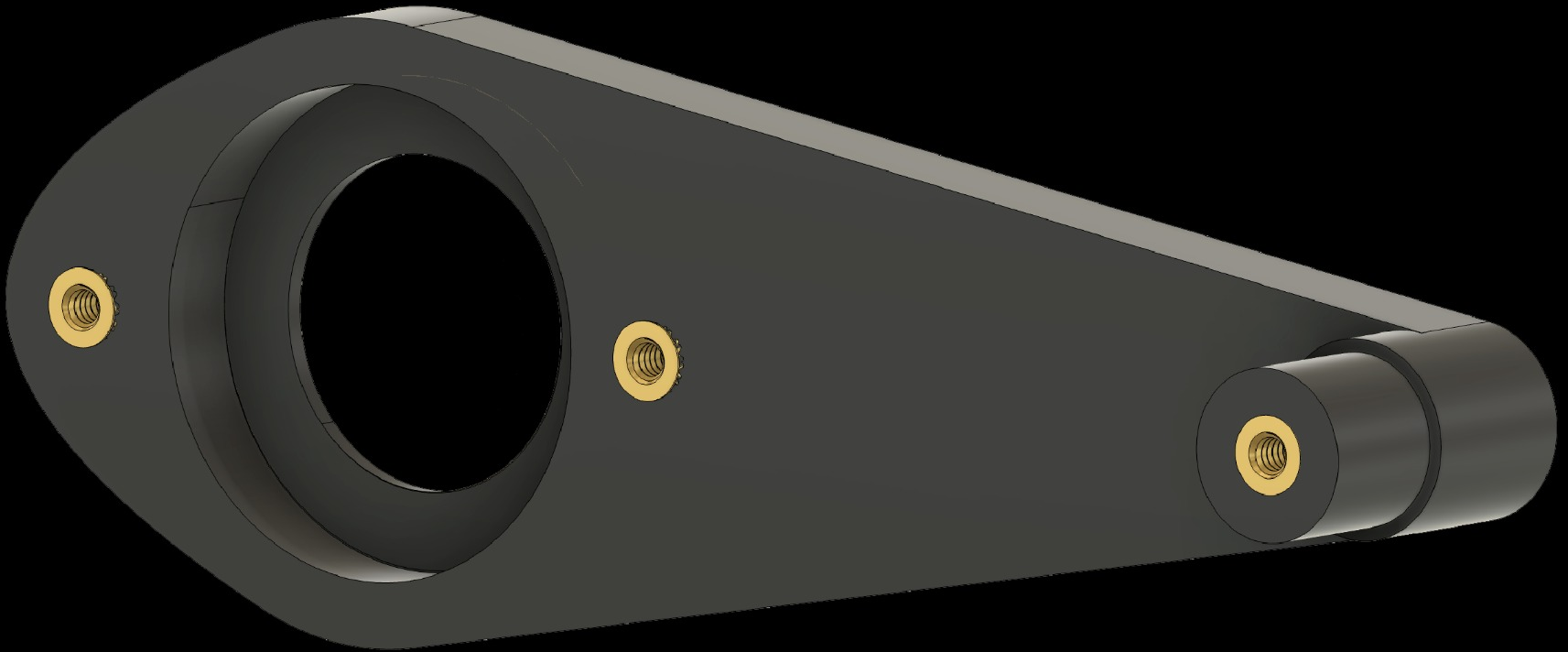
2. Adding Threaded Inserts to the Components

2.4 Add threaded inserts to the Elbow-to-Finger components (2x)



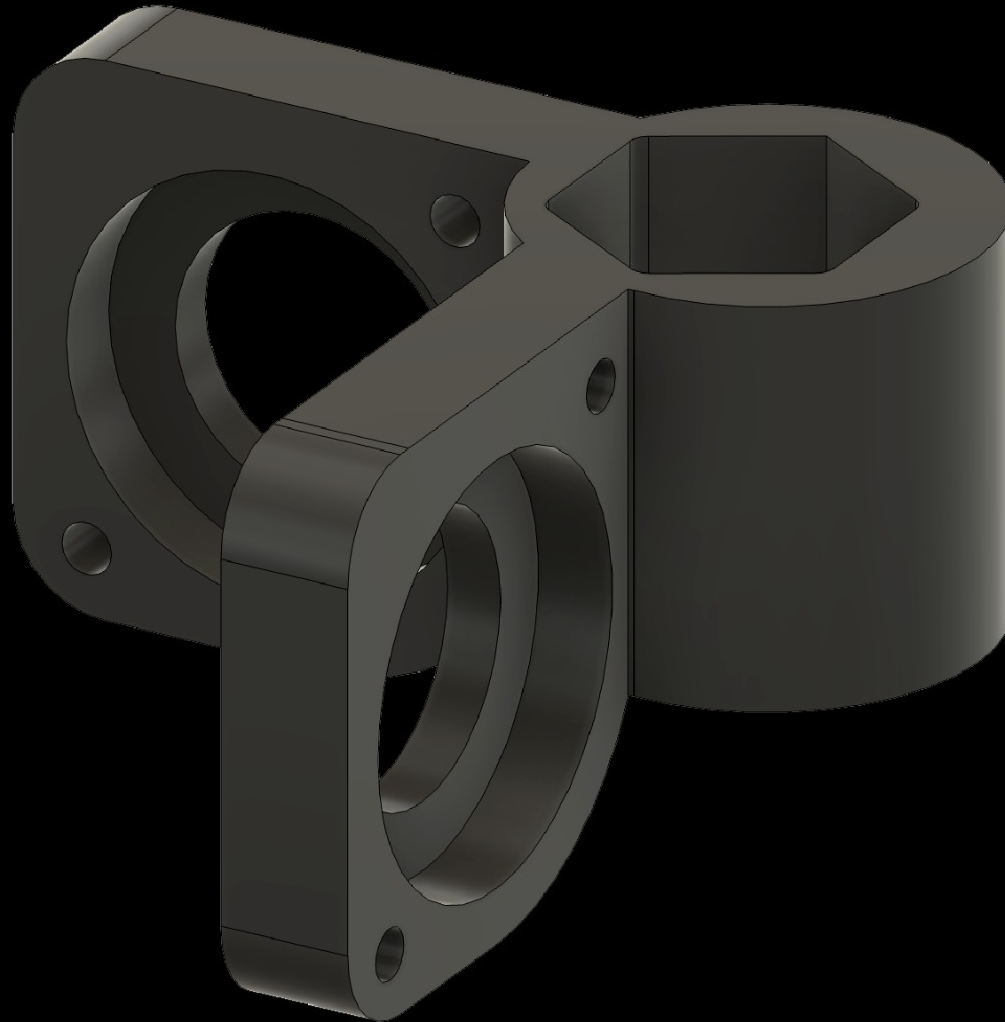
2. Adding Threaded Inserts to the Components

2.4 Add threaded inserts to the Elbow-to-Finger components (2x)



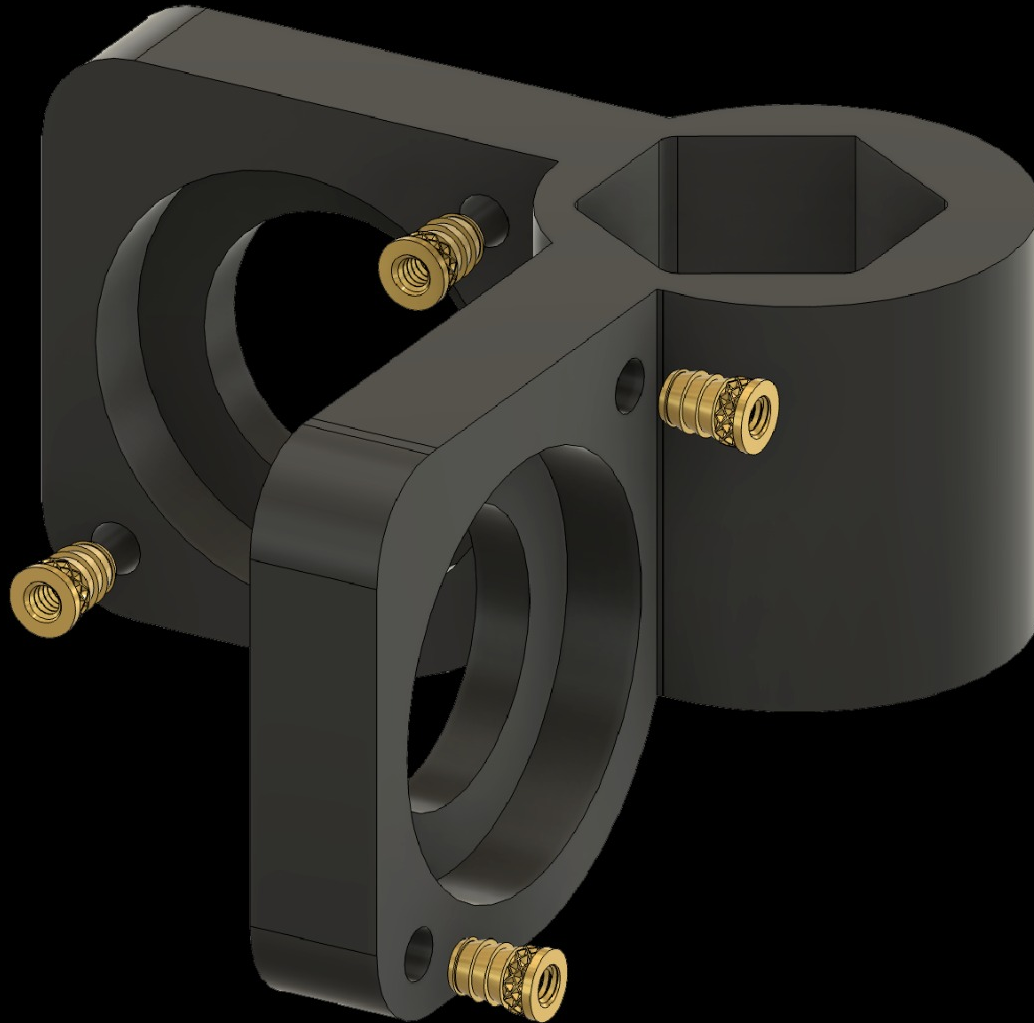
2. Adding Threaded Inserts to the Components

2.5 Add threaded inserts to the Joystick Attachment



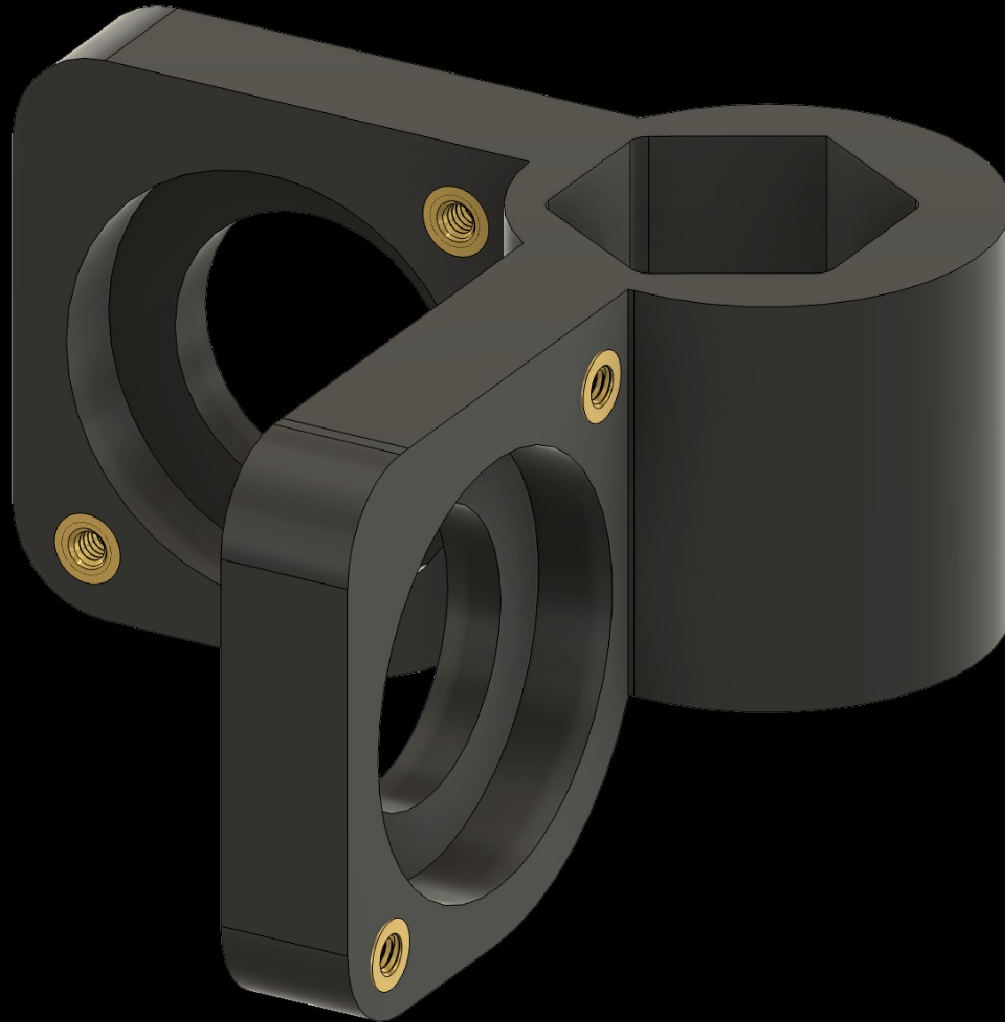
2. Adding Threaded Inserts to the Components

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2. Adding Threaded Inserts to the Components

2.6 Add threaded inserts to the Motor Attachments (2x)



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2. Adding Threaded Inserts to the Components

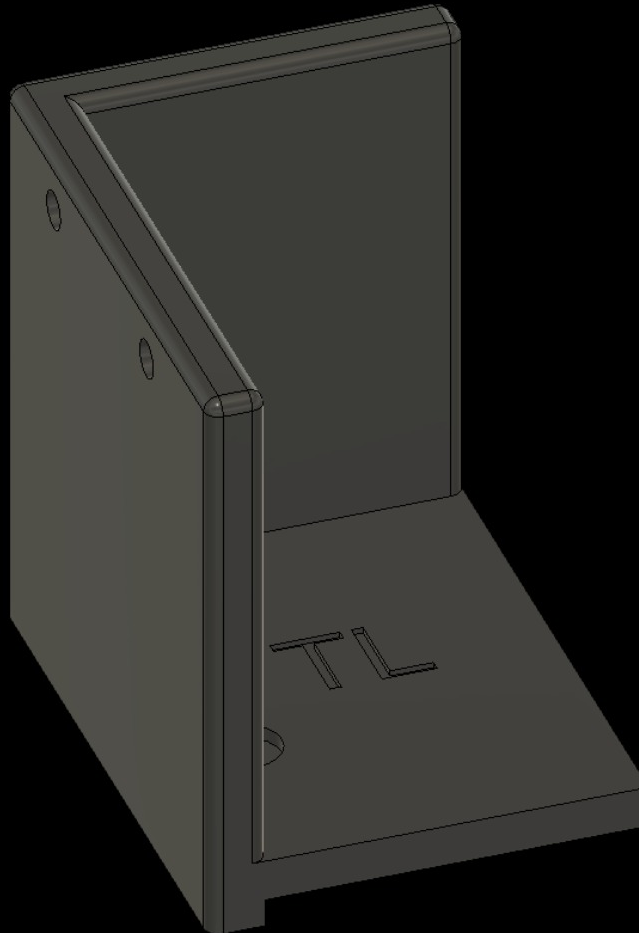
2.6 Add threaded inserts to the Motor Attachments (2x)



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

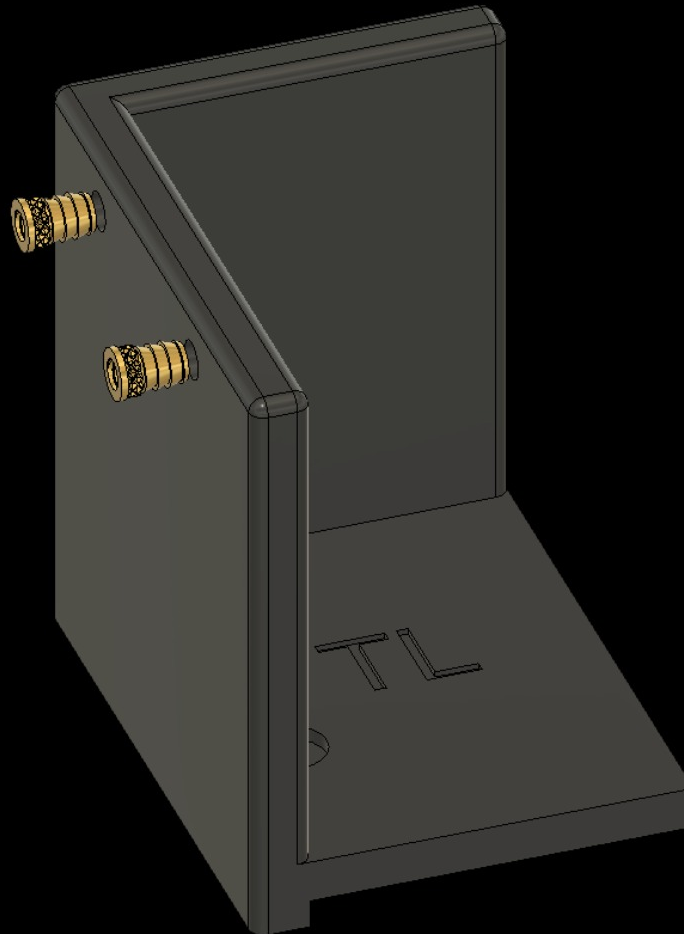
2.7a Top Left Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

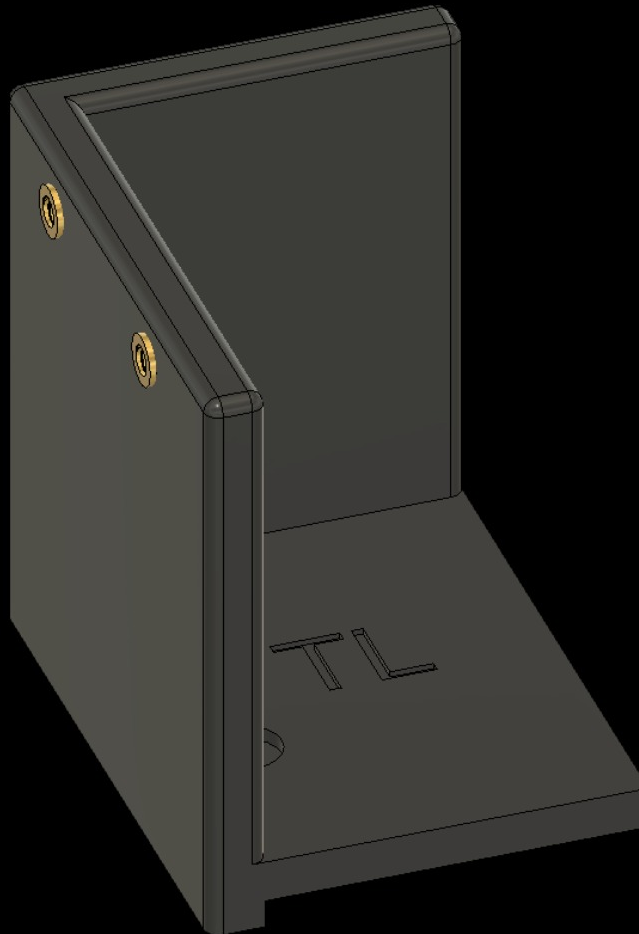
2.7a Top Left Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

2.7a Top Left Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

2.7b Top Right Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

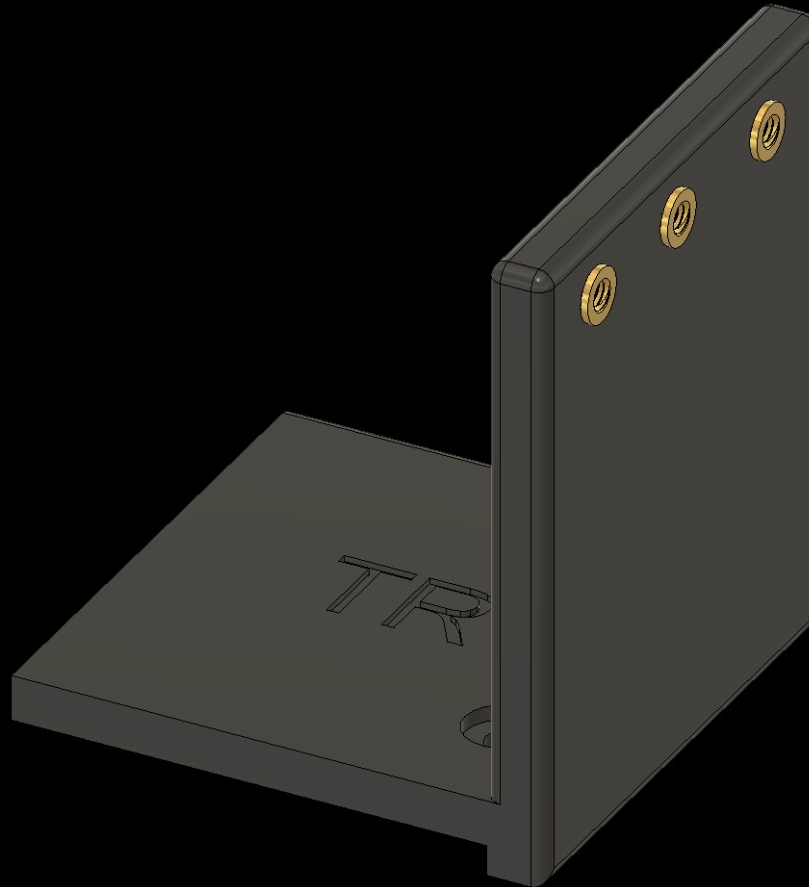
2.7b Top Right Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

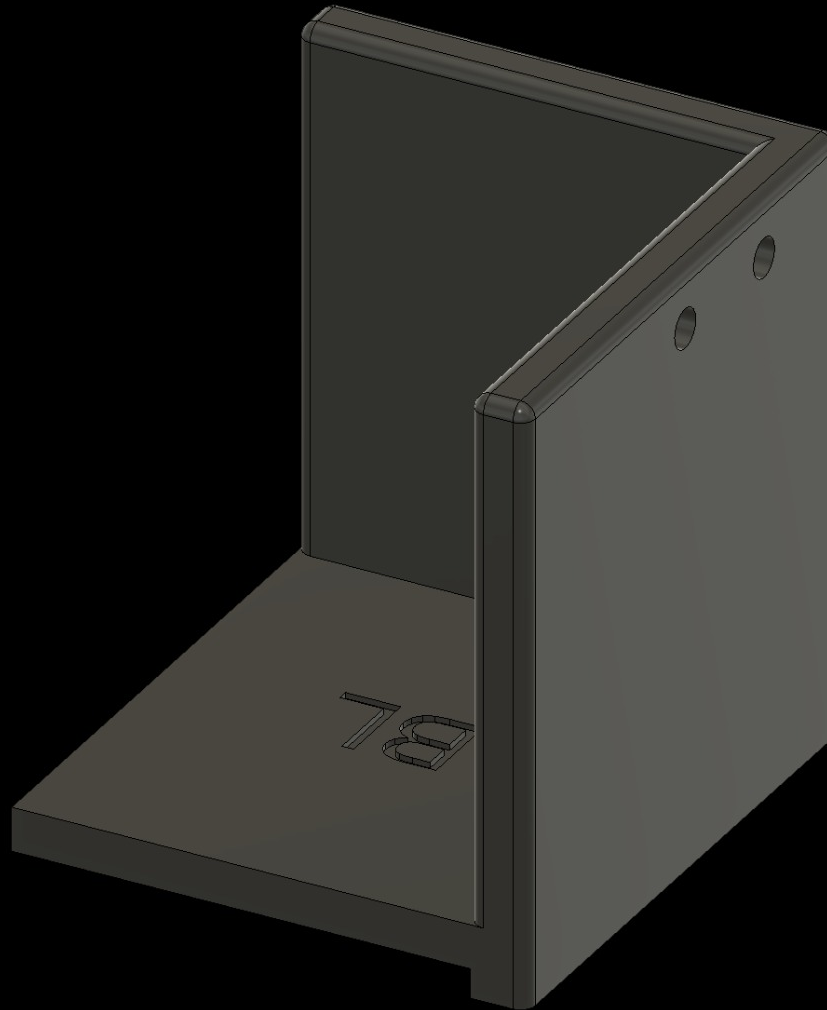
2.7b Top Right Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

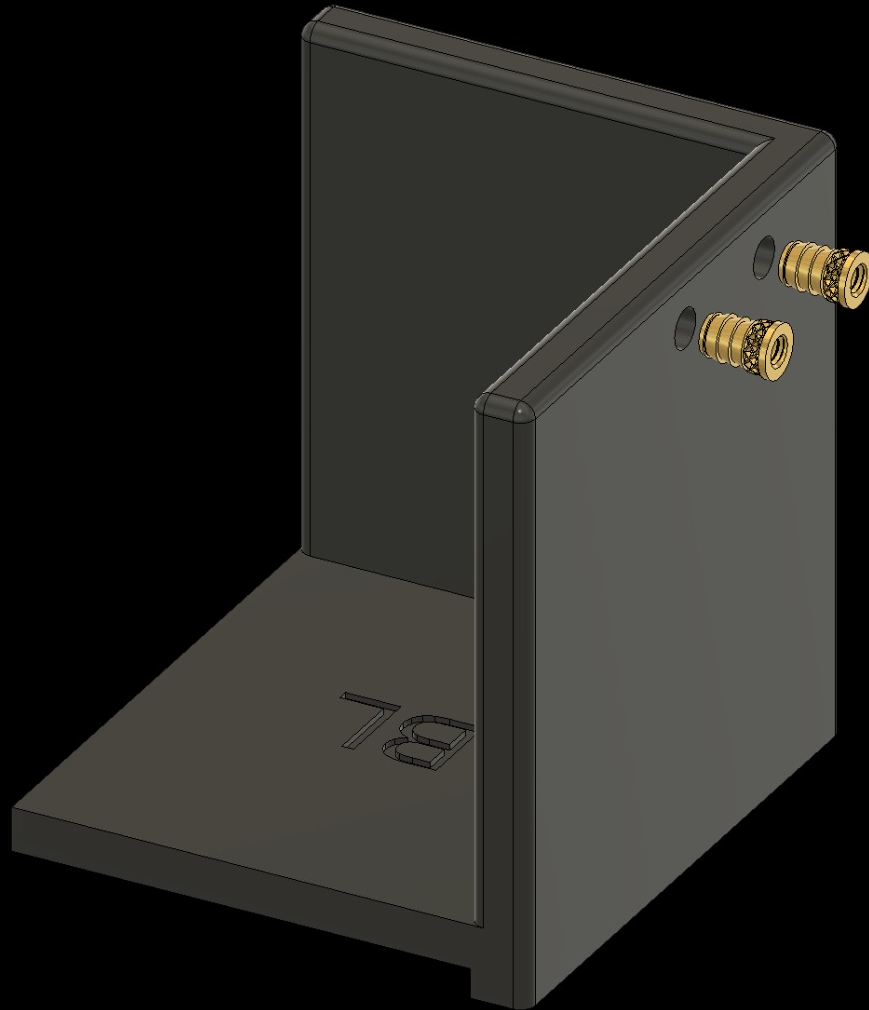
2.7c Bottom Left Corner



2. Adding Threaded Inserts to the Components

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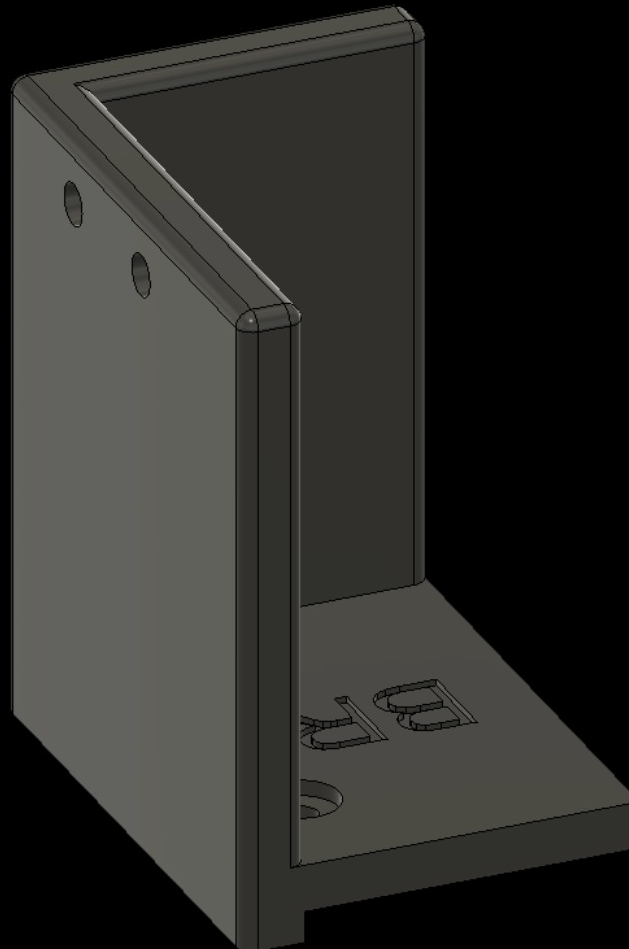
2.7c Bottom Left Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

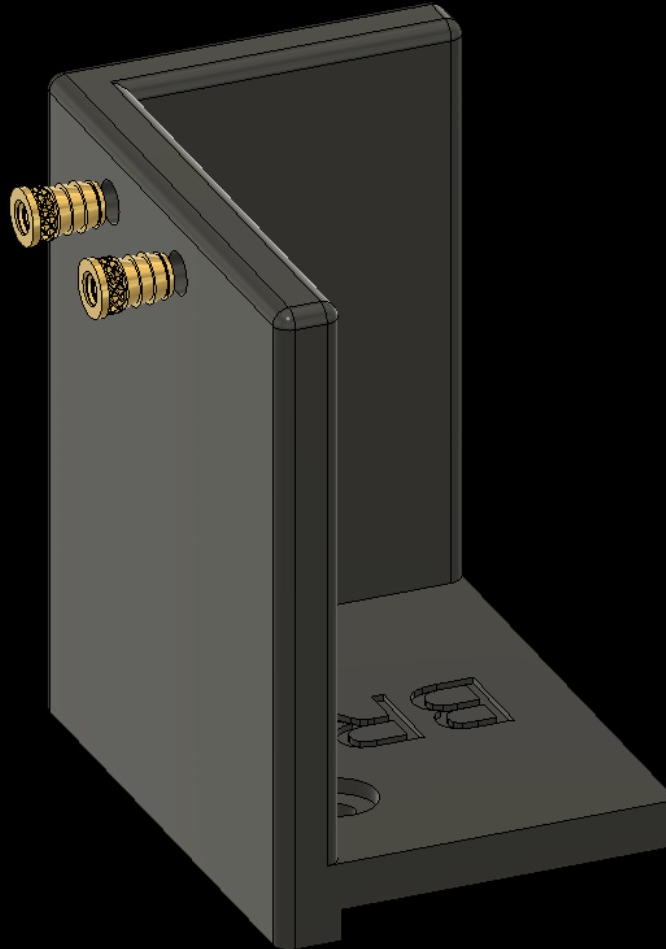
2.7d Bottom Right Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

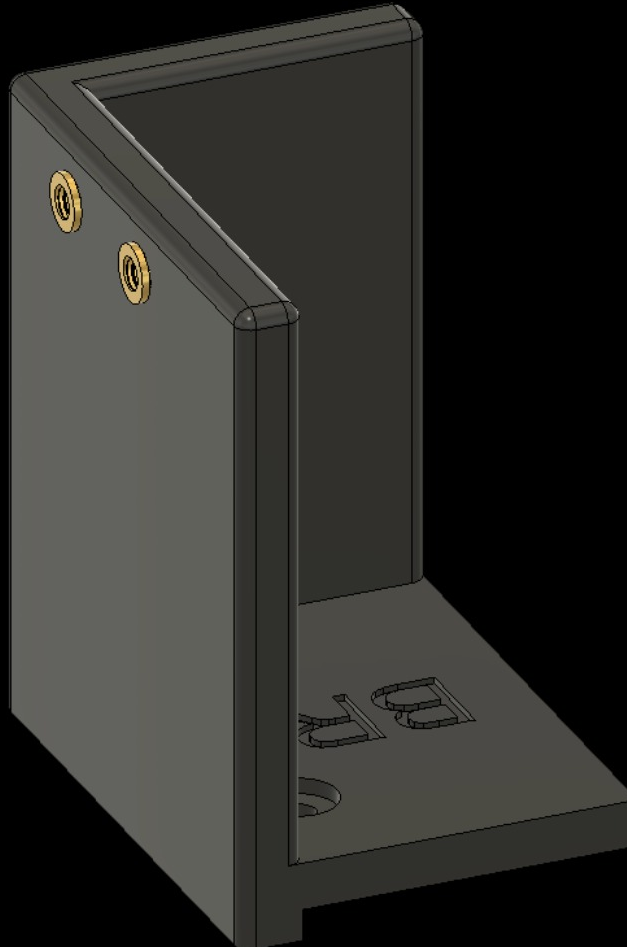
2.7d Bottom Right Corner



2. Adding Threaded Inserts to the Components

2.7 Add threaded inserts to the Corner Pieces (4x)

2.7d Bottom Right Corner



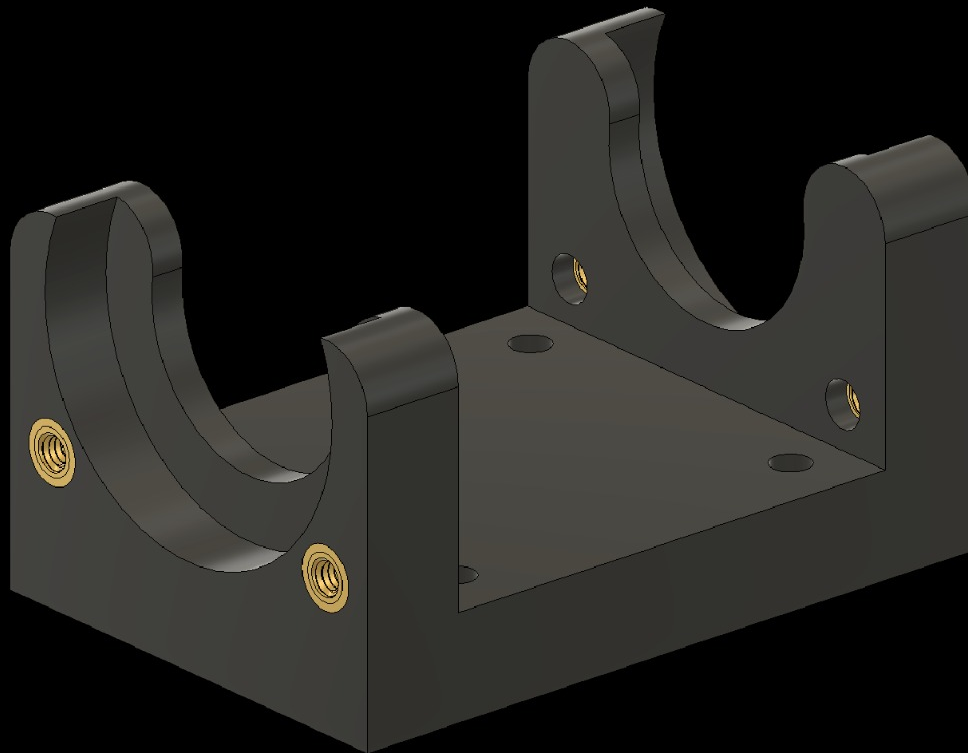
3. Assembling Individual Components

Next, assemble the individual components. The following slides show each step. Apply a thread-locking compound to all screws so they do not loosen over time—Loctite 243 Threadlocker works well.

If you are using the replacement metal horn for the Dynamixel servos, attach them to the motors before continuing.

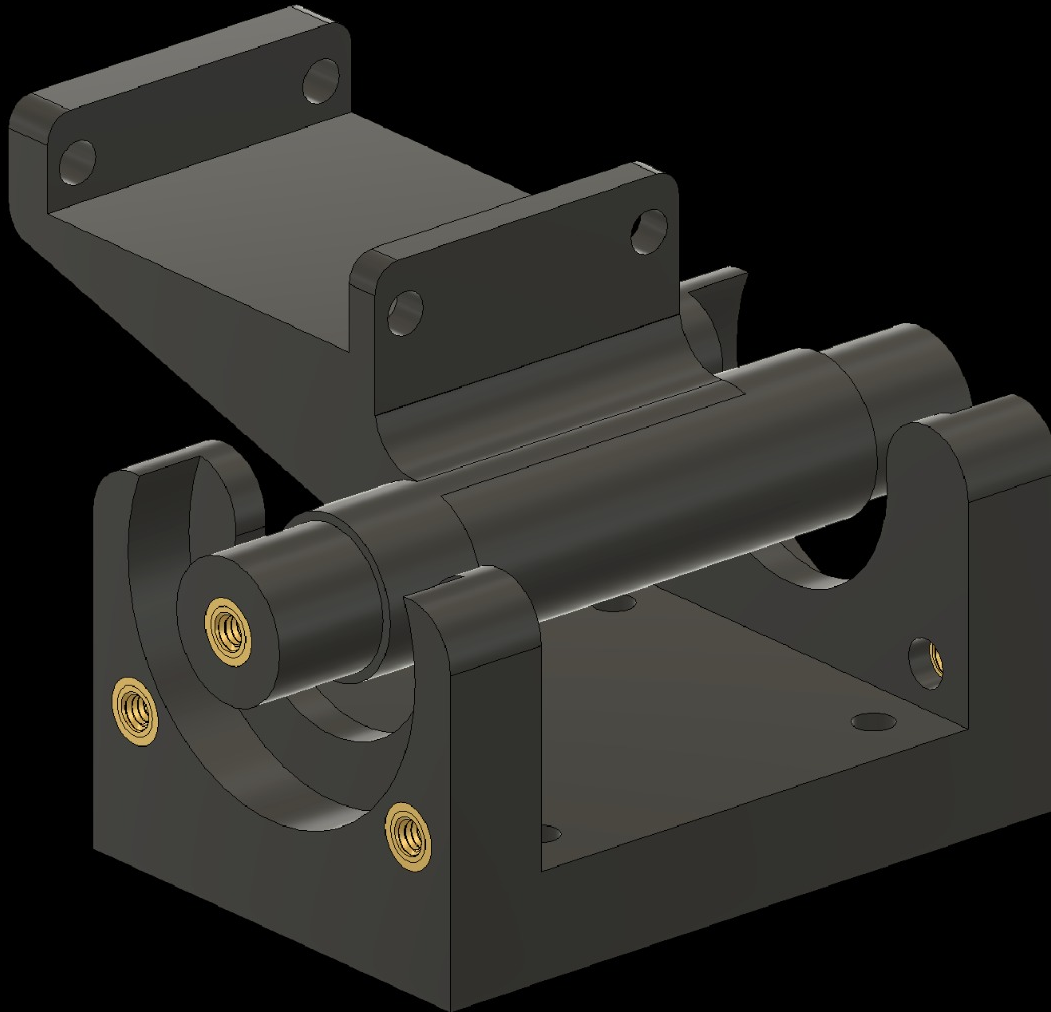
3. Assembling Individual Components

3.1 Add bearings to the Shoulders (2x)



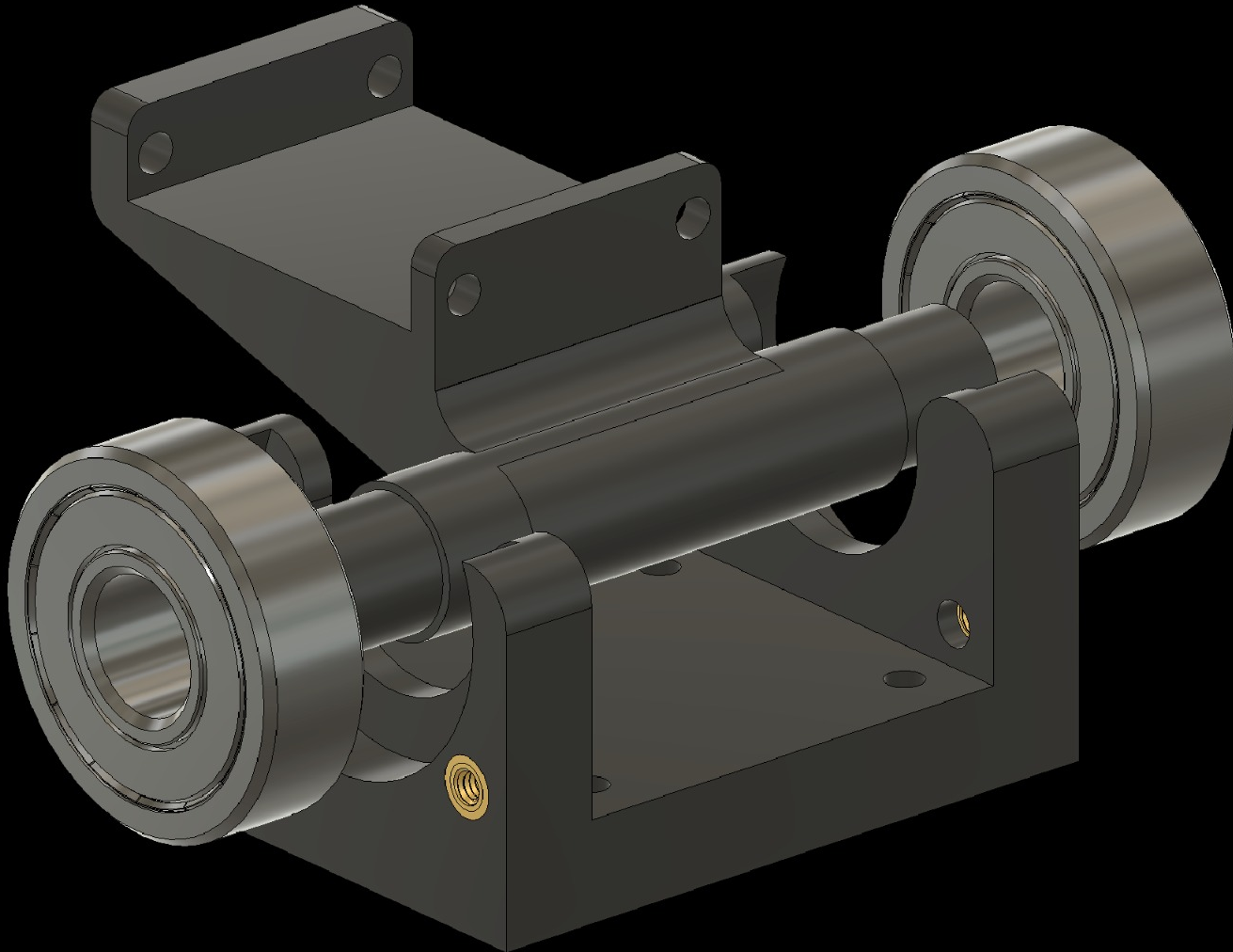
3. Assembling Individual Components

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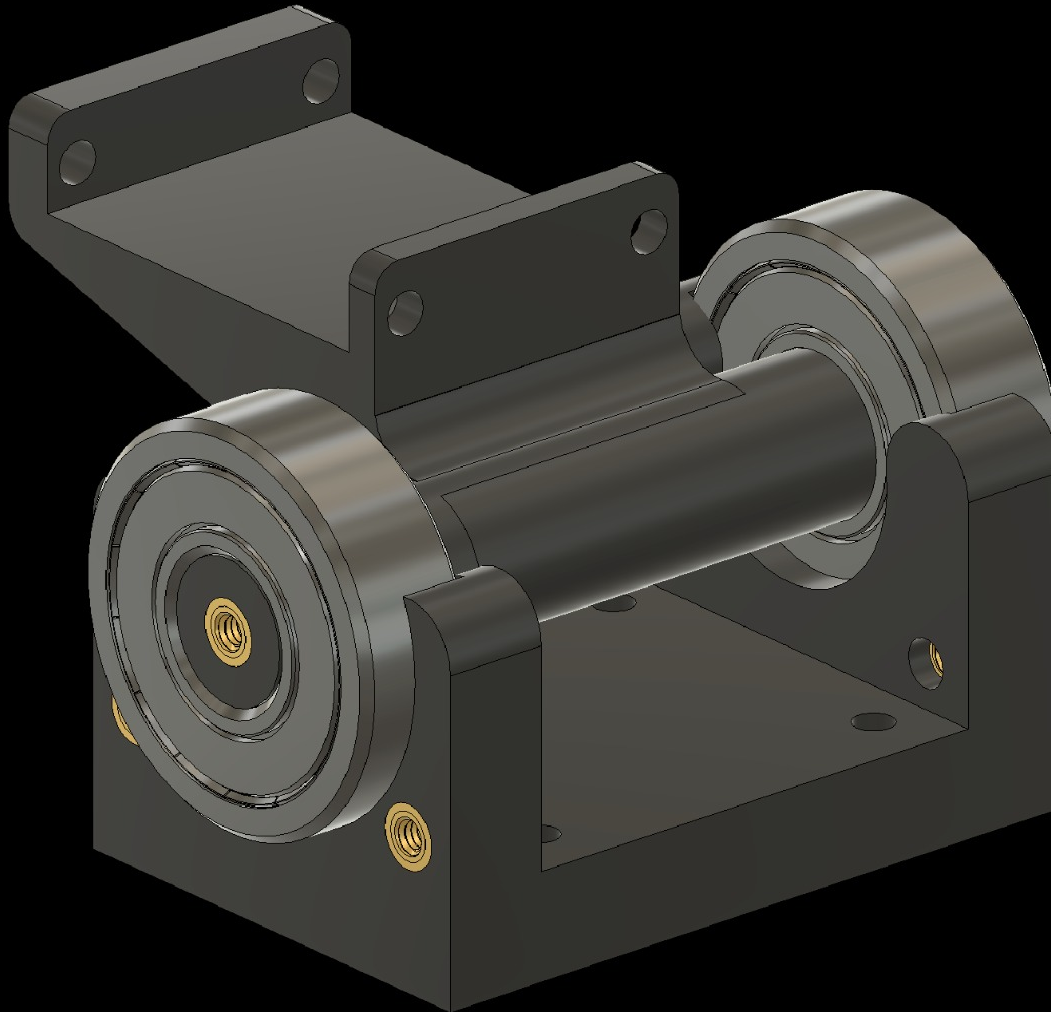
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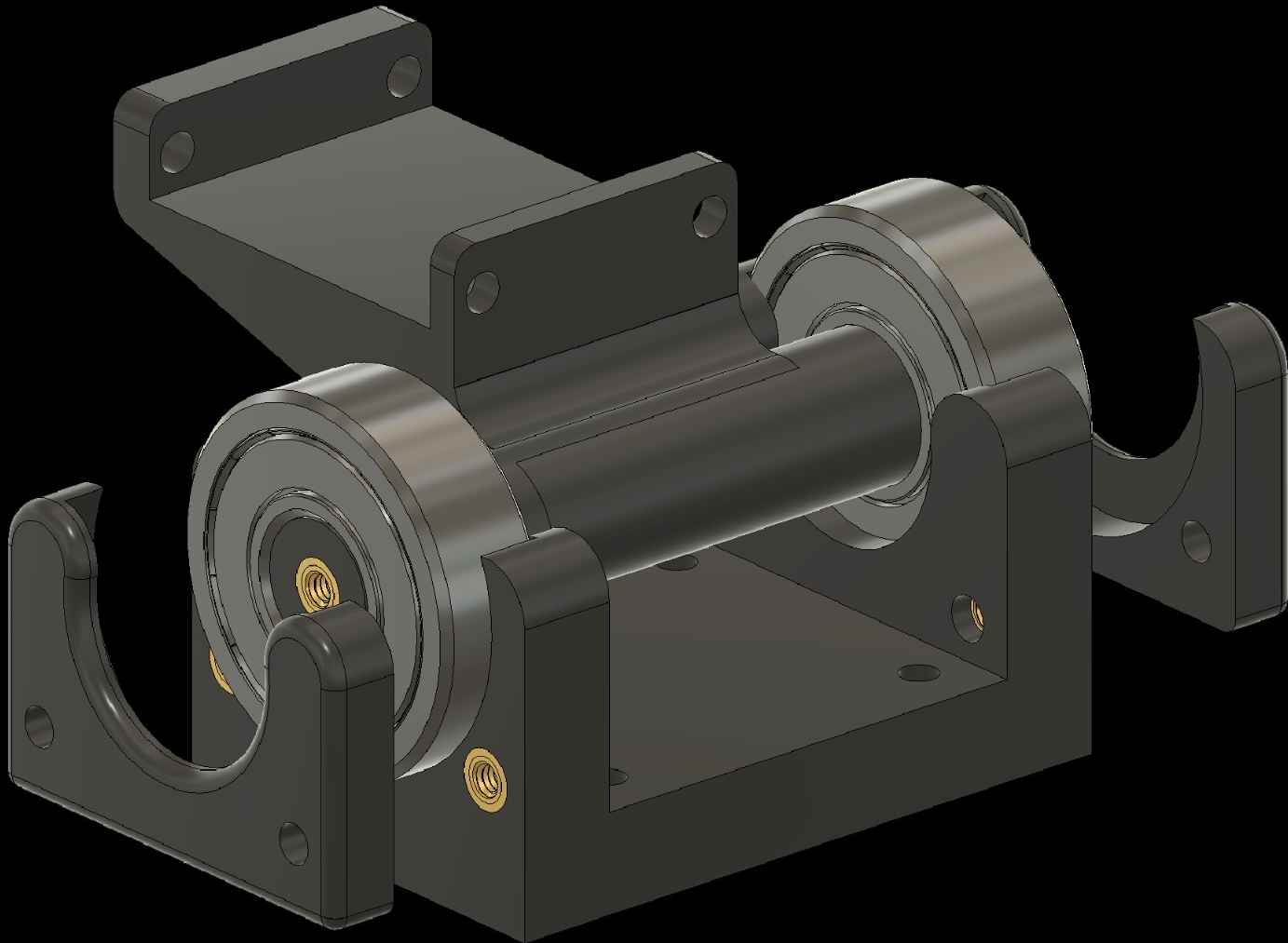
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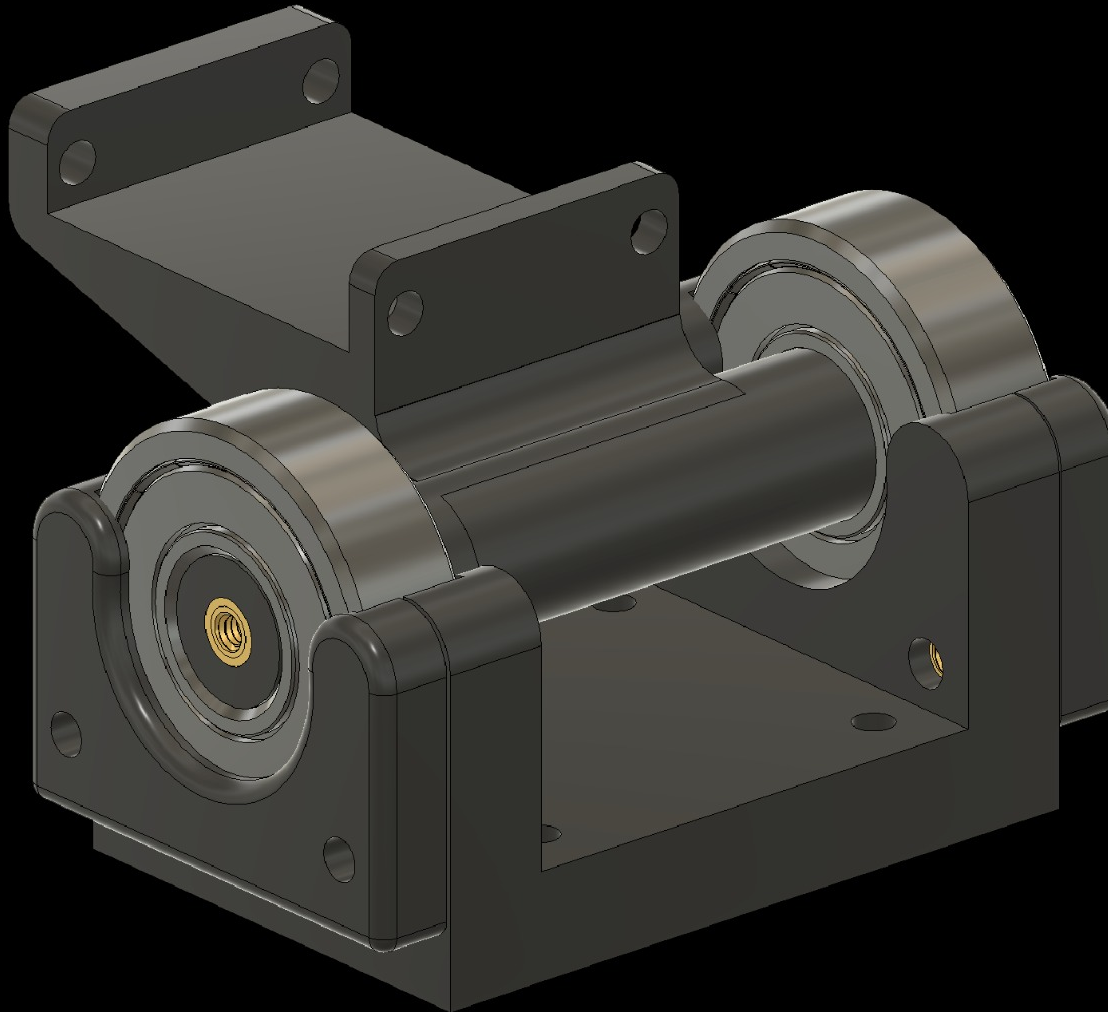
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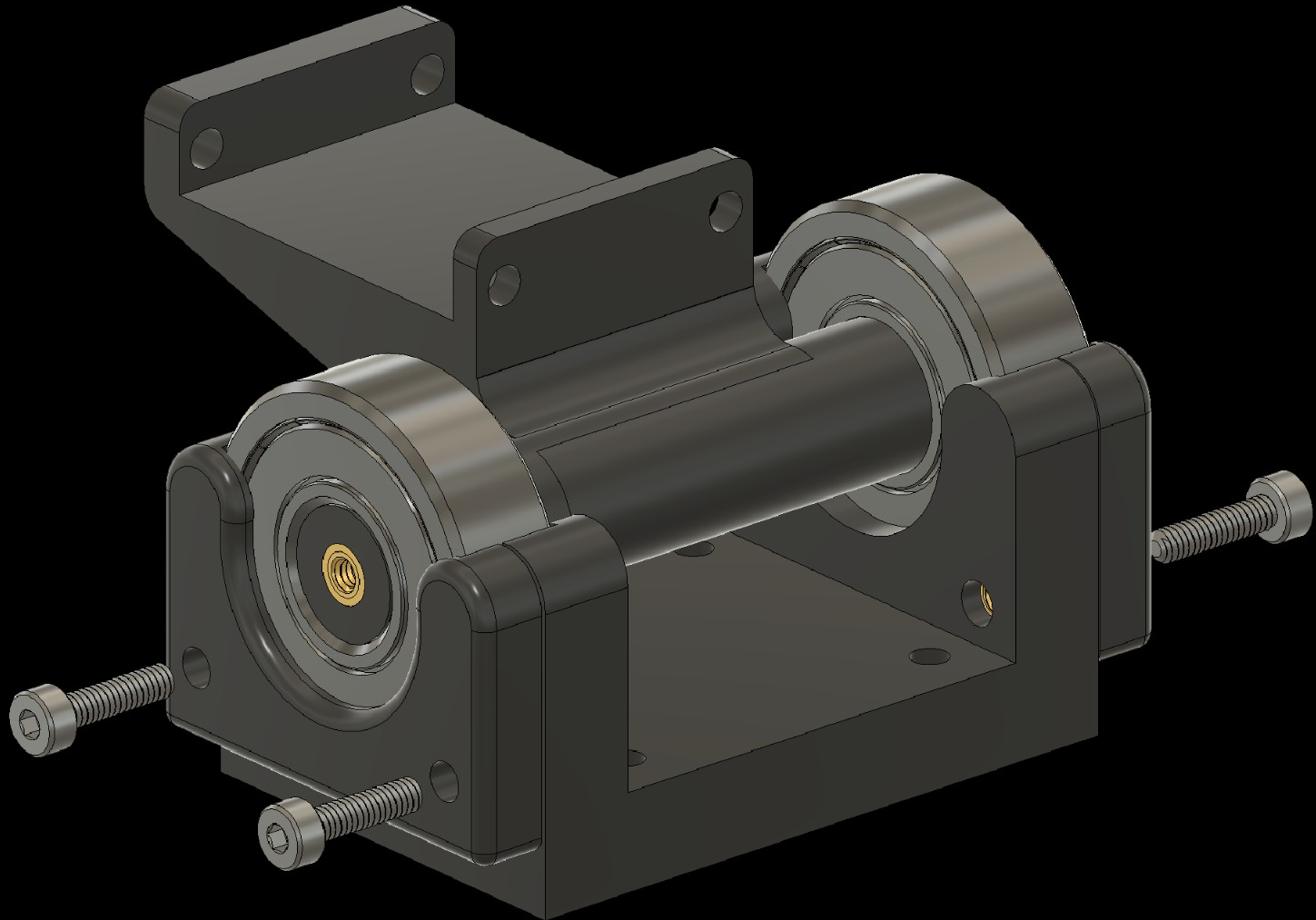
3. Assembling Individual Components

3.1 Add bearings to the Shoulders (2x)



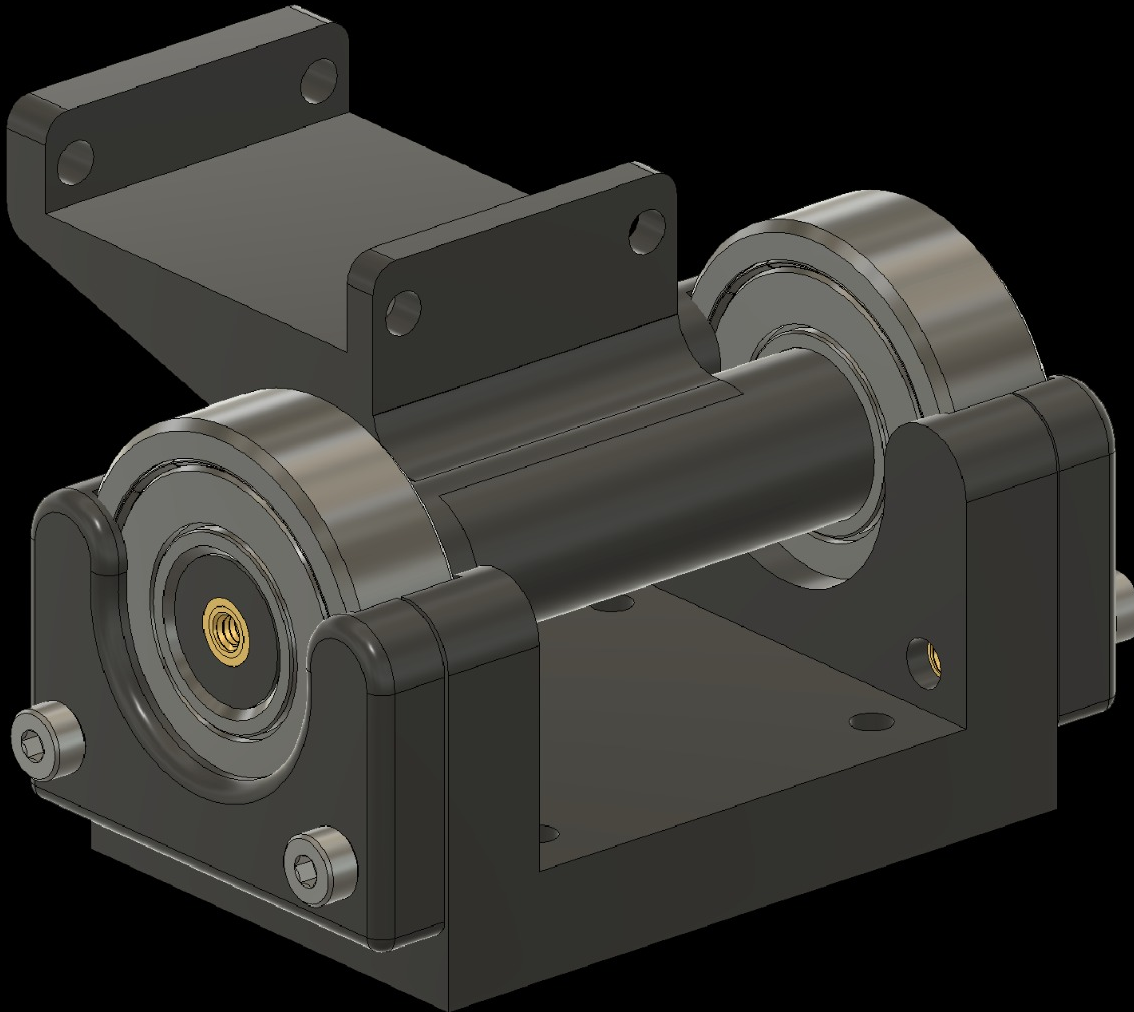
3. Assembling Individual Components

3.1 Add bearings to the Shoulders (2x)



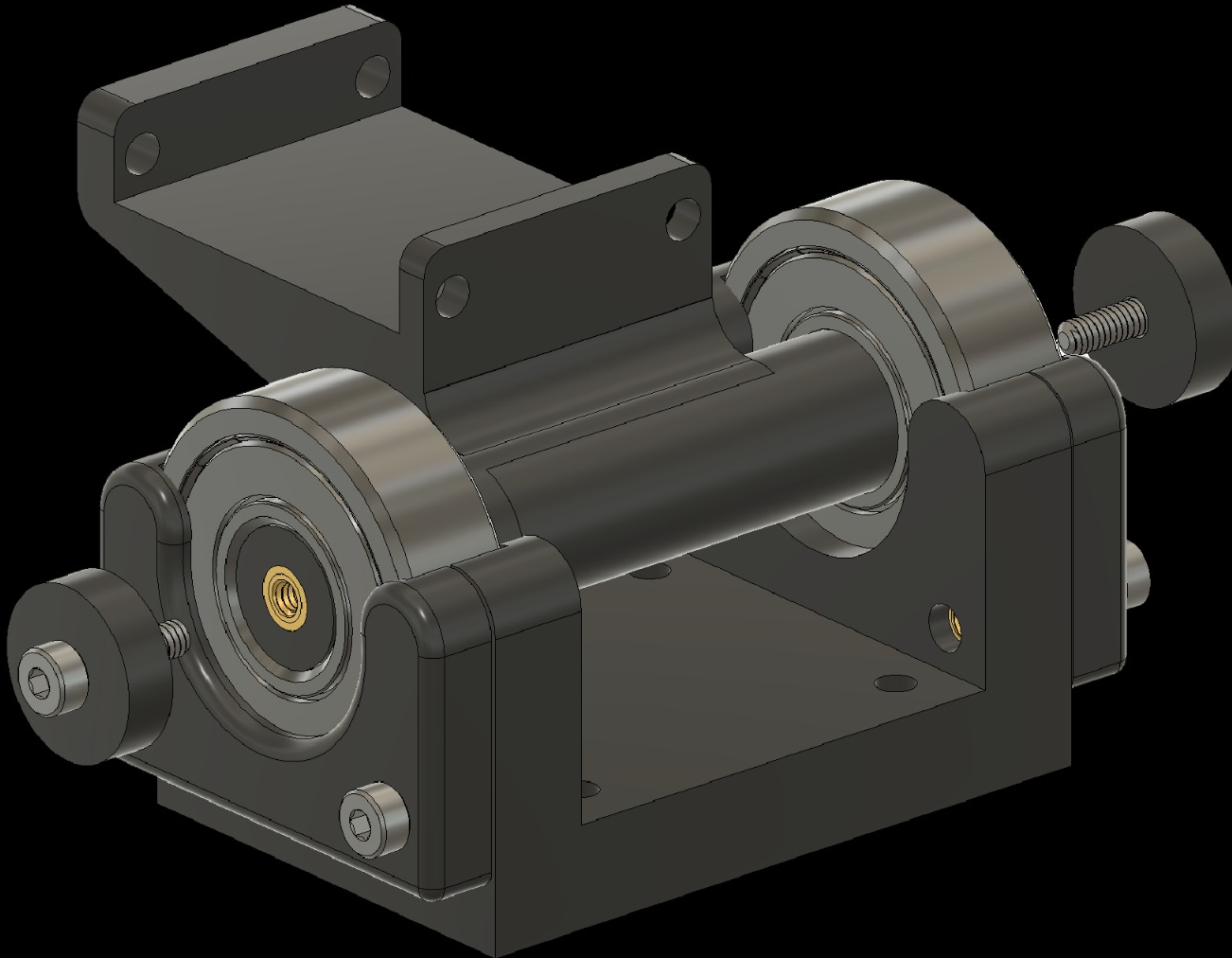
3. Assembling Individual Components

3.1 Add bearings to the Shoulders (2x)



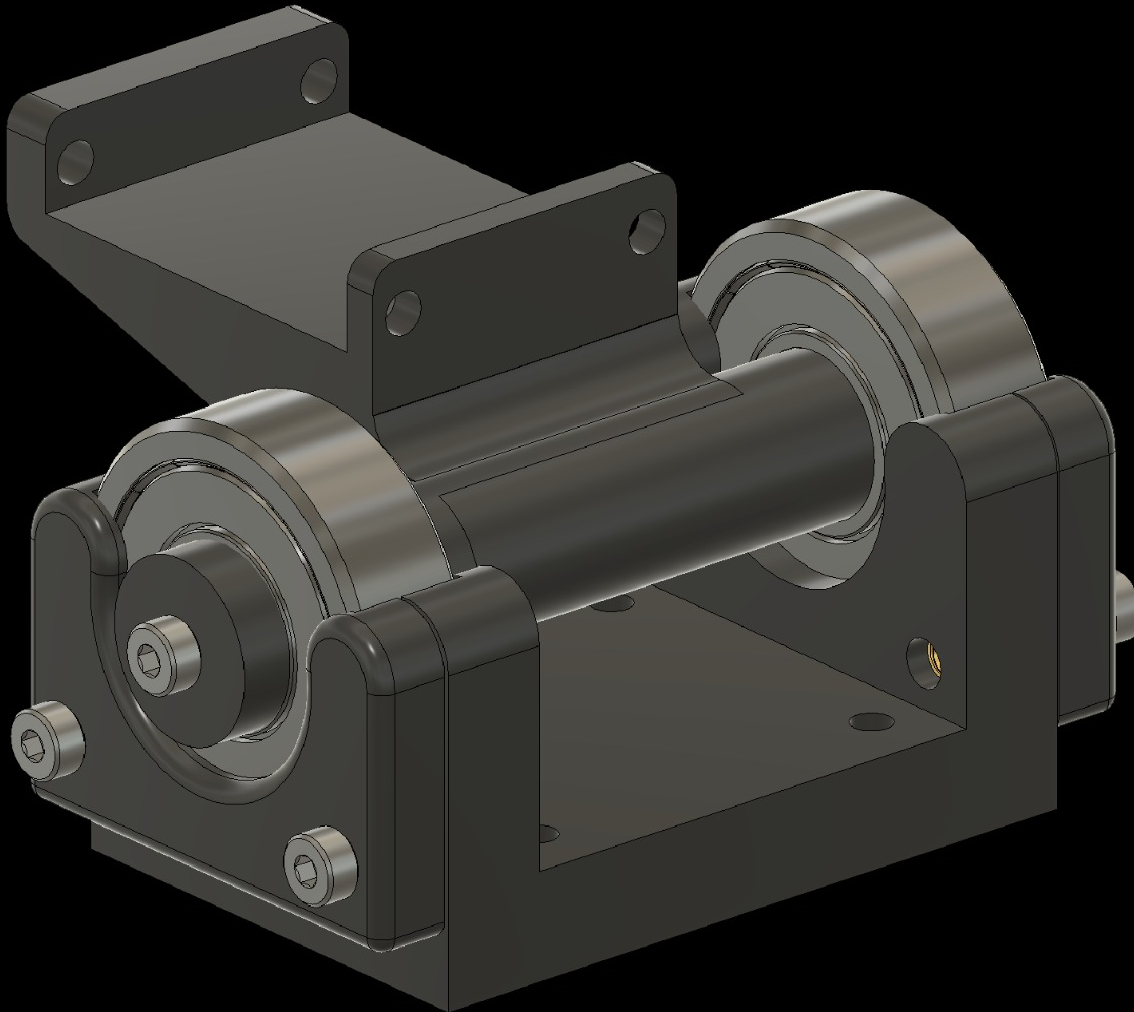
3. Assembling Individual Components

3.1 Add bearings to the Shafts (2x)



3. Assembling Individual Components

3.1 Add bearings to the Shoulders (2x)



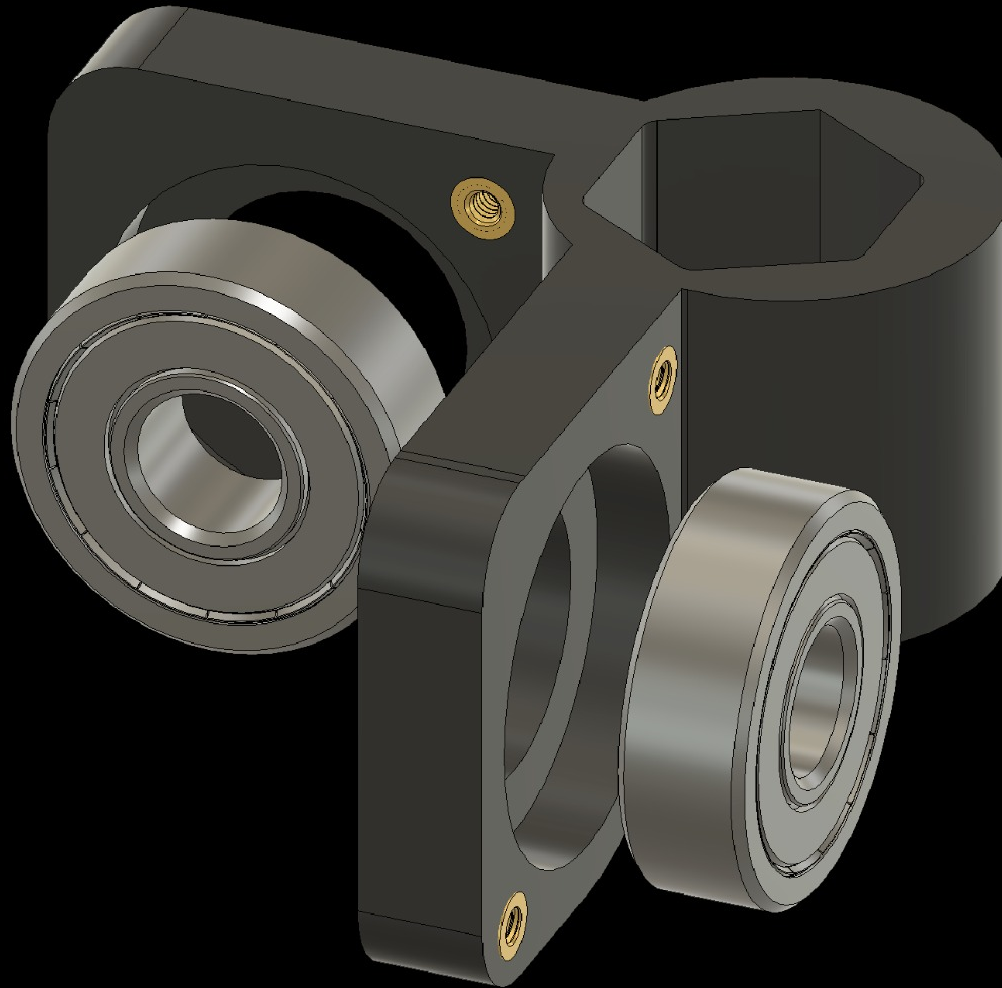
3. Assembling Individual Components

3.2 Add bearings to the Joystick Attachment



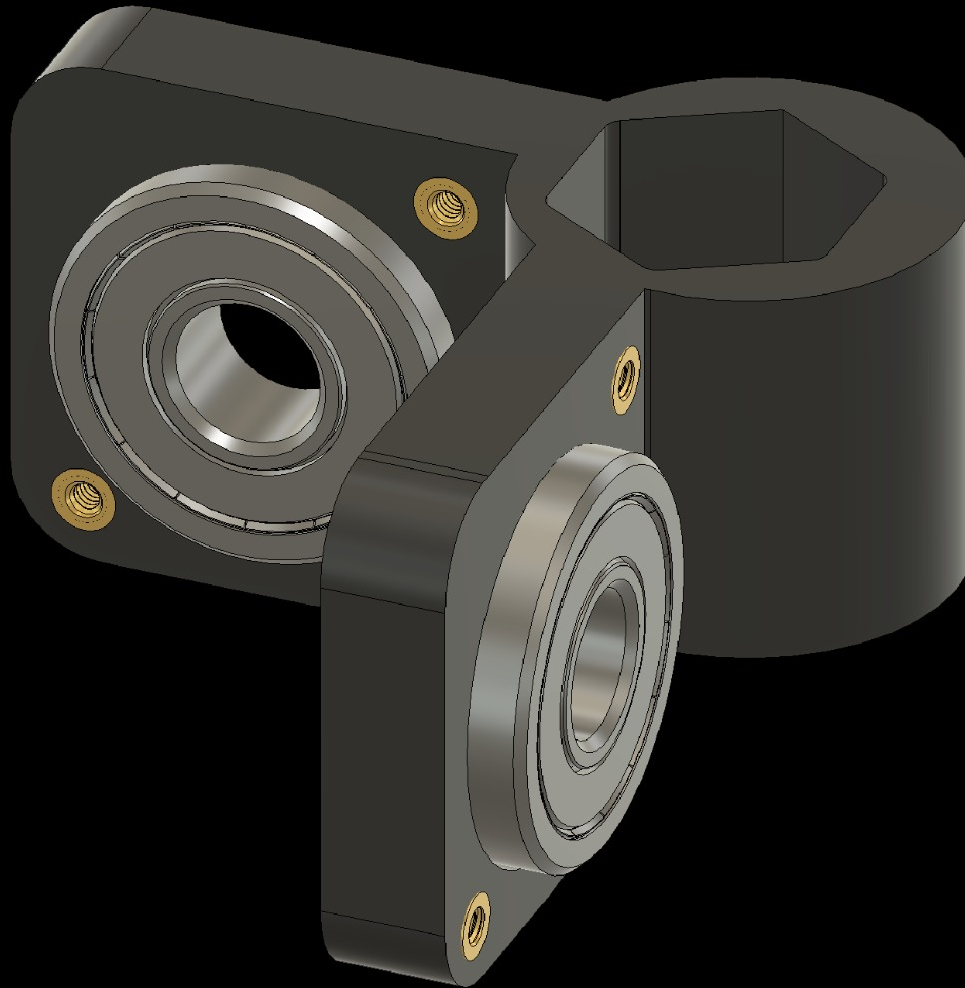
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3.2 Add bearings to the Joystick Attachment



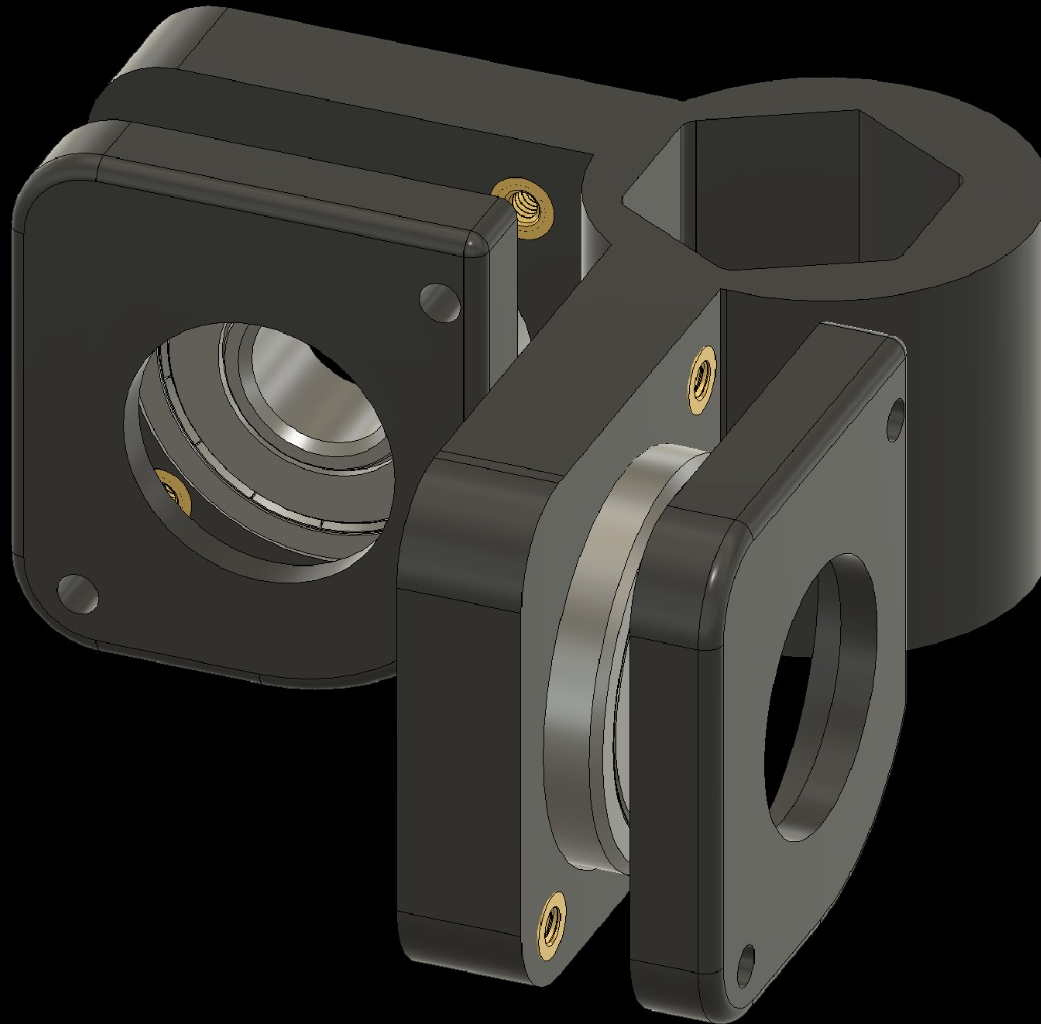
3. Assembling Individual Components

3.2 Add bearings to the Joystick Attachment



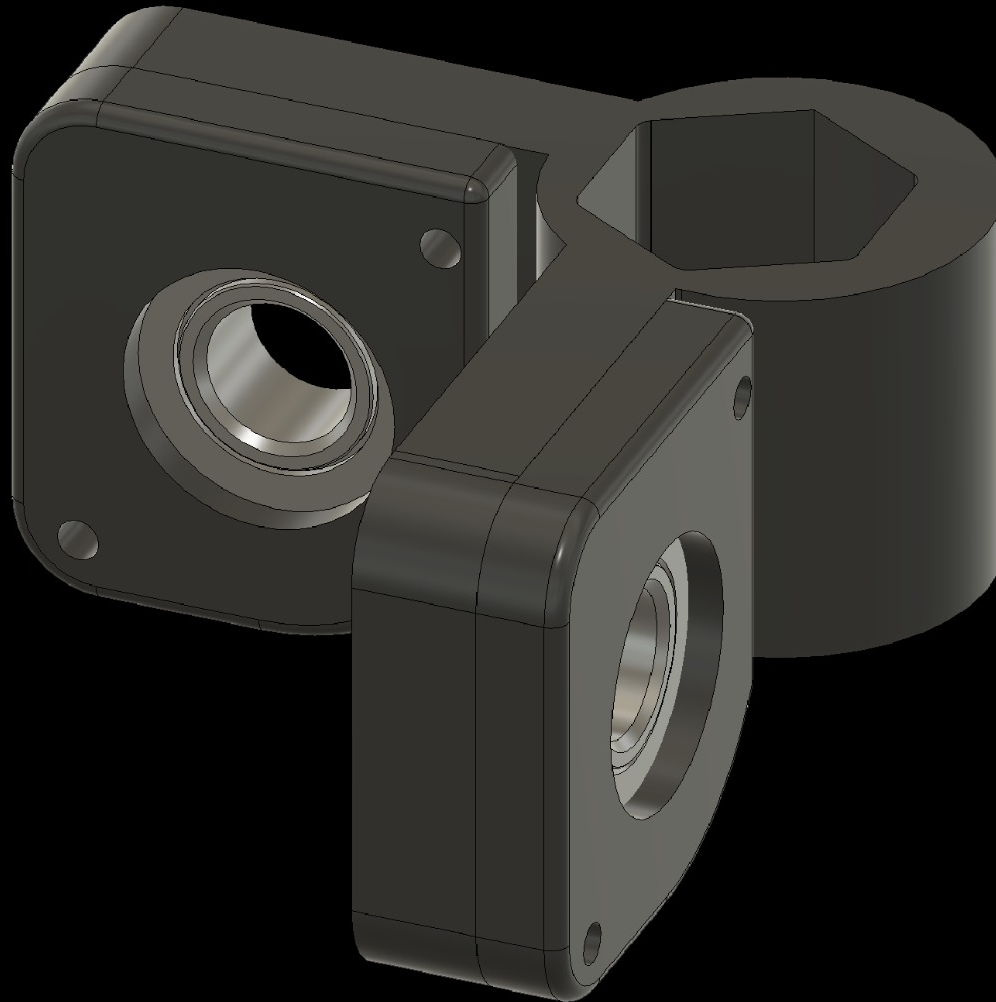
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3.2 Add bearings to the Joystick Attachment



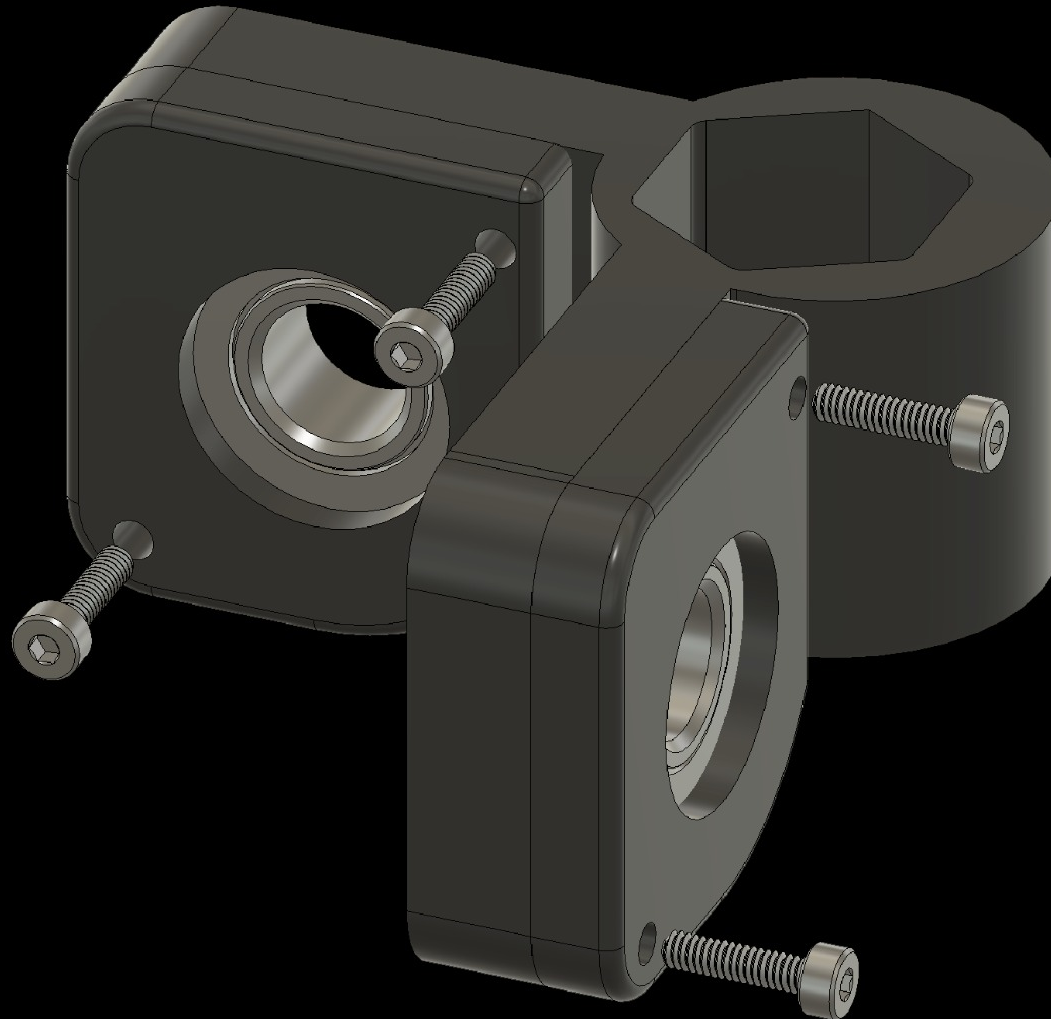
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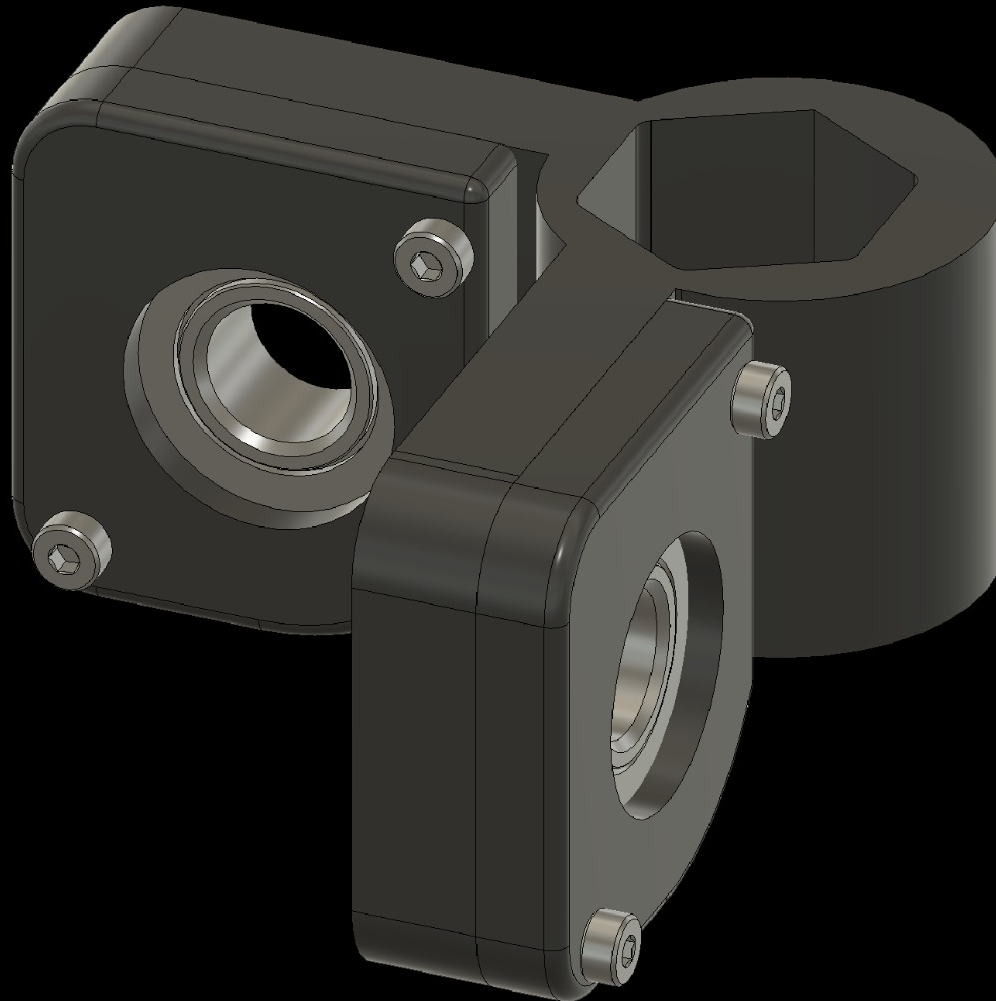
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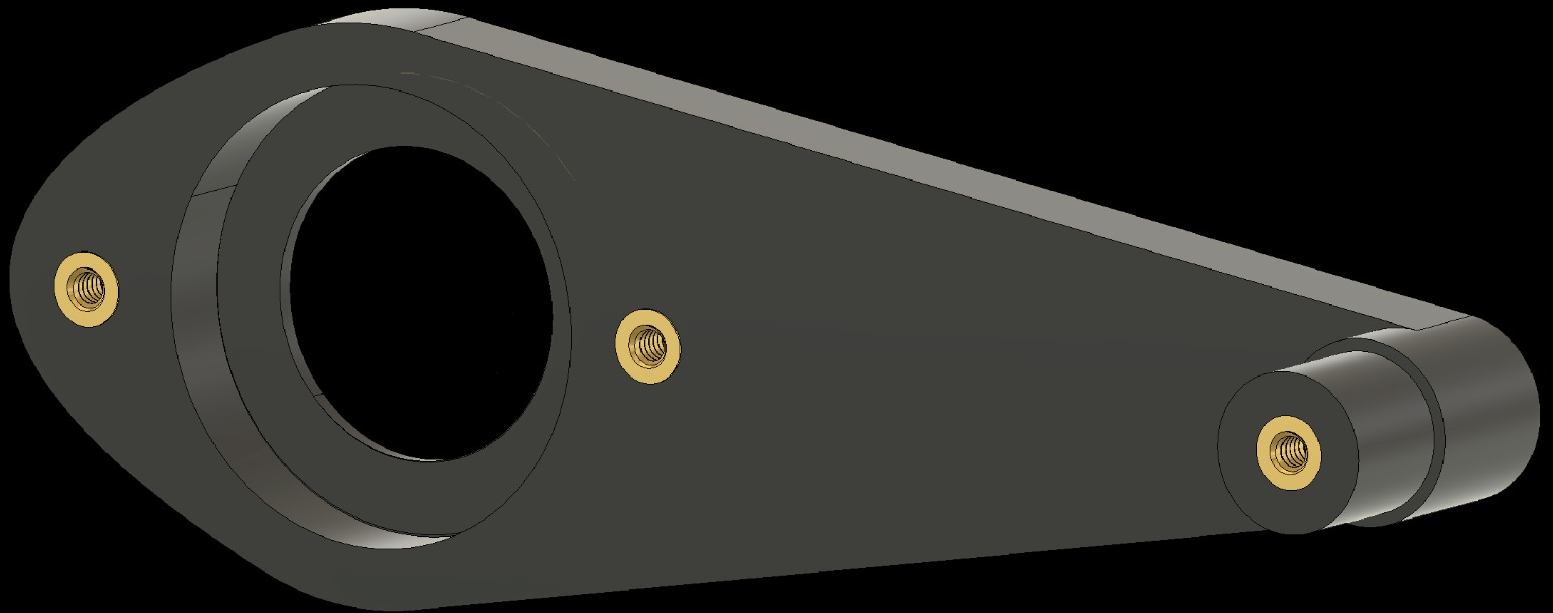
3. Assembling Individual Components

3.2 Add bearings to the Joystick Attachment



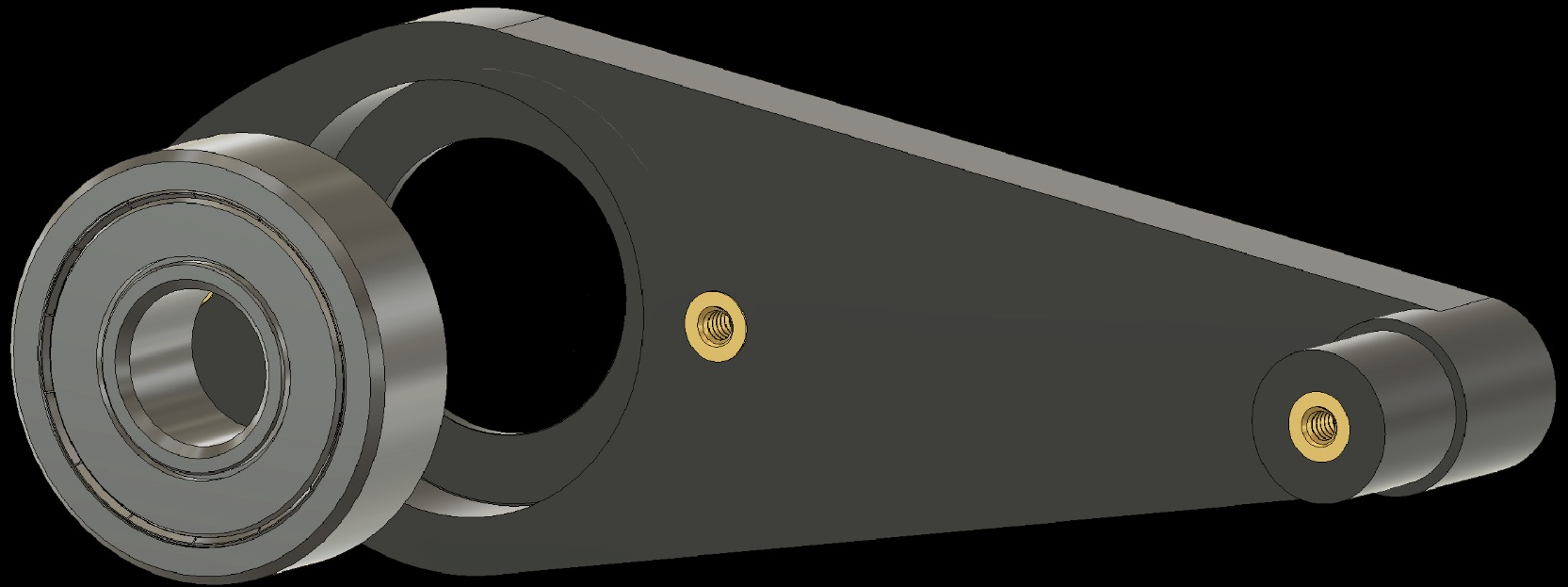
3. Assembling Individual Components

3.3 Add bearings to the Elbow-to-Finger components (2x)



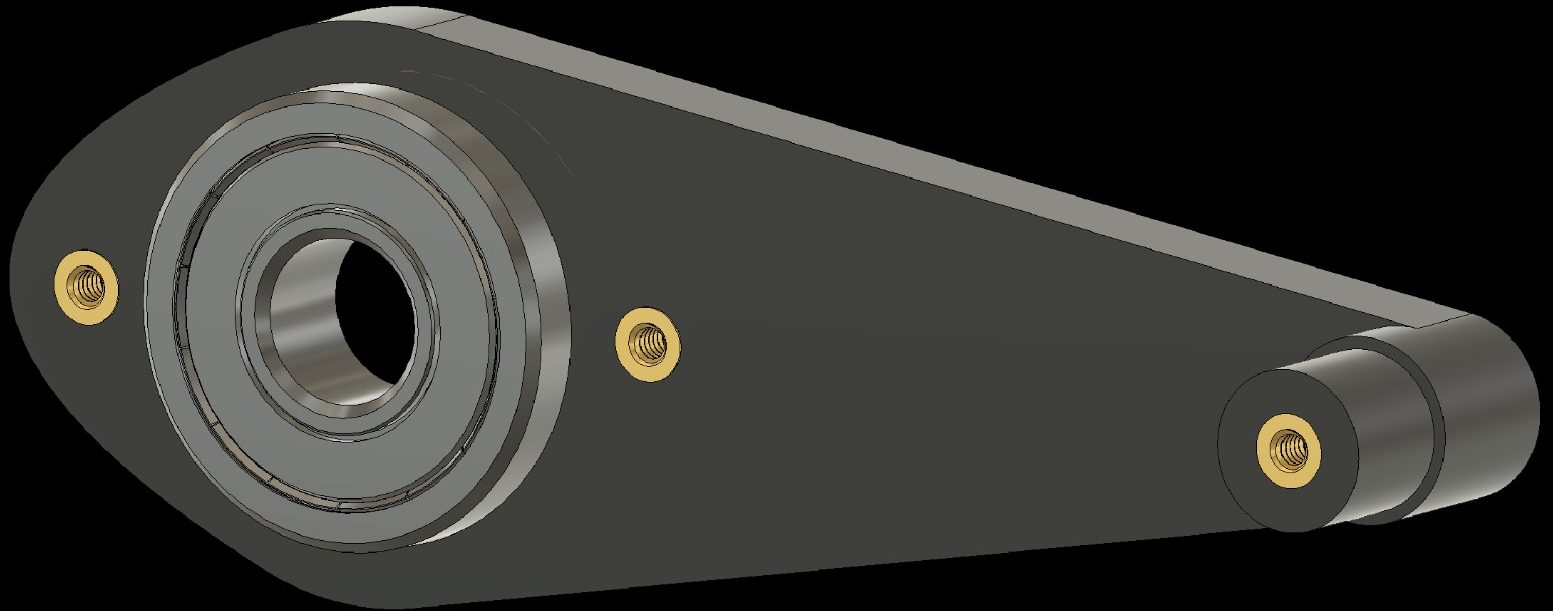
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3.3 Add bearings to the Elbow-to-Finger components (2x)



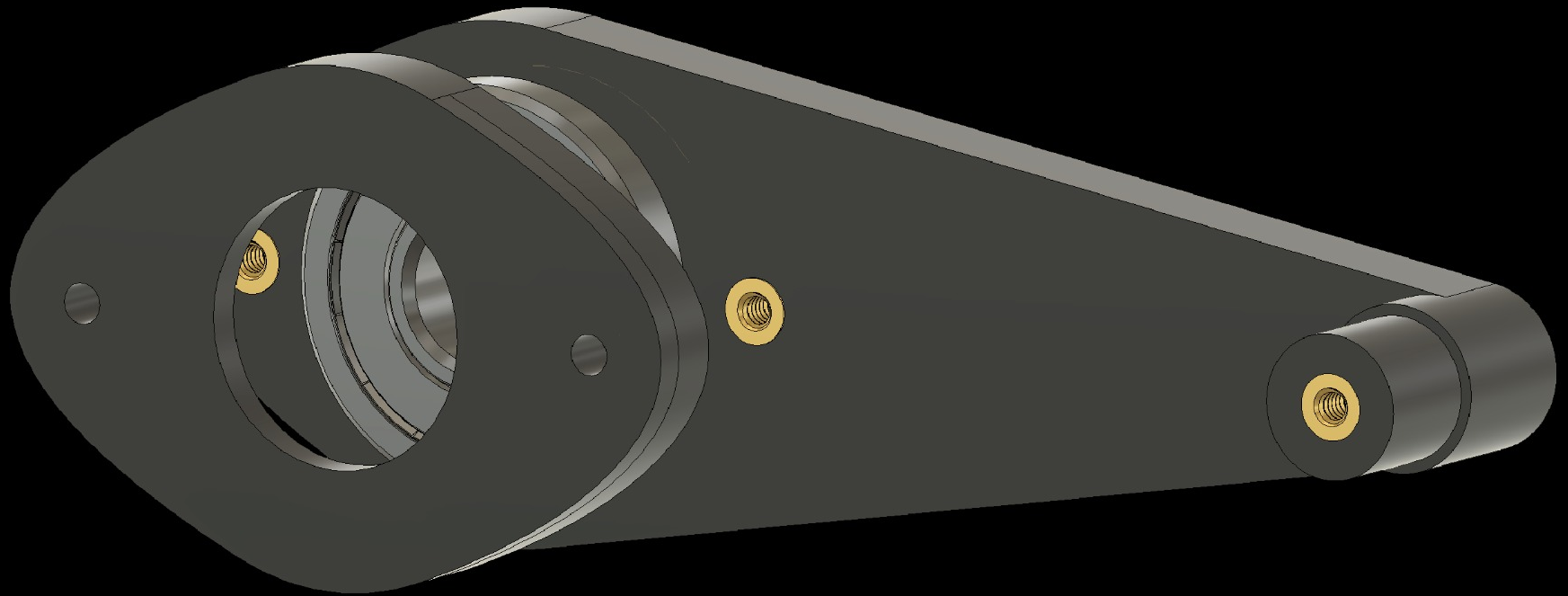
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3.3 Add bearings to the Elbow-to-Finger components (2x)



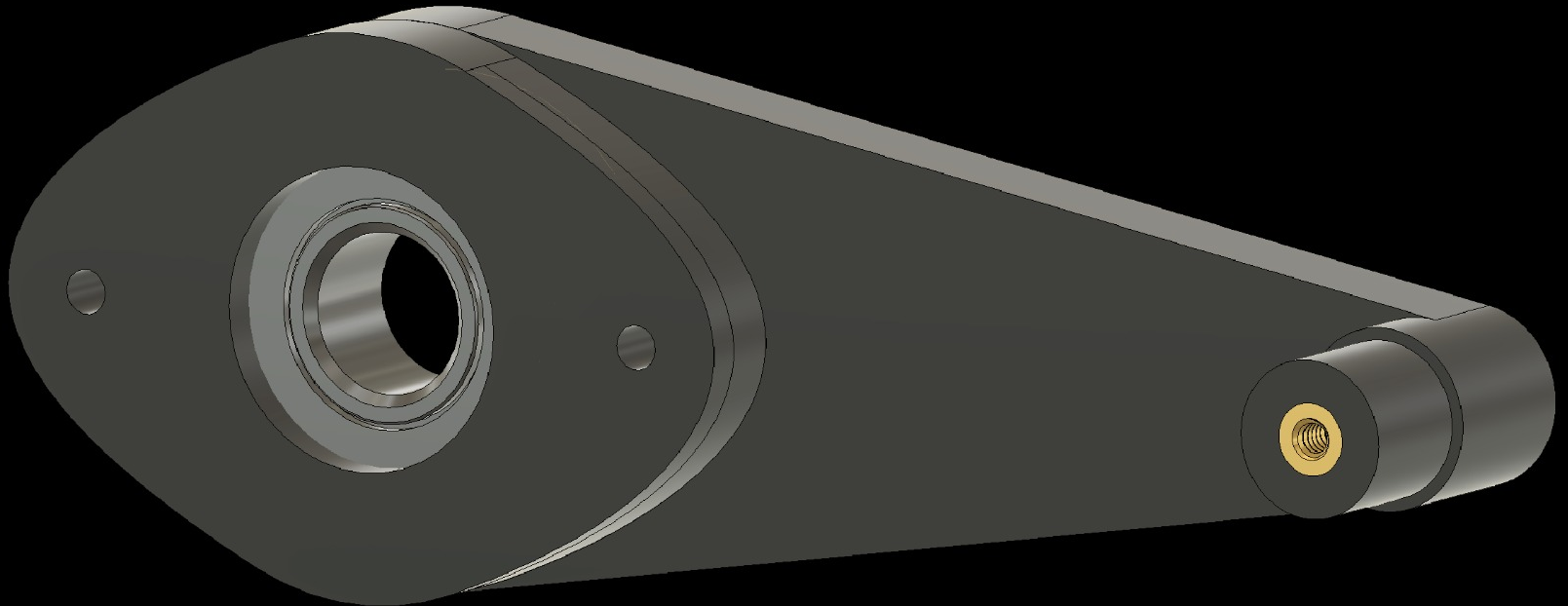
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3.3 Add bearings to the Elbow-to-Finger components (2x)



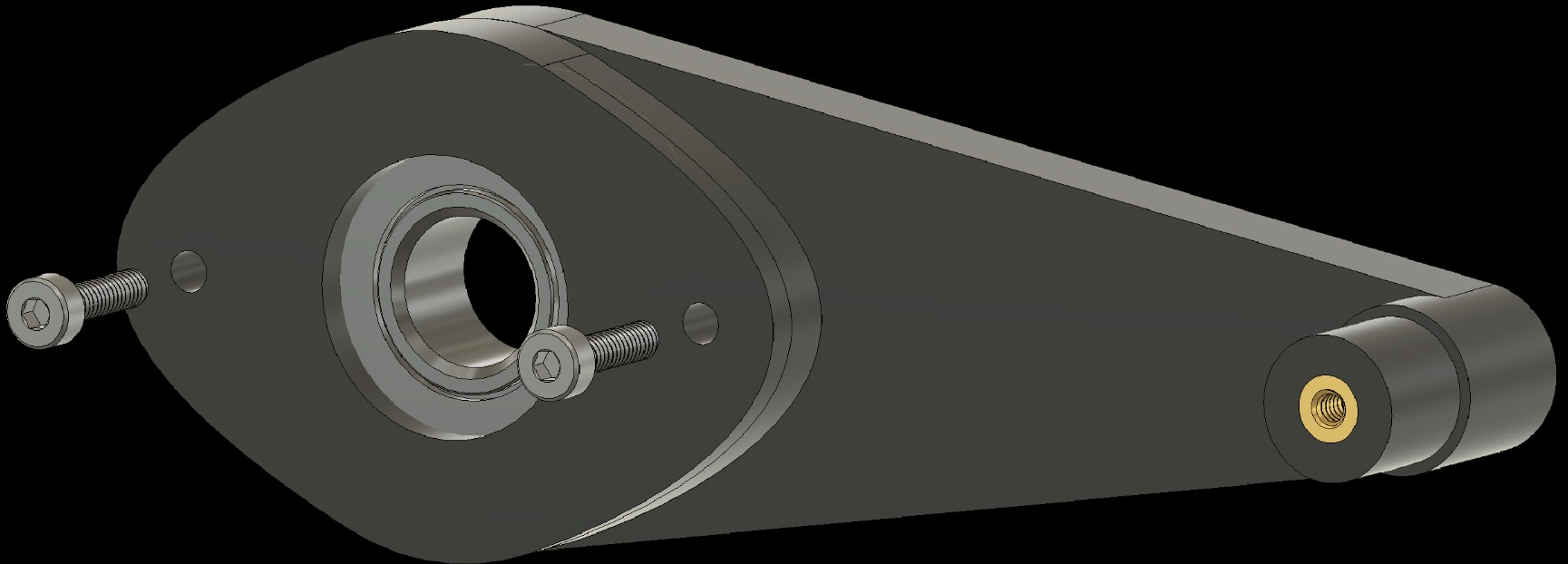
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3.3 Add bearings to the Elbow-to-Finger components (2x)



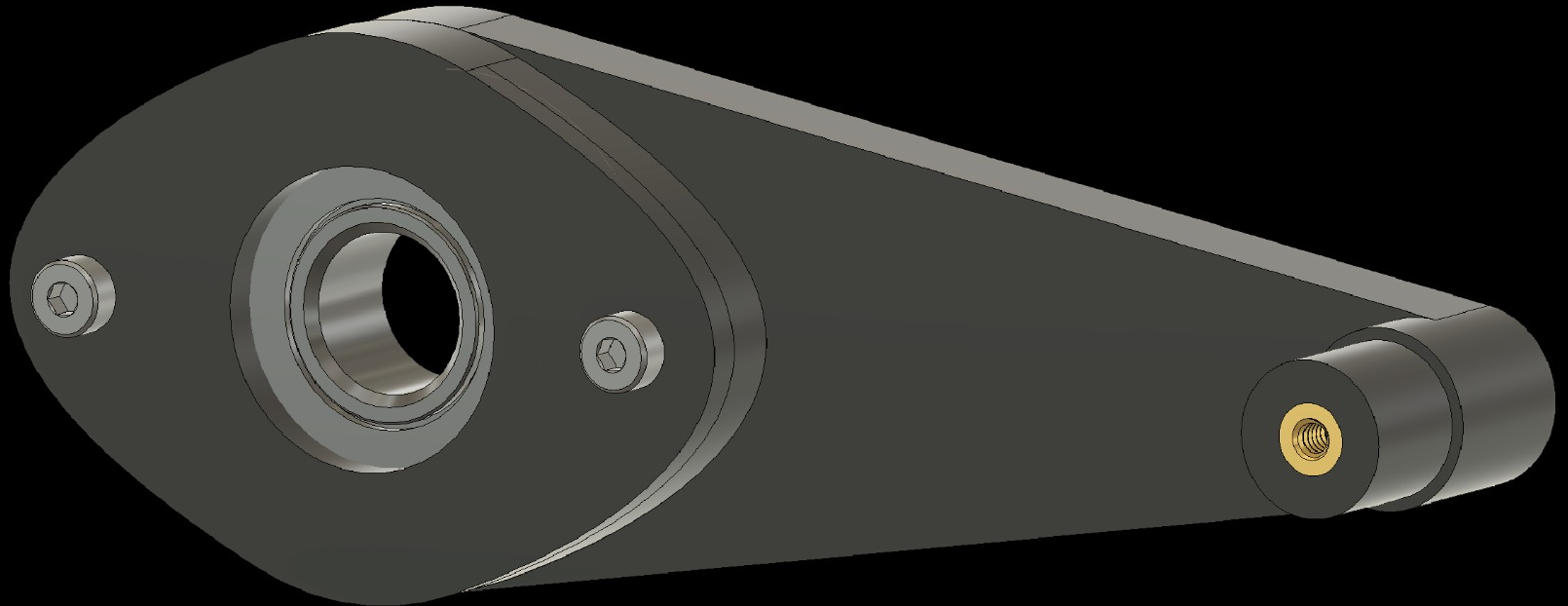
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3.3 Add bearings to the Elbow-to-Finger components (2x)



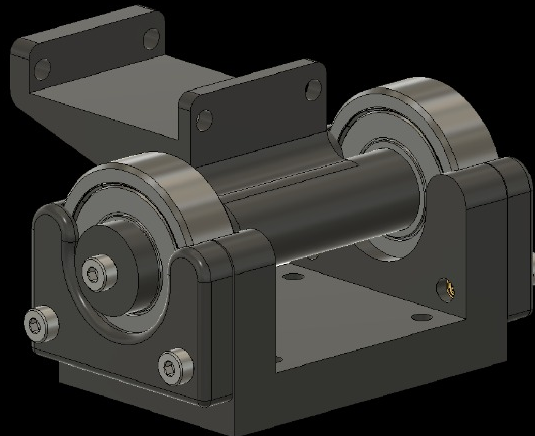
3. Assembling Individual Components

3.3 Add bearings to the Elbow-to-Finger components (2x)



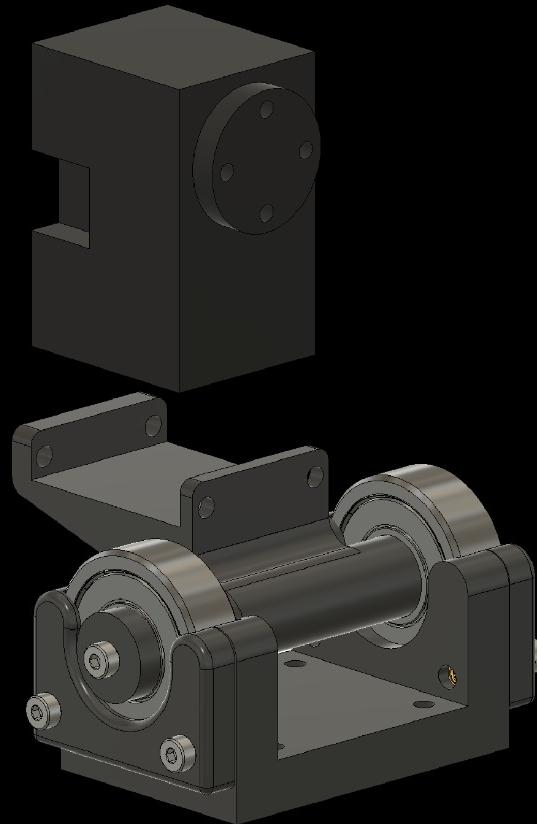
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



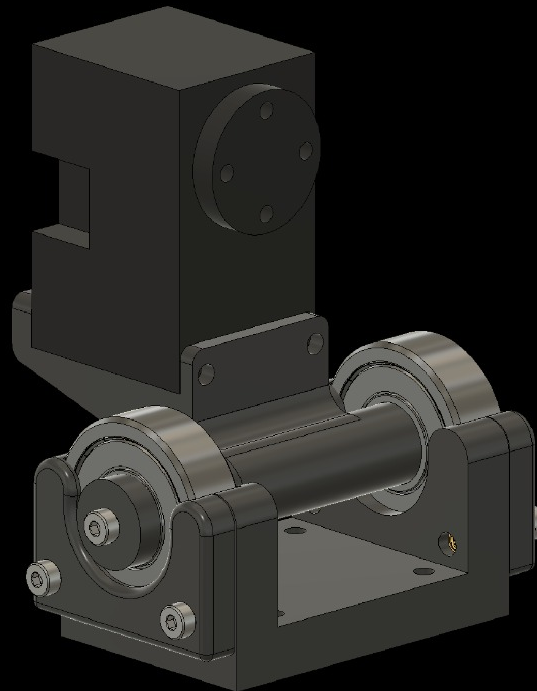
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



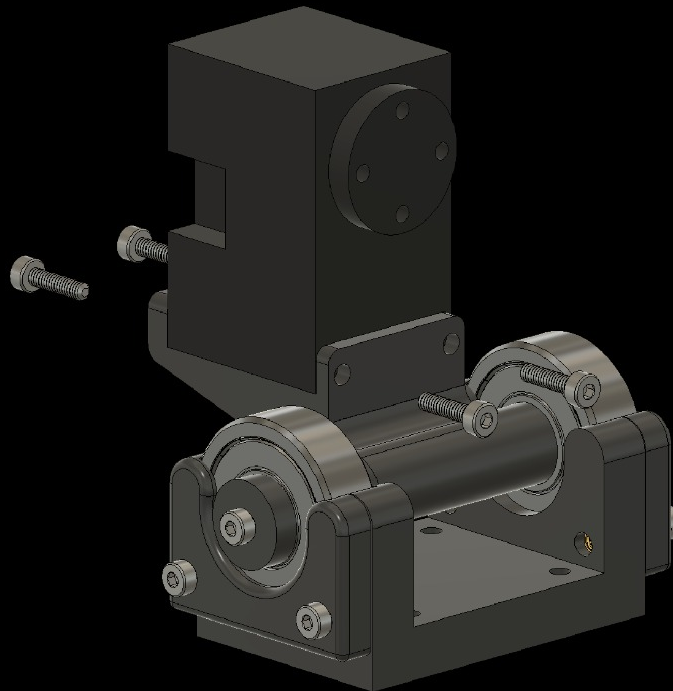
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



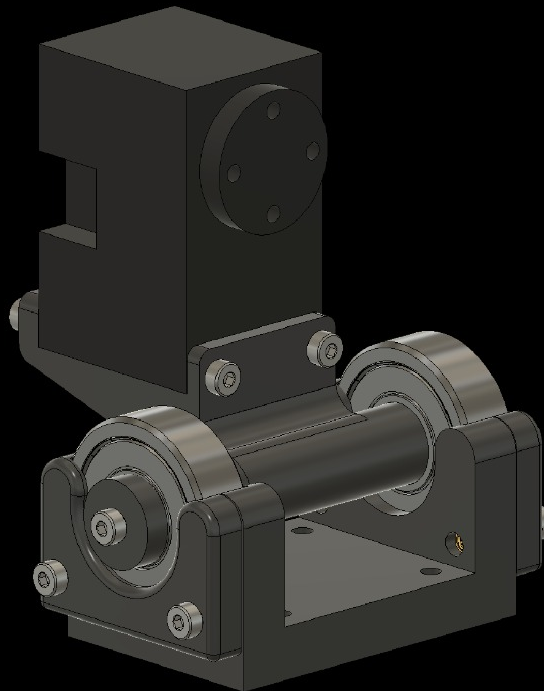
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



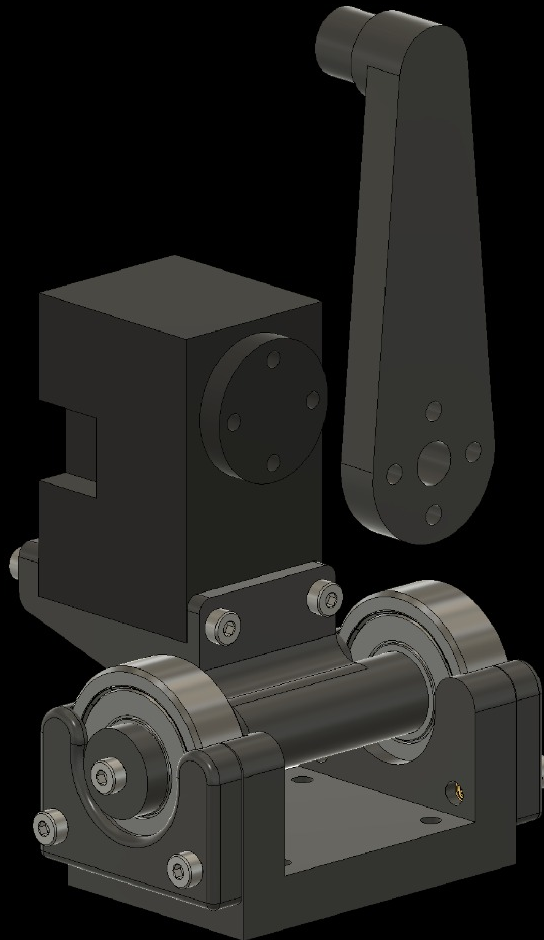
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



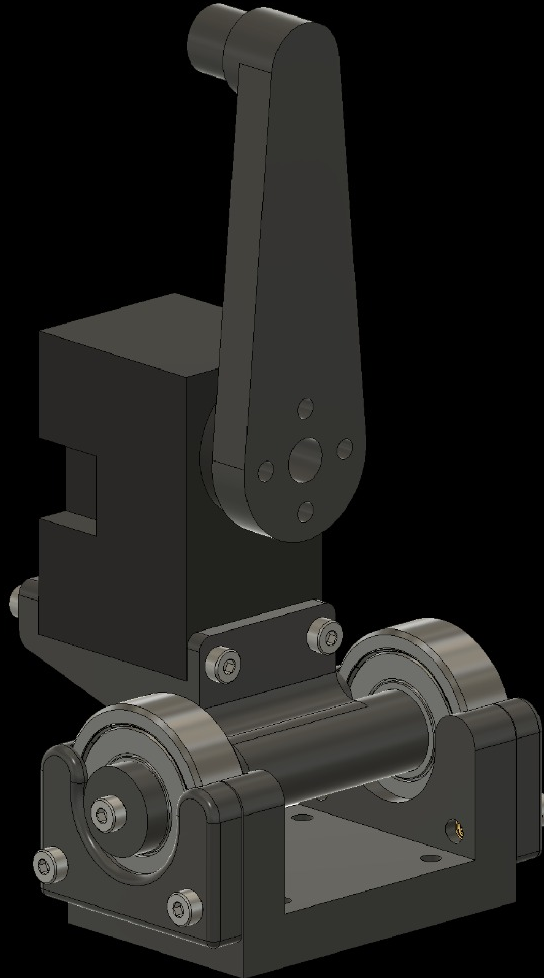
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



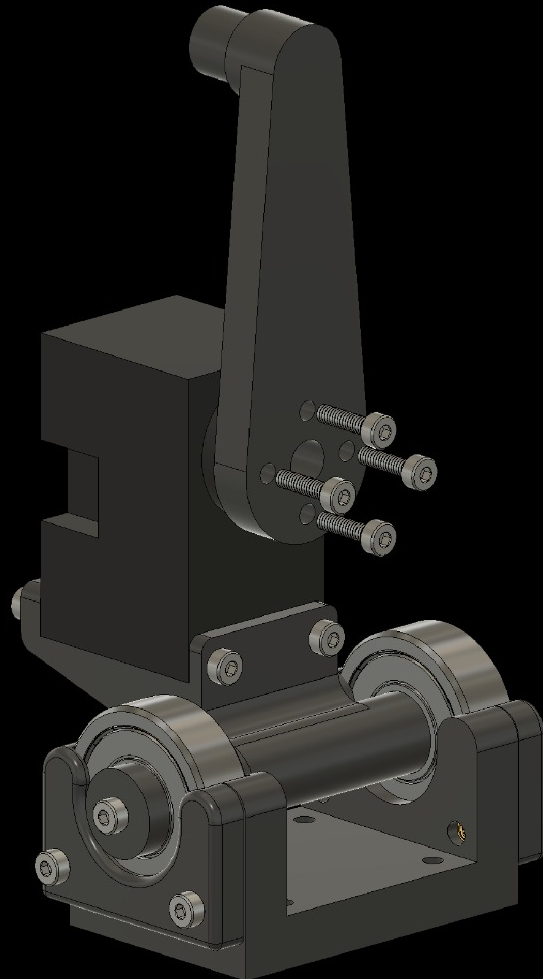
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



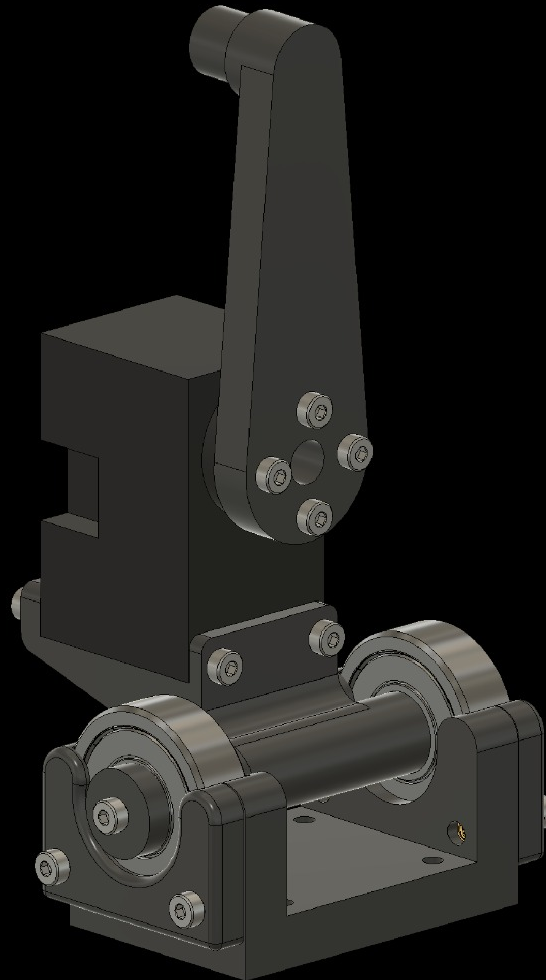
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3.4 Attach the Dynamixels (2x)



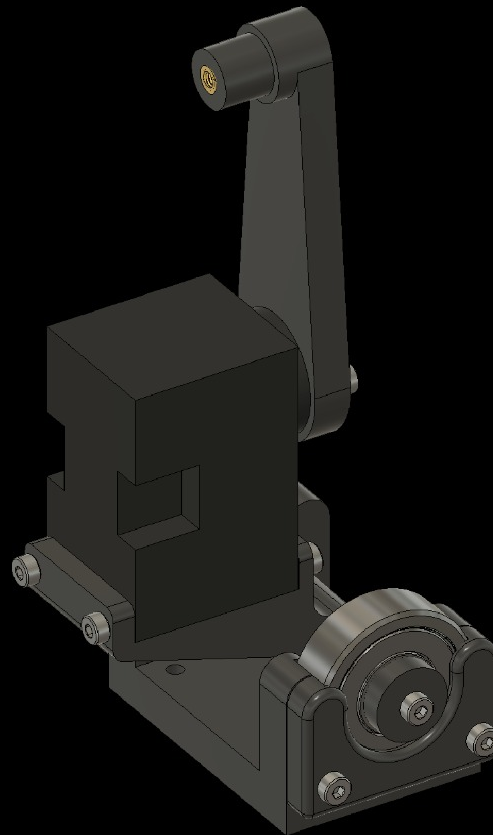
3. Assembling Individual Components

3.4 Attach the Dynamixels (2x)



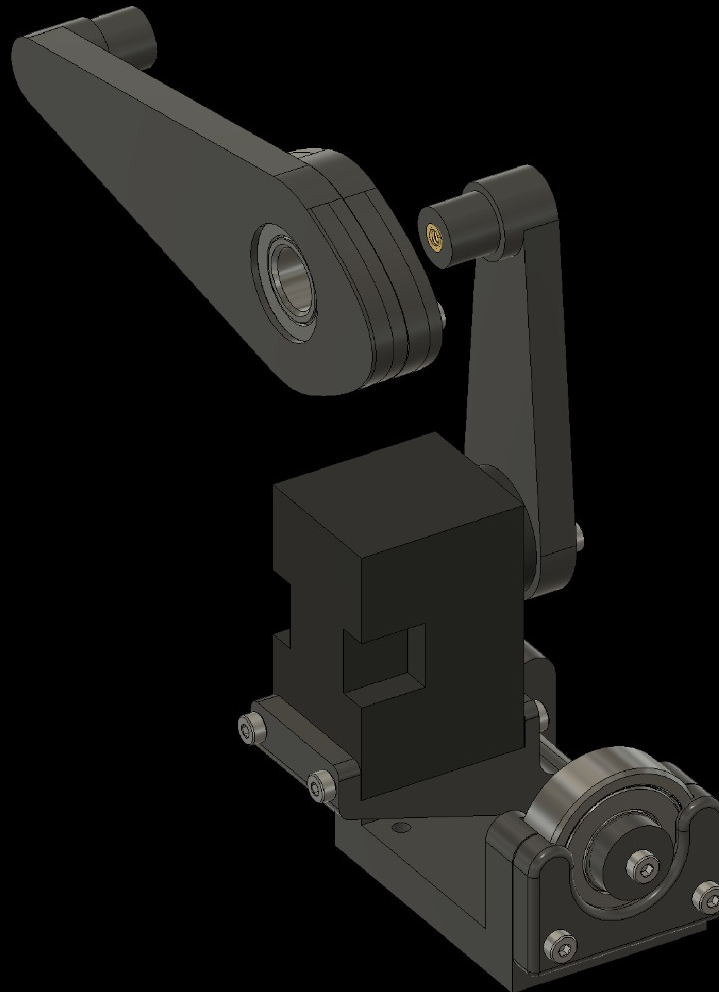
3. Assembling Individual Components

3.5 Complete the Arms (2x)



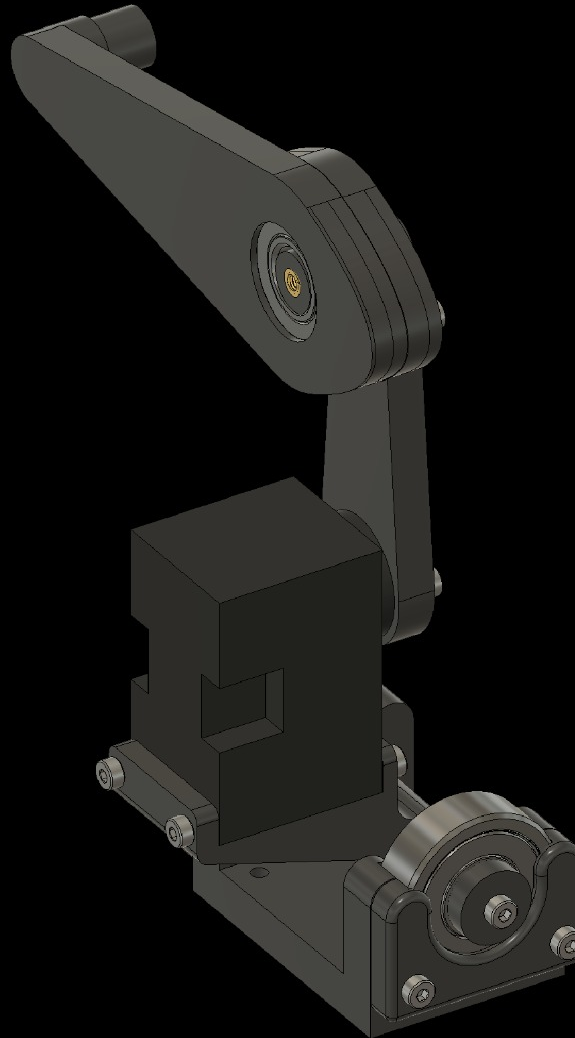
3. Assembling Individual Components

3.5 Complete the Arms (2x)



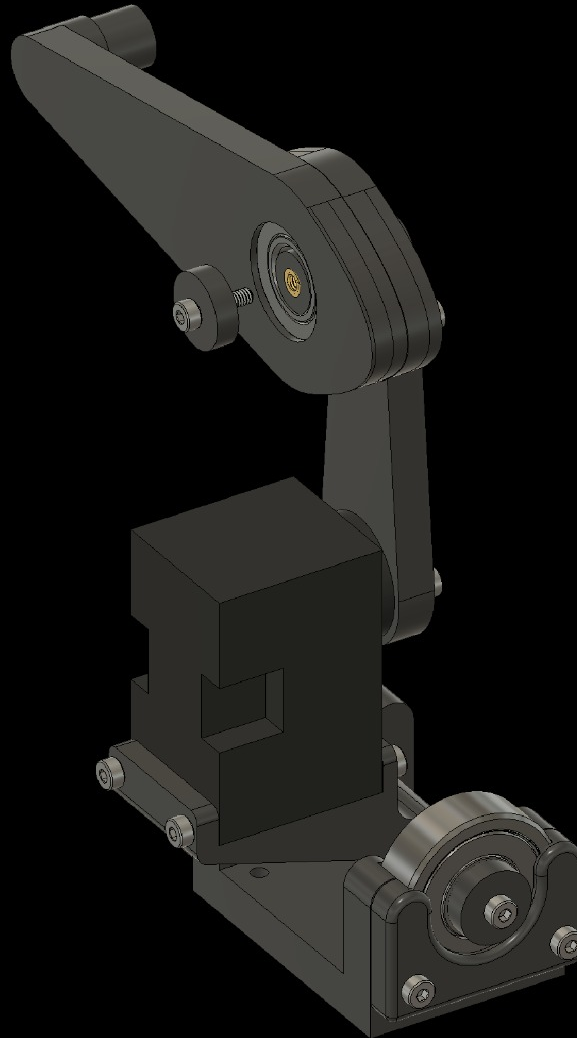
3. Assembling Individual Components

3.5 Complete the Arms (2x)



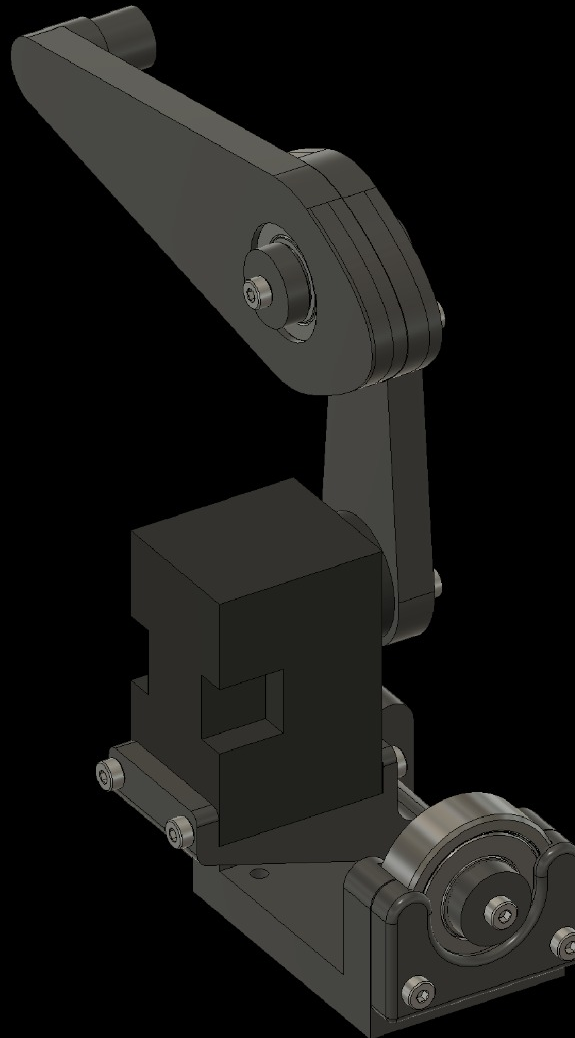
3. Assembling Individual Components

3.5 Complete the Arms (2x)



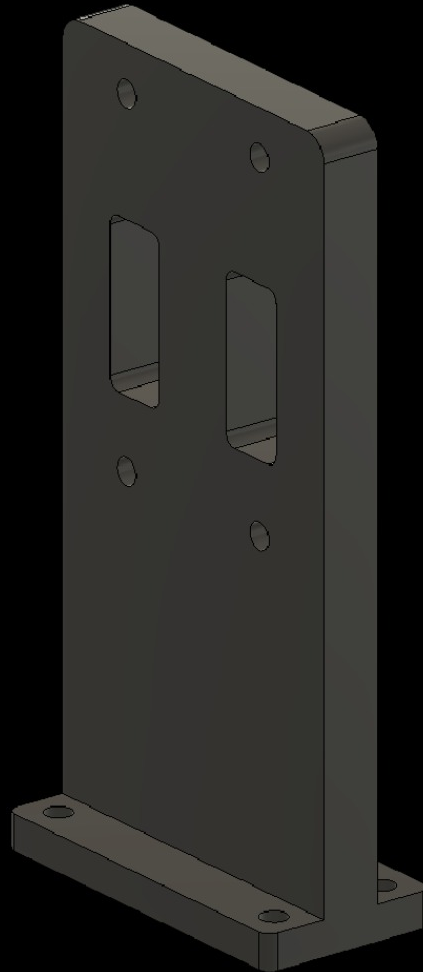
3. Assembling Individual Components

3.5 Complete the Arms (2x)



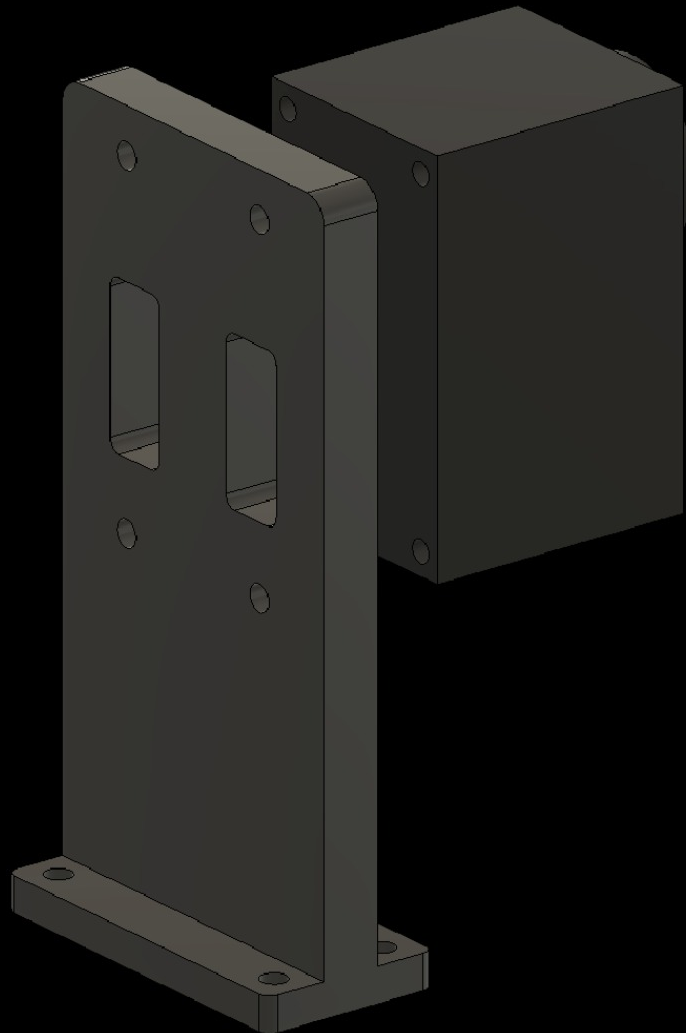
3. Assembling Individual Components

3.6a Attach the Fire Button Servo



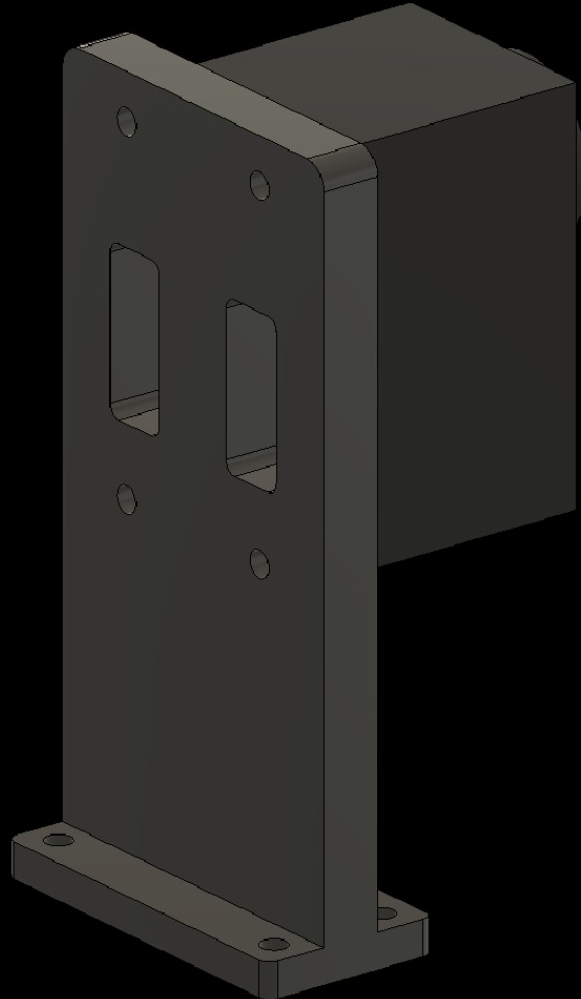
3. Assembling Individual Components

3.6a Attach the Fire Button Servo



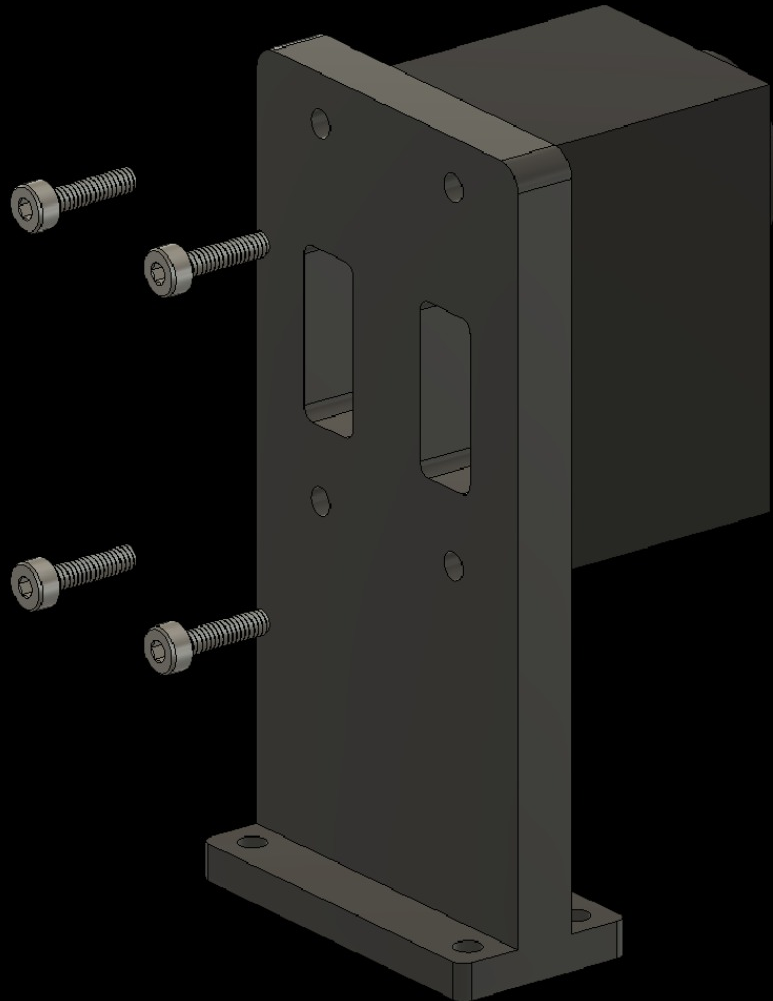
3. Assembling Individual Components

3.6a Attach the Fire Button Servo



3. Assembling Individual Components

3.6a Attach the Fire Button Servo



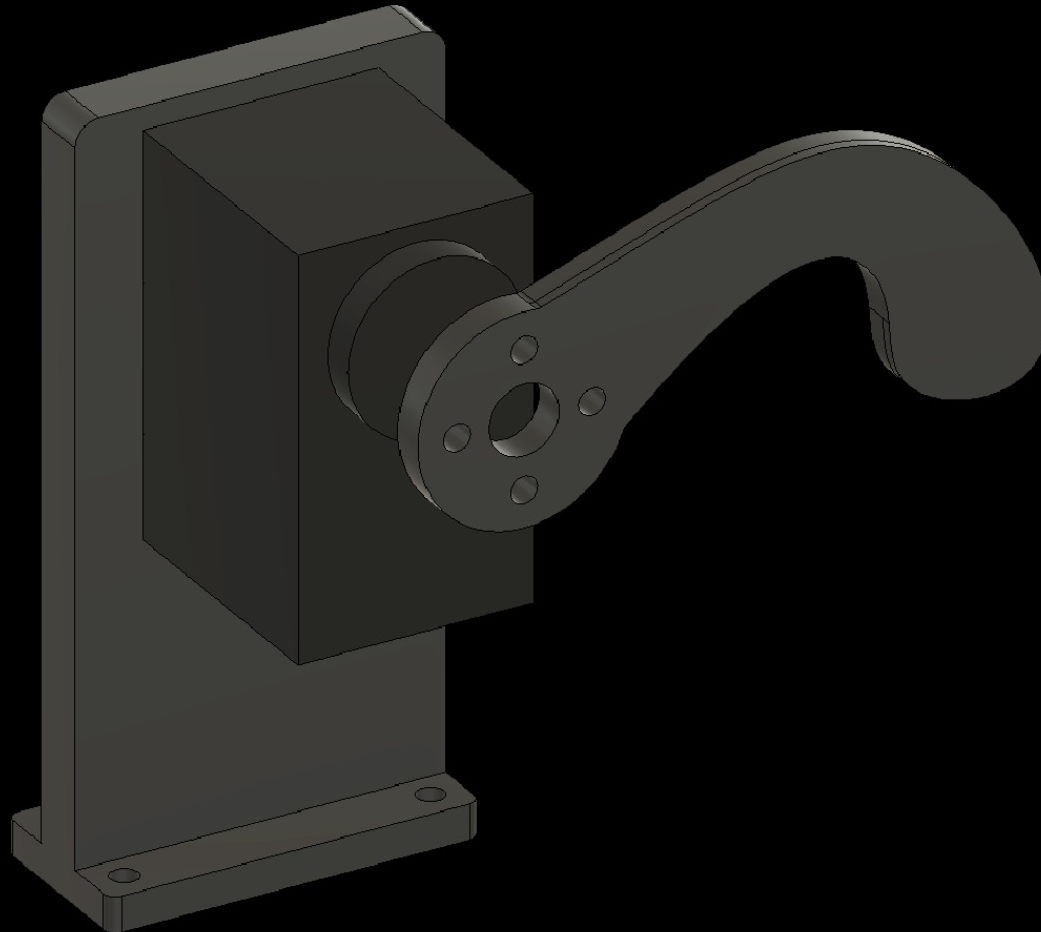
3. Assembling Individual Components

3.6a Attach the Fire Button Servo



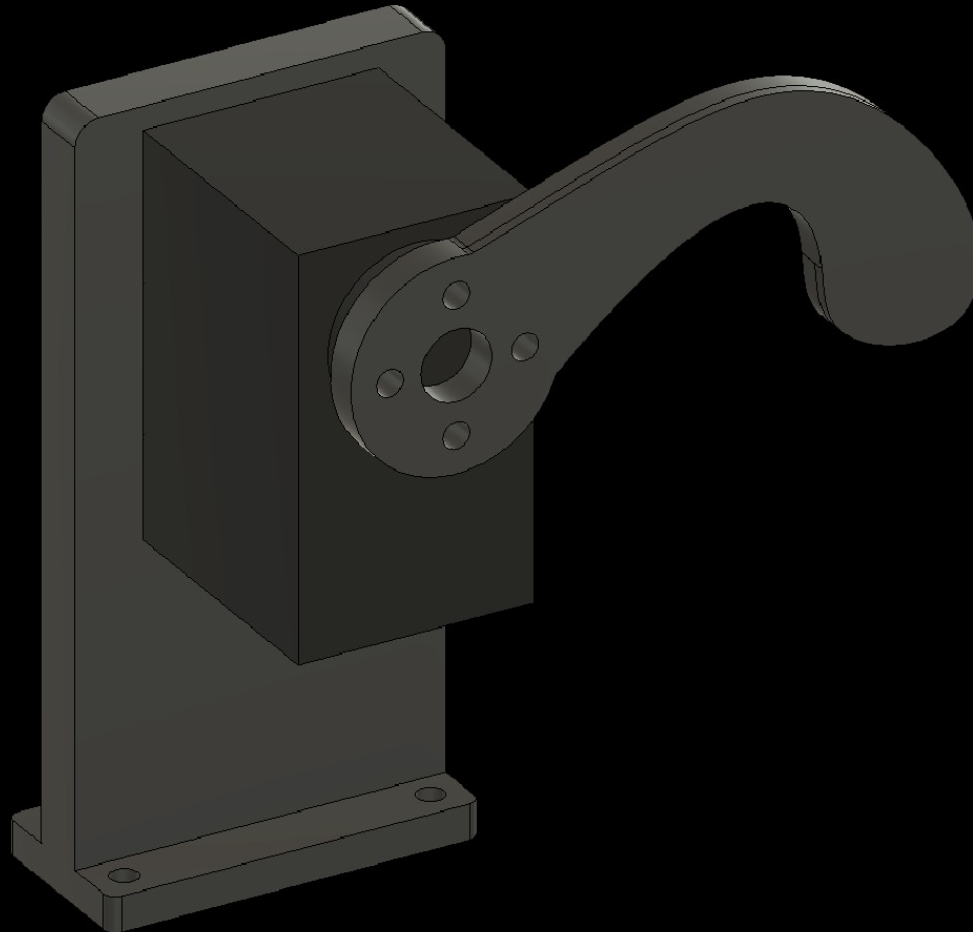
3. Assembling Individual Components

3.6b Attach the Fire Finger to the Servo



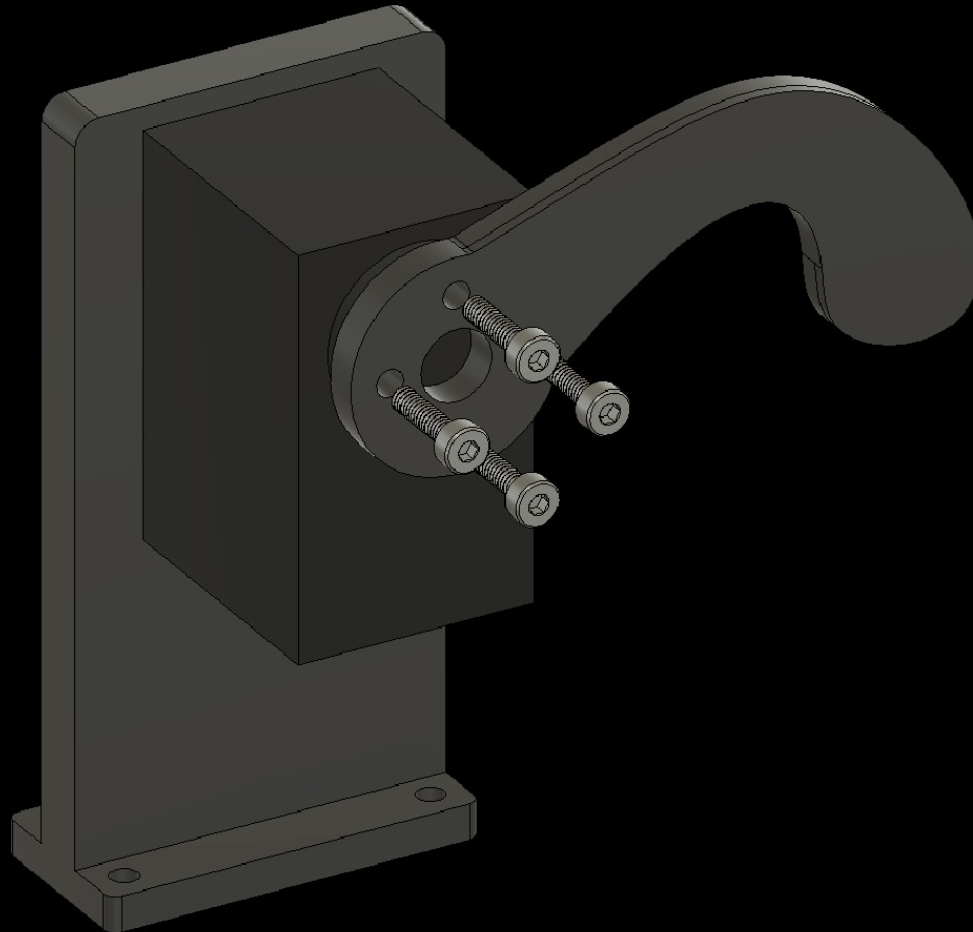
3. Assembling Individual Components

3.6b Attach the Fire Finger to the Servo



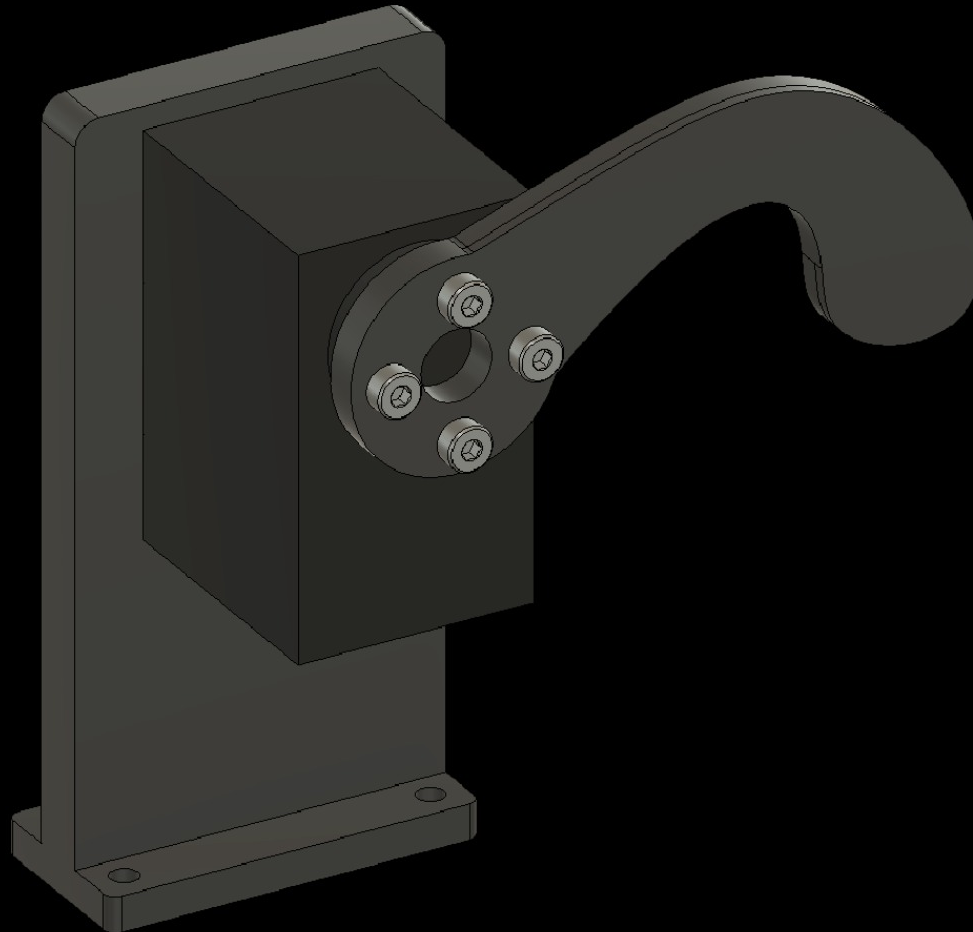
3. Assembling Individual Components

3.6b Attach the Fire Finger to the Servo



3. Assembling Individual Components

3.6b Attach the Fire Finger to the Servo

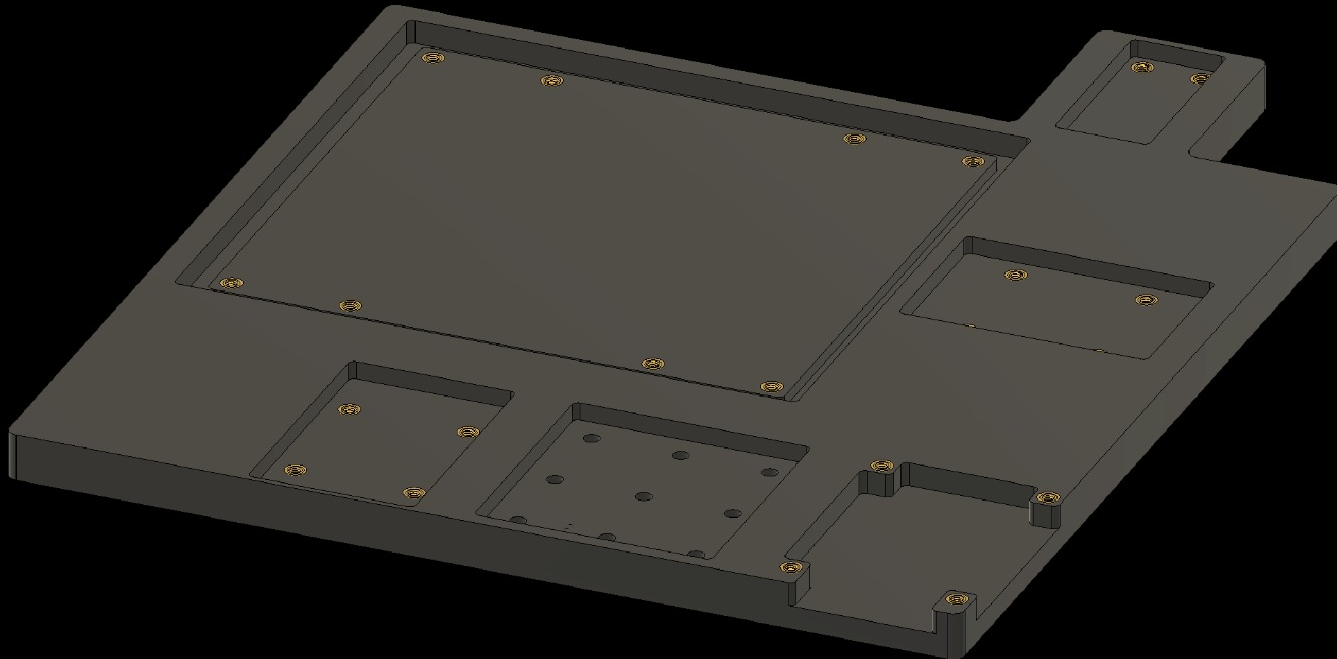


4. Attaching Components to the Baseplate

Next, attach the assembled components to the baseplate. Apply a thread-locking compound to all screws.

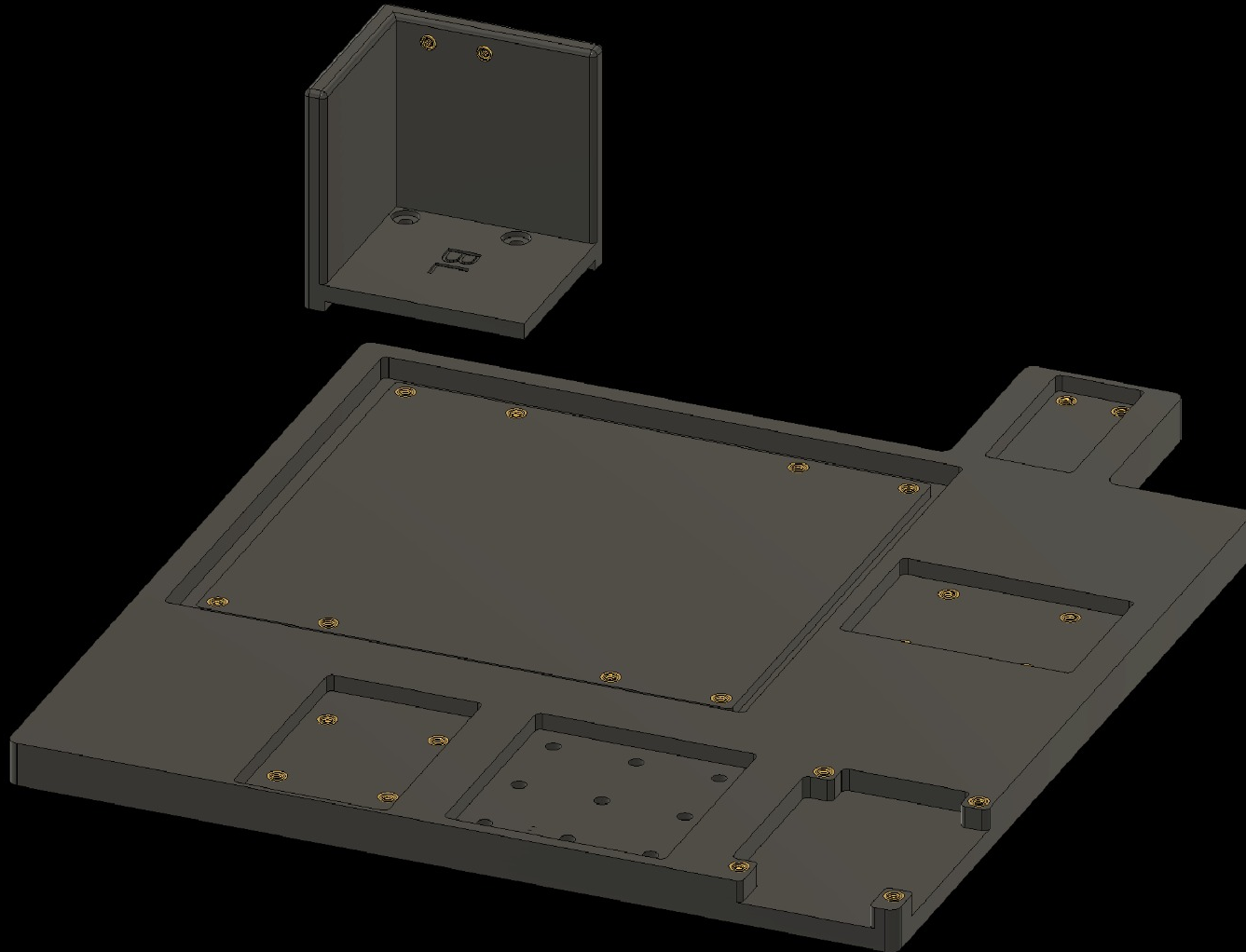
4. Attaching Components to the Baseplate

4.1 Attach Corner 1 to the baseplate



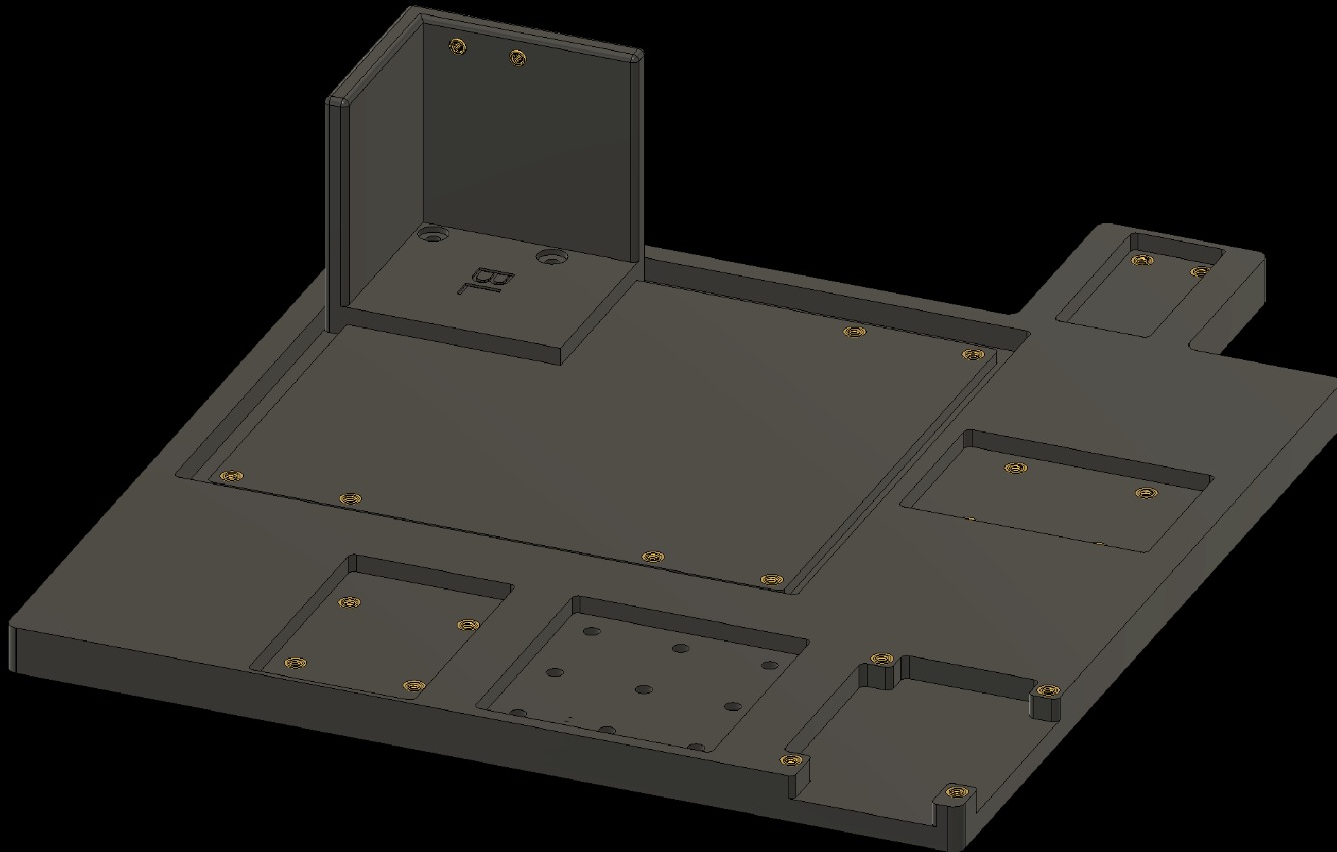
4. Attaching Components to the Baseplate

4.1 Attach Corner 1 to the baseplate



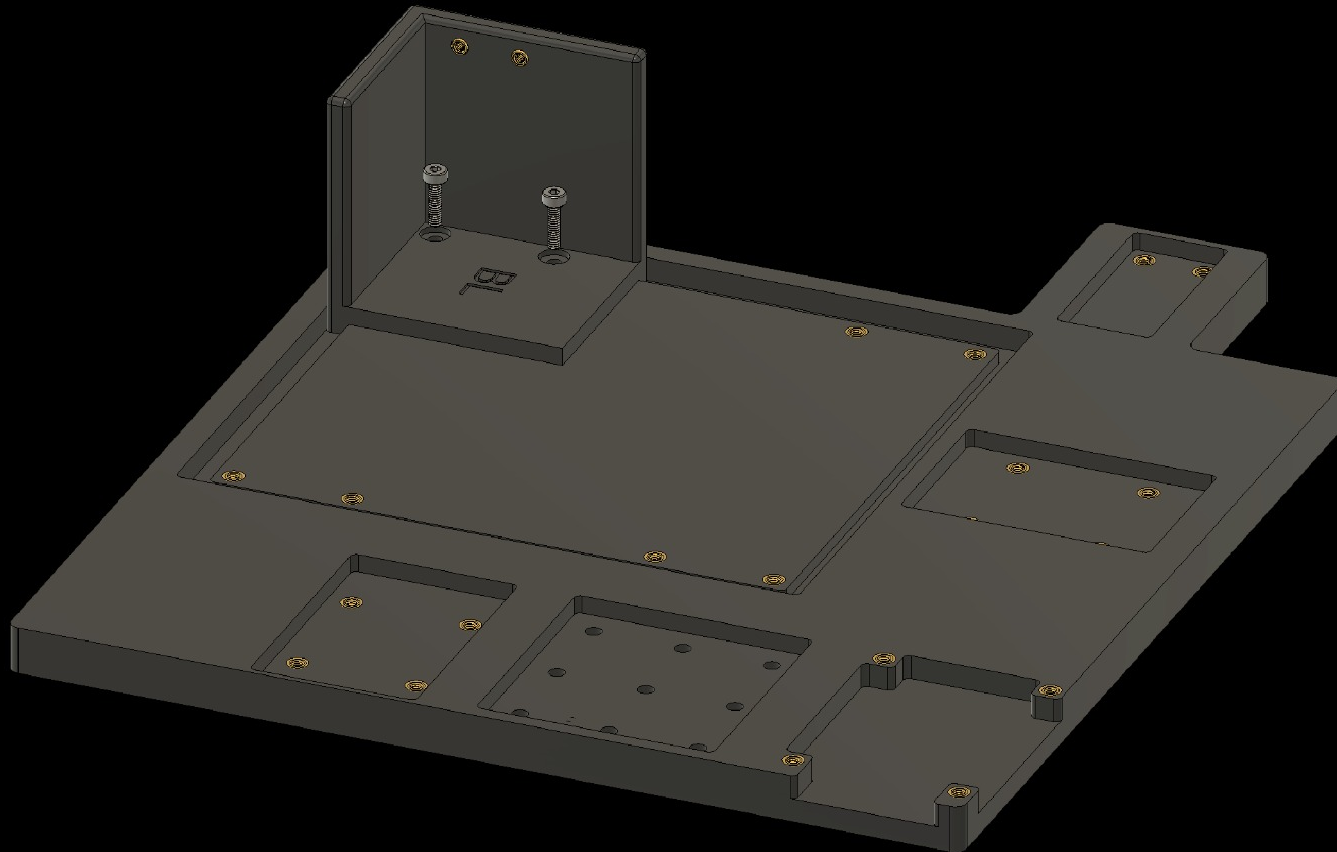
4. Attaching Components to the Baseplate

4.1 Attach Corner 1 to the baseplate



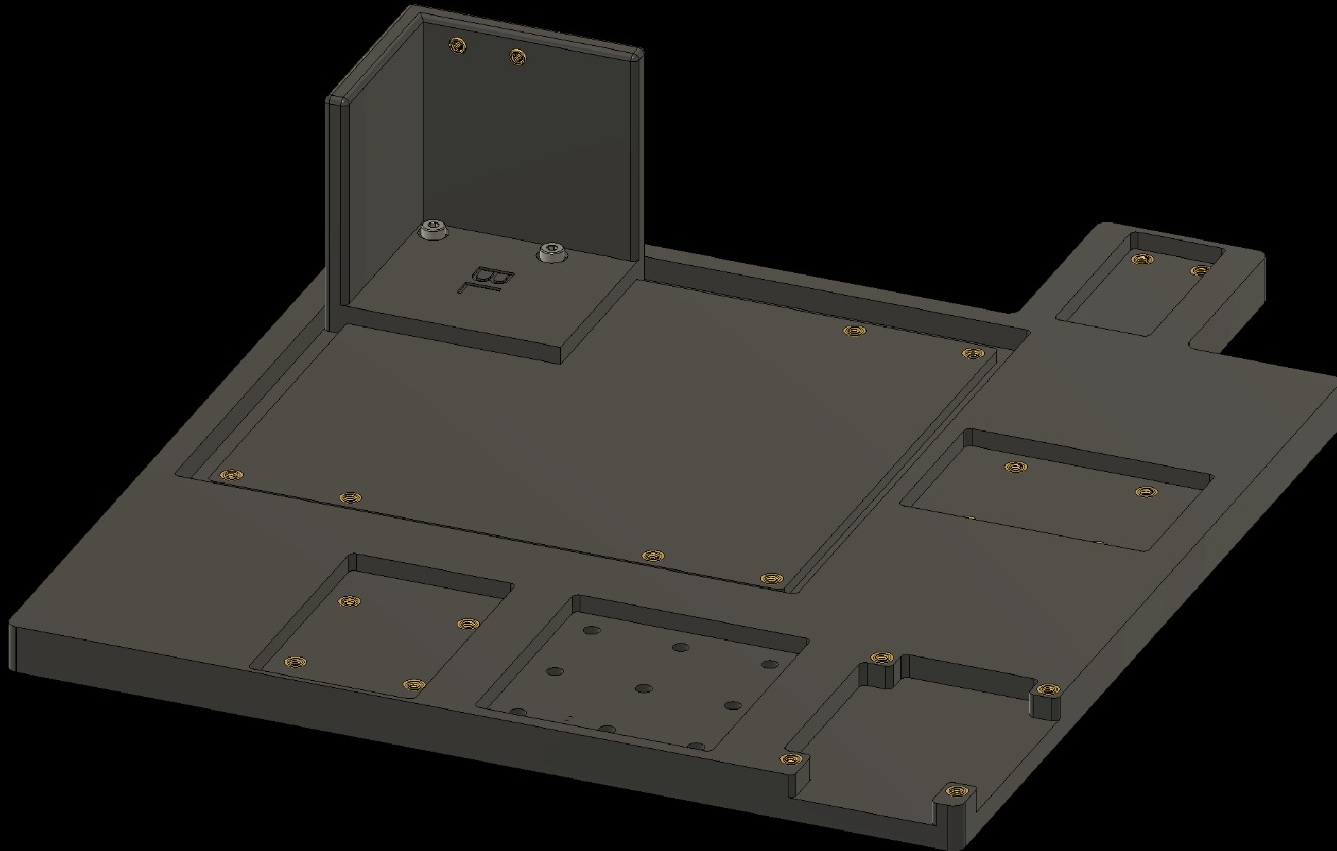
4. Attaching Components to the Baseplate

4.1 Attach Corner 1 to the baseplate



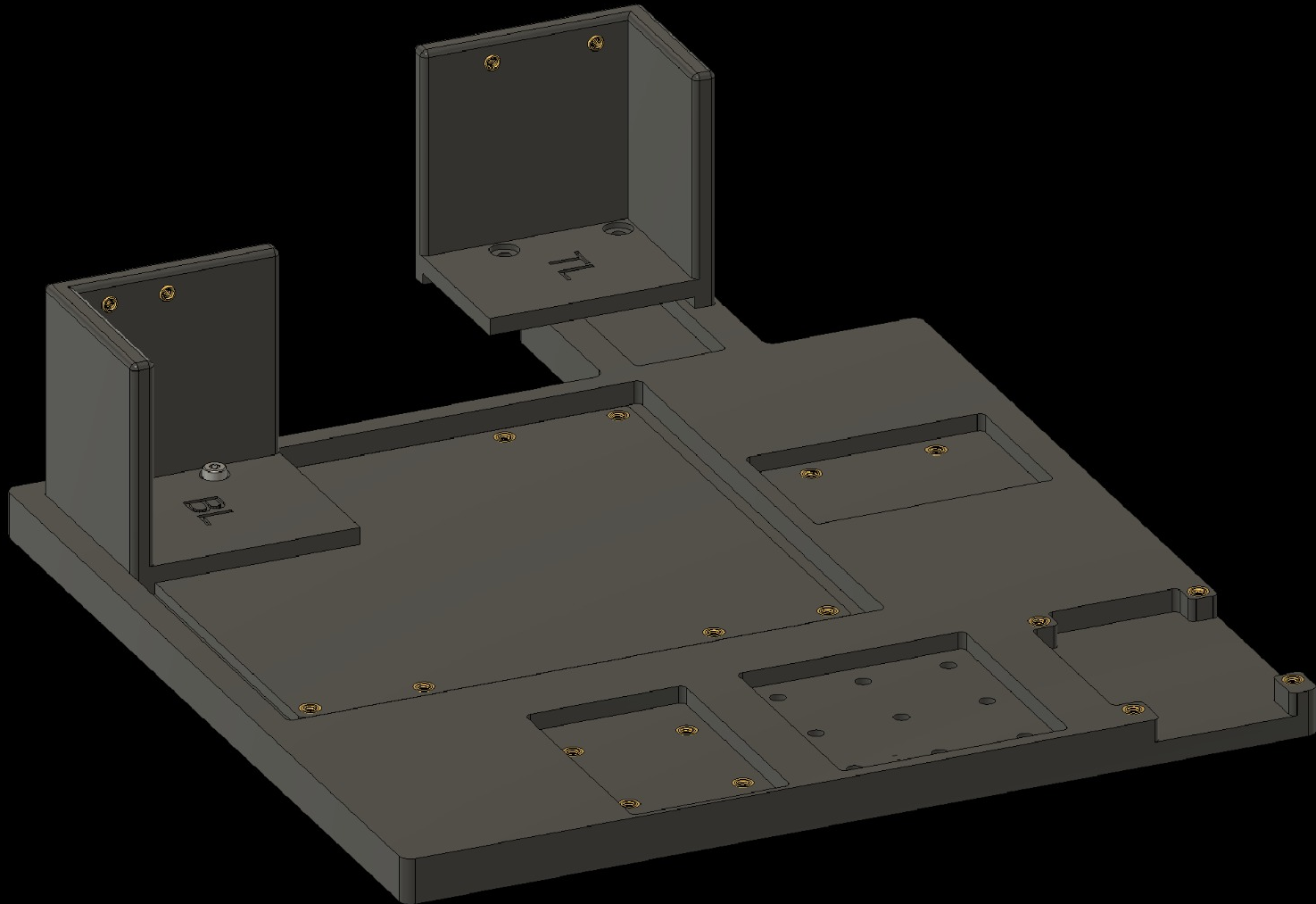
4. Attaching Components to the Baseplate

4.1 Attach Corner 1 to the baseplate



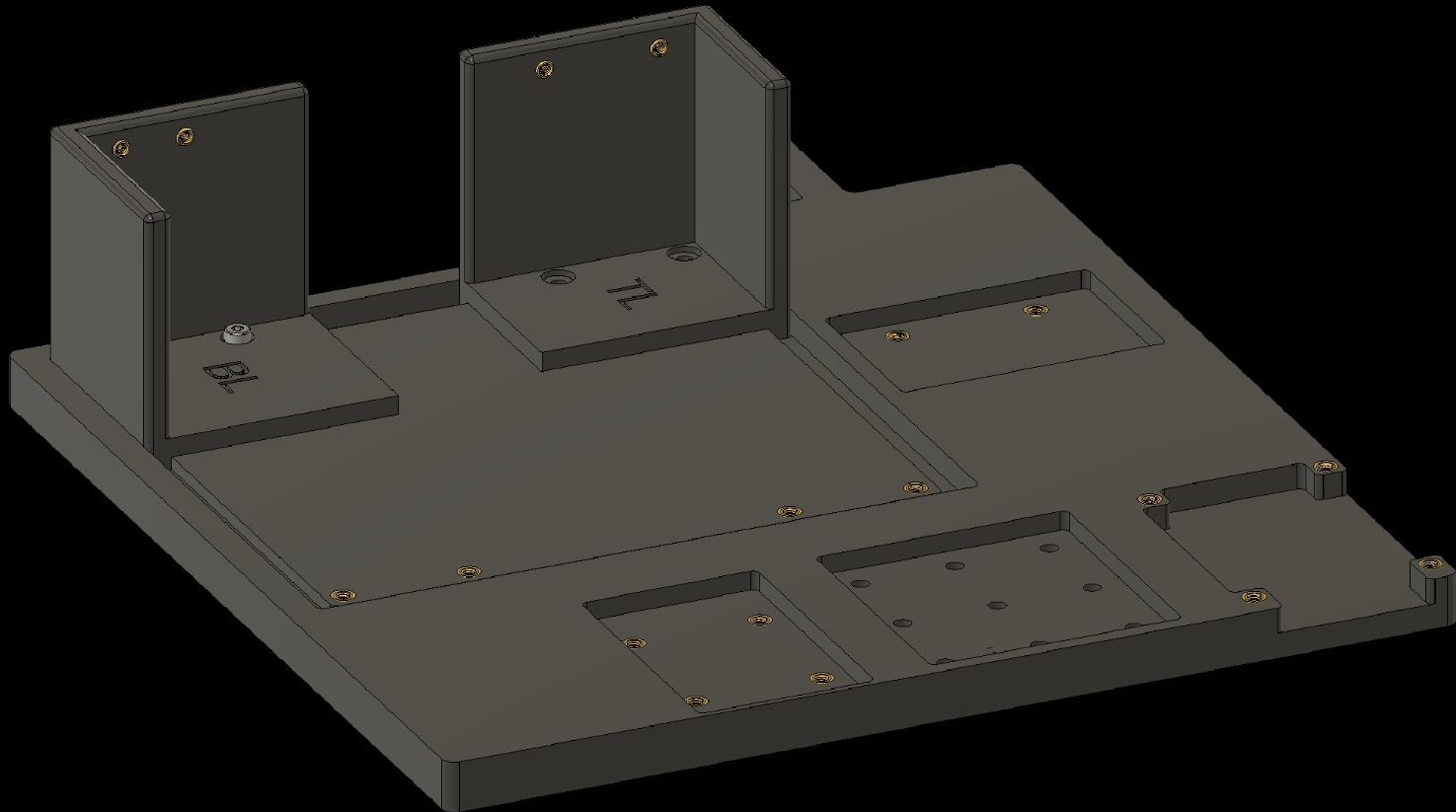
4. Attaching Components to the Baseplate

4.2 Attach Corner 2 to the baseplate



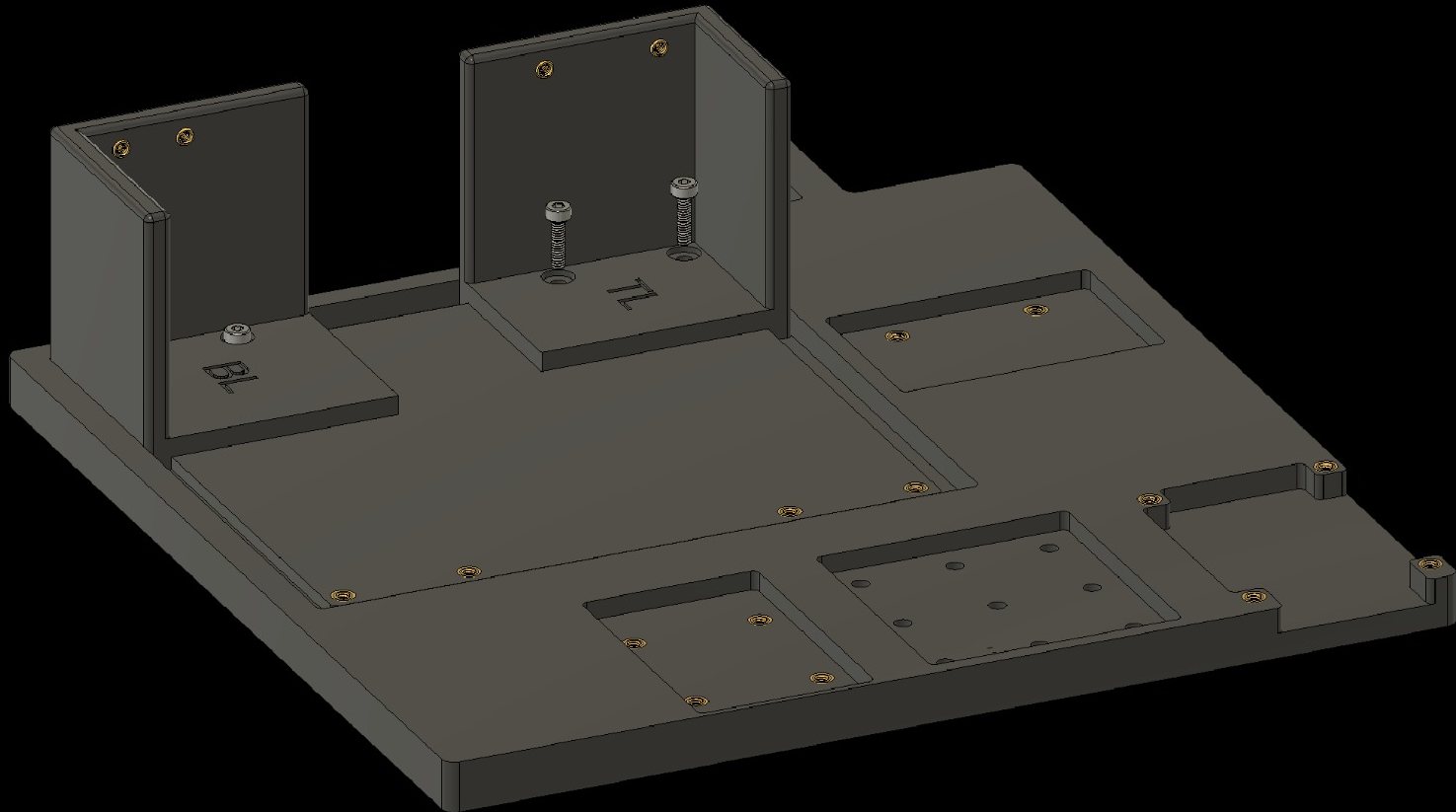
4. Attaching Components to the Baseplate

4.2 Attach Corner 2 to the baseplate



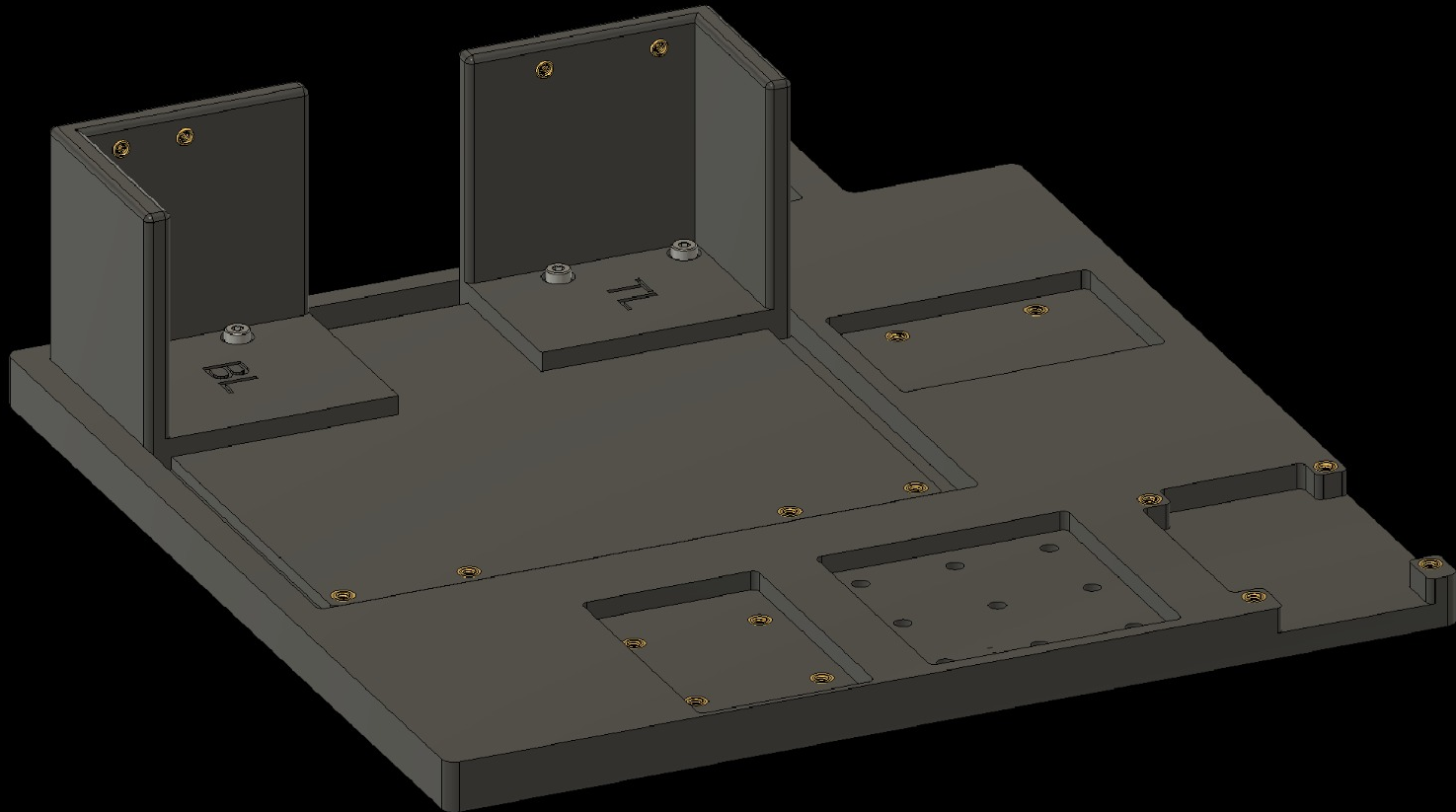
4. Attaching Components to the Baseplate

4.2 Attach Corner 2 to the baseplate



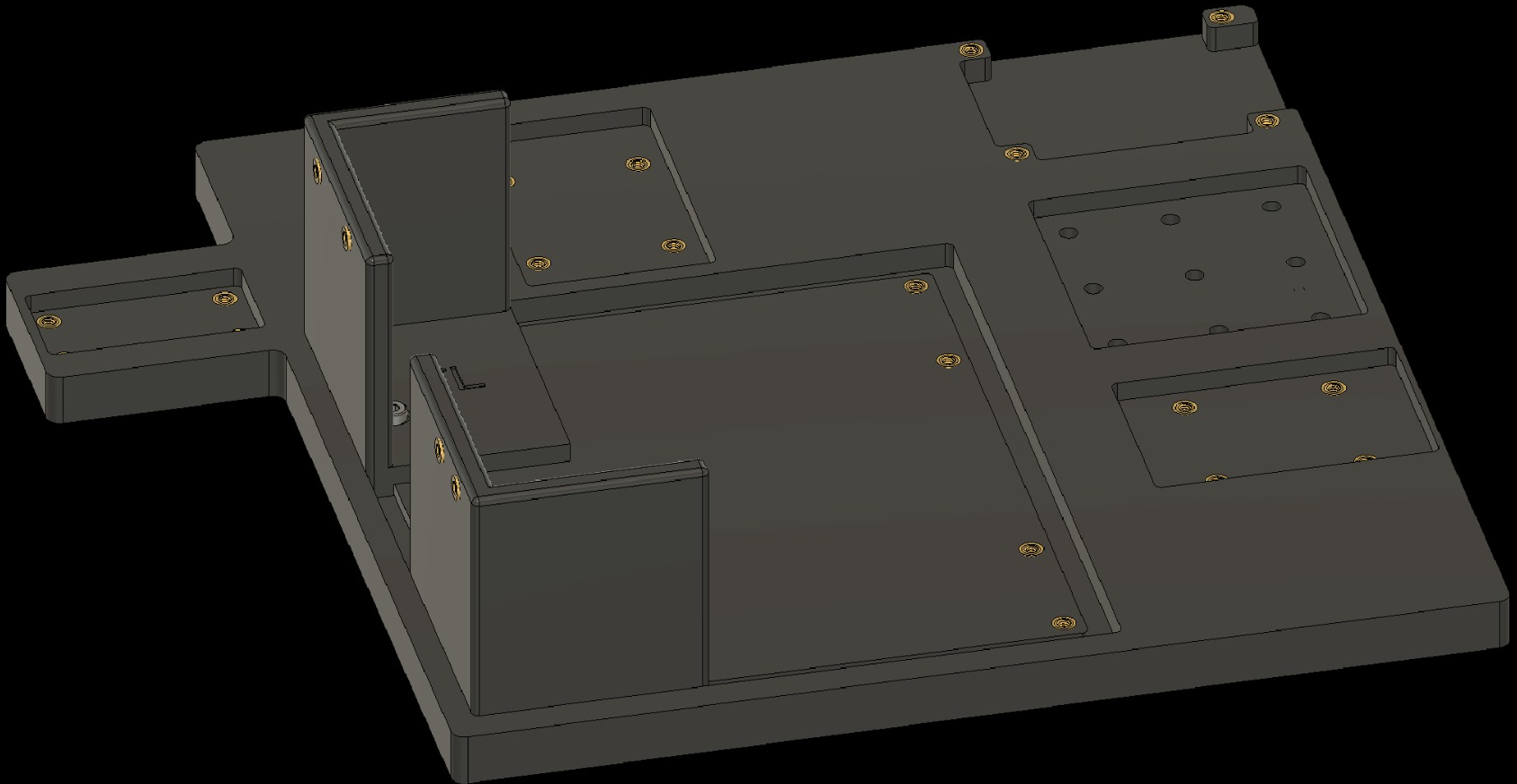
4. Attaching Components to the Baseplate

4.2 Attach Corner 2 to the baseplate



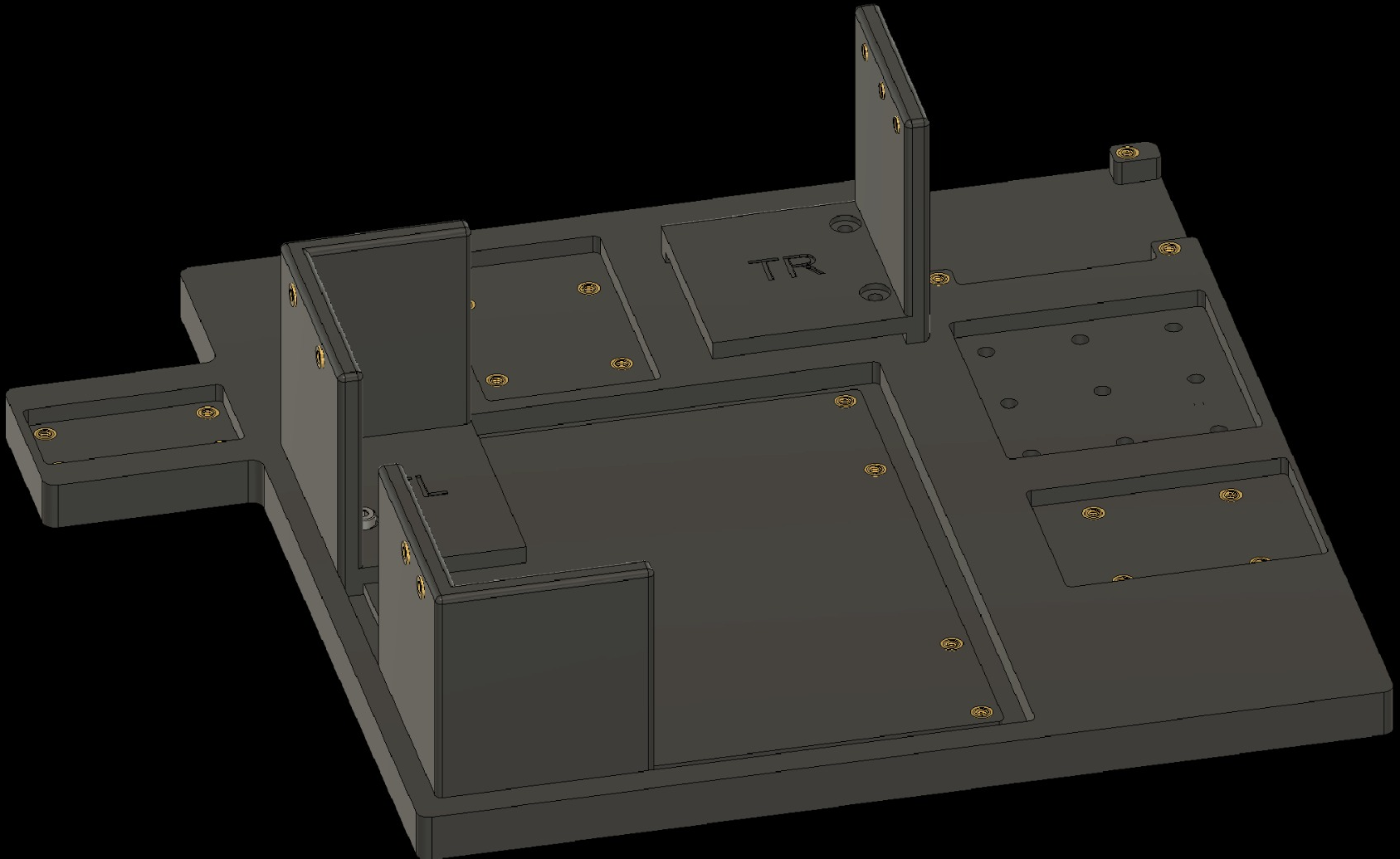
4. Attaching Components to the Baseplate

4.3 Attach Corner 3 to the baseplate



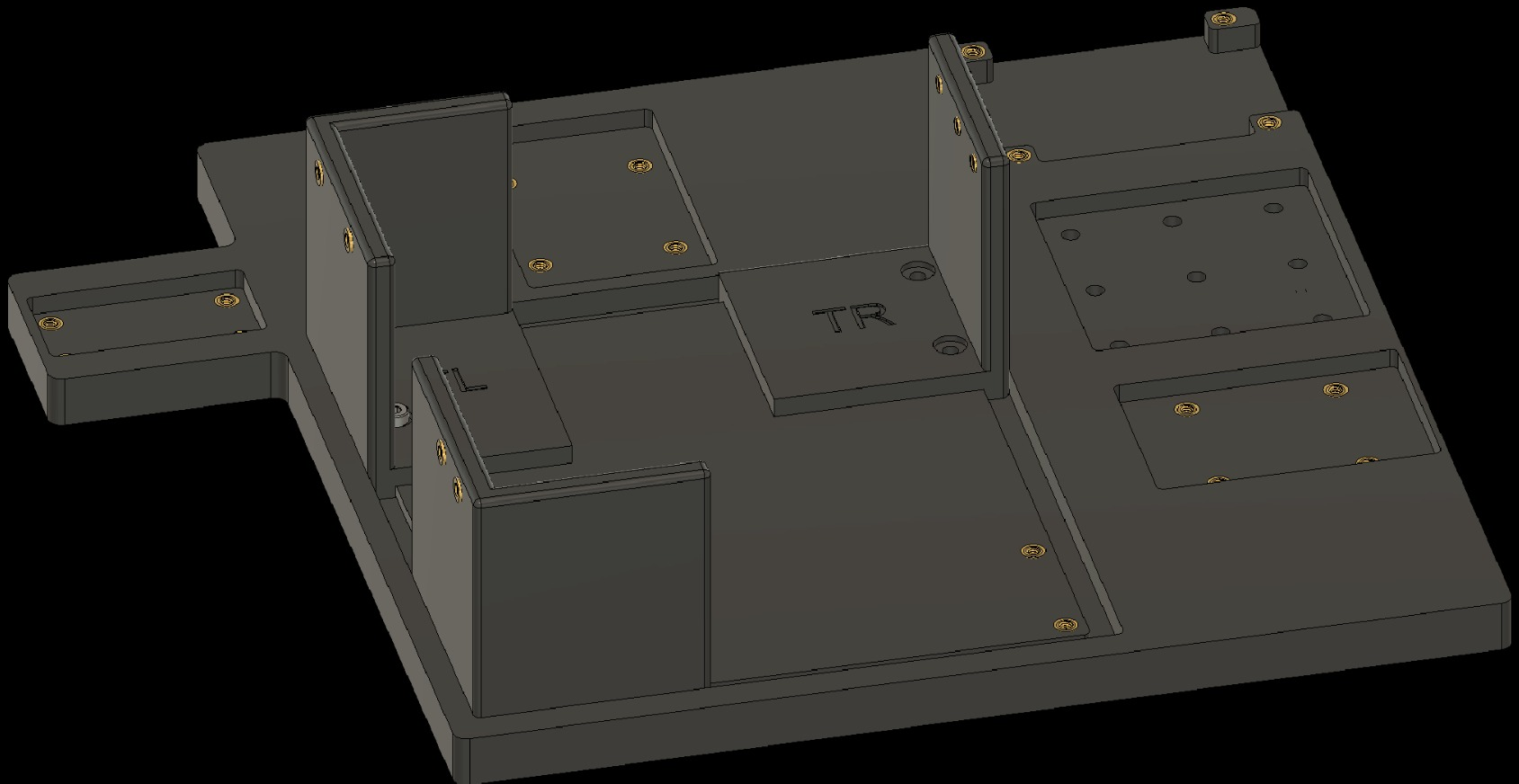
4. Attaching Components to the Baseplate

4.3 Attach Corner 3 to the baseplate



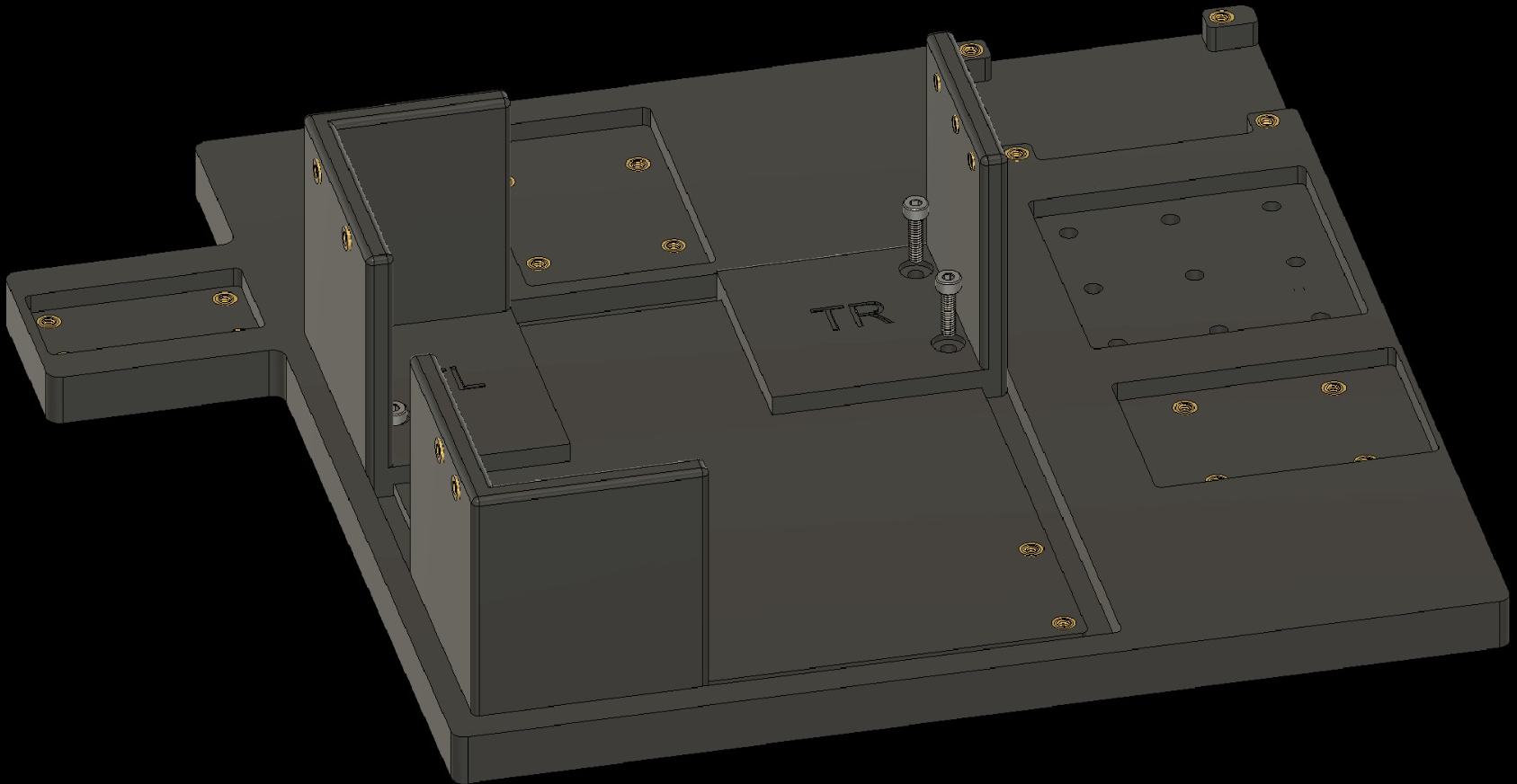
4. Attaching Components to the Baseplate

4.3 Attach Corner 3 to the baseplate



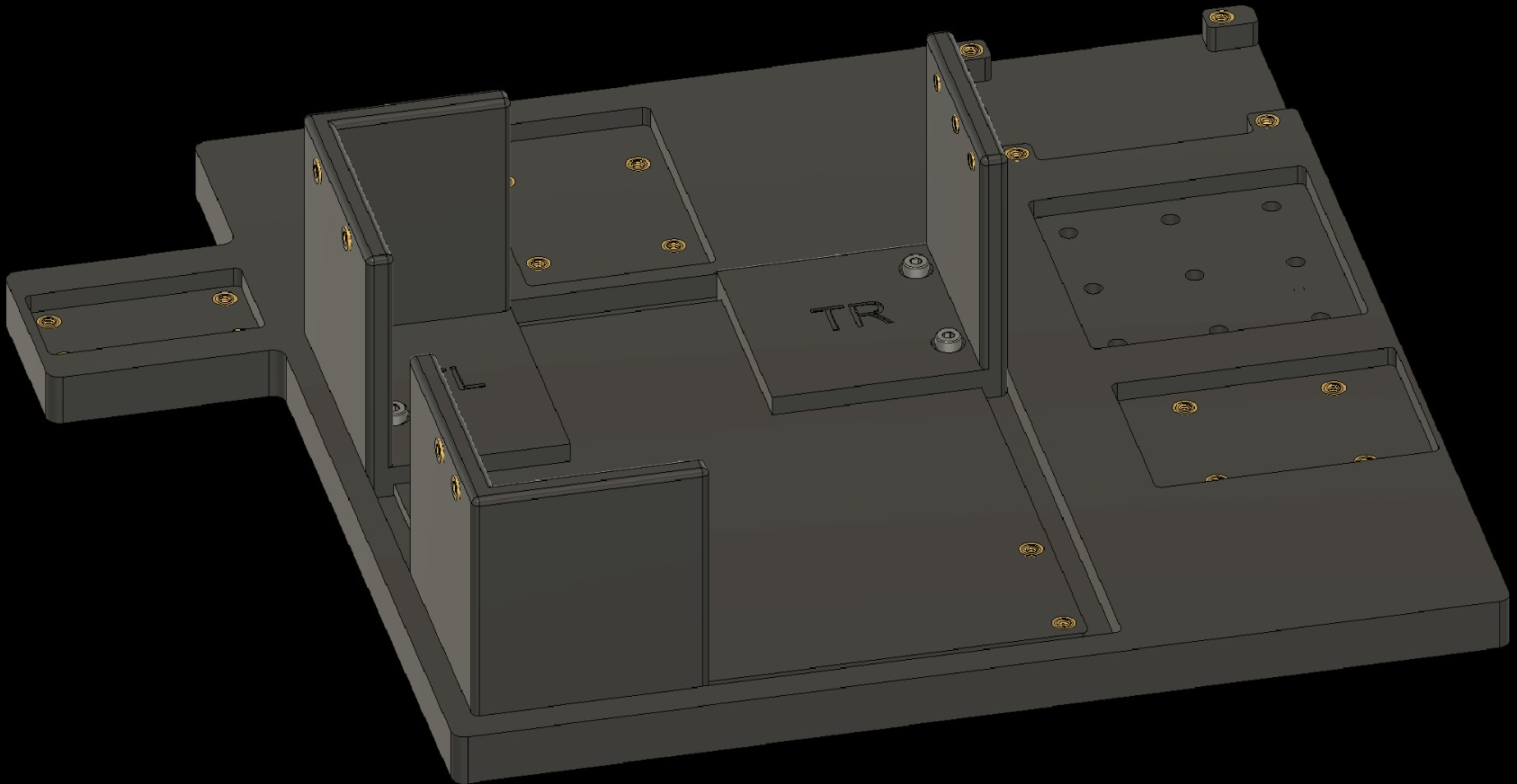
4. Attaching Components to the Baseplate

4.3 Attach Corner 3 to the baseplate



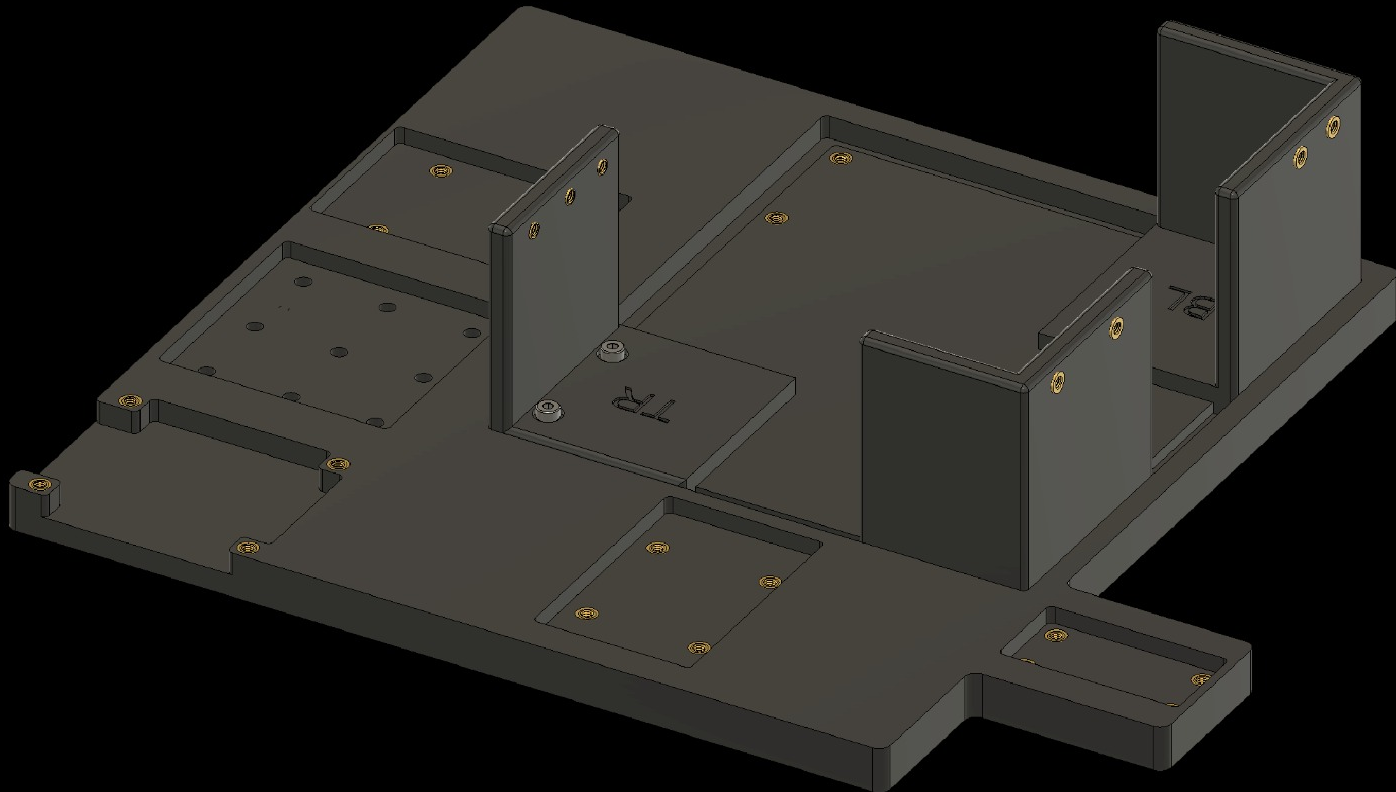
4. Attaching Components to the Baseplate

4.3 Attach Corner 3 to the baseplate



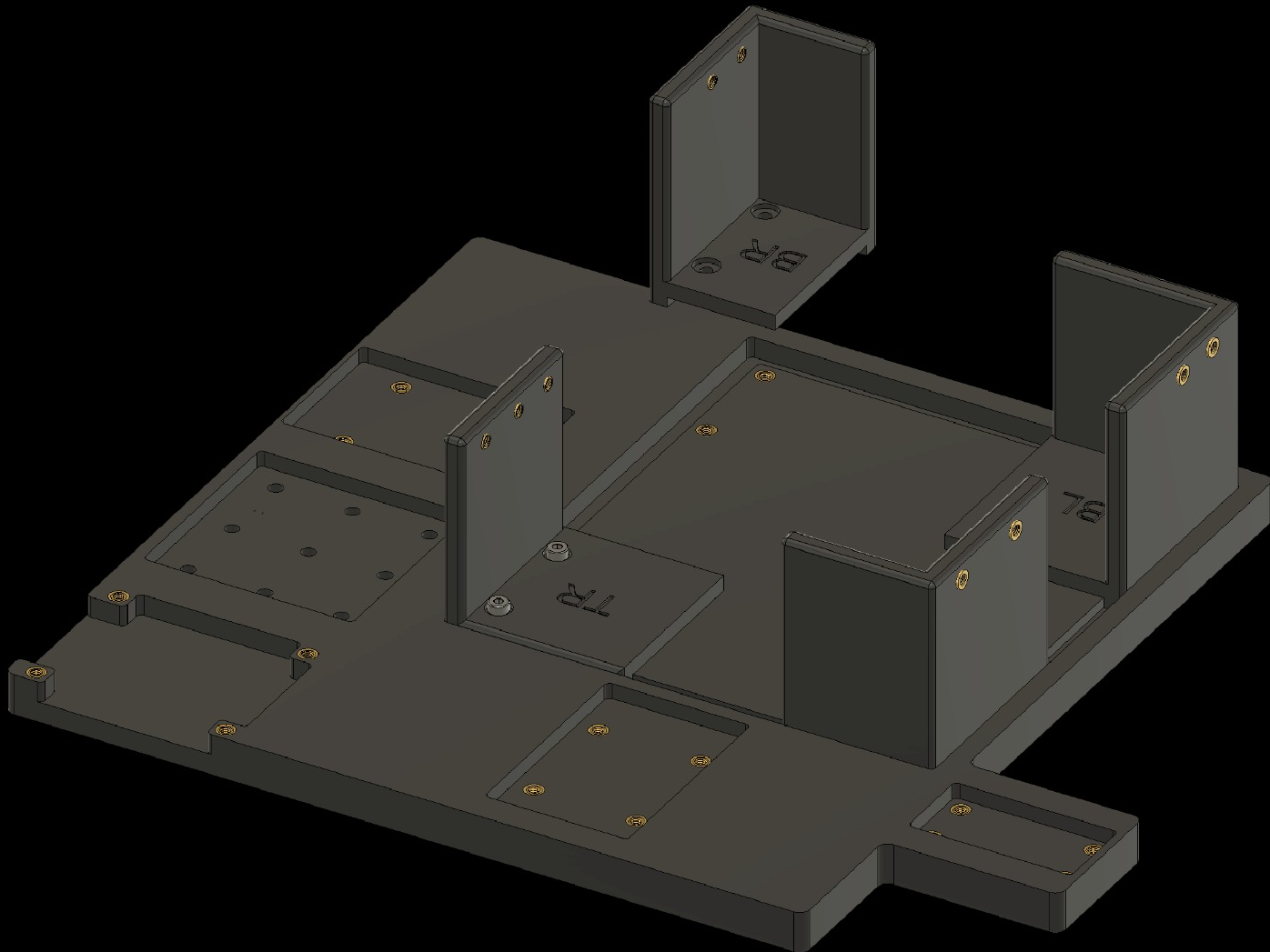
4. Attaching Components to the Baseplate

4.4 Attach Corner 4 to the baseplate



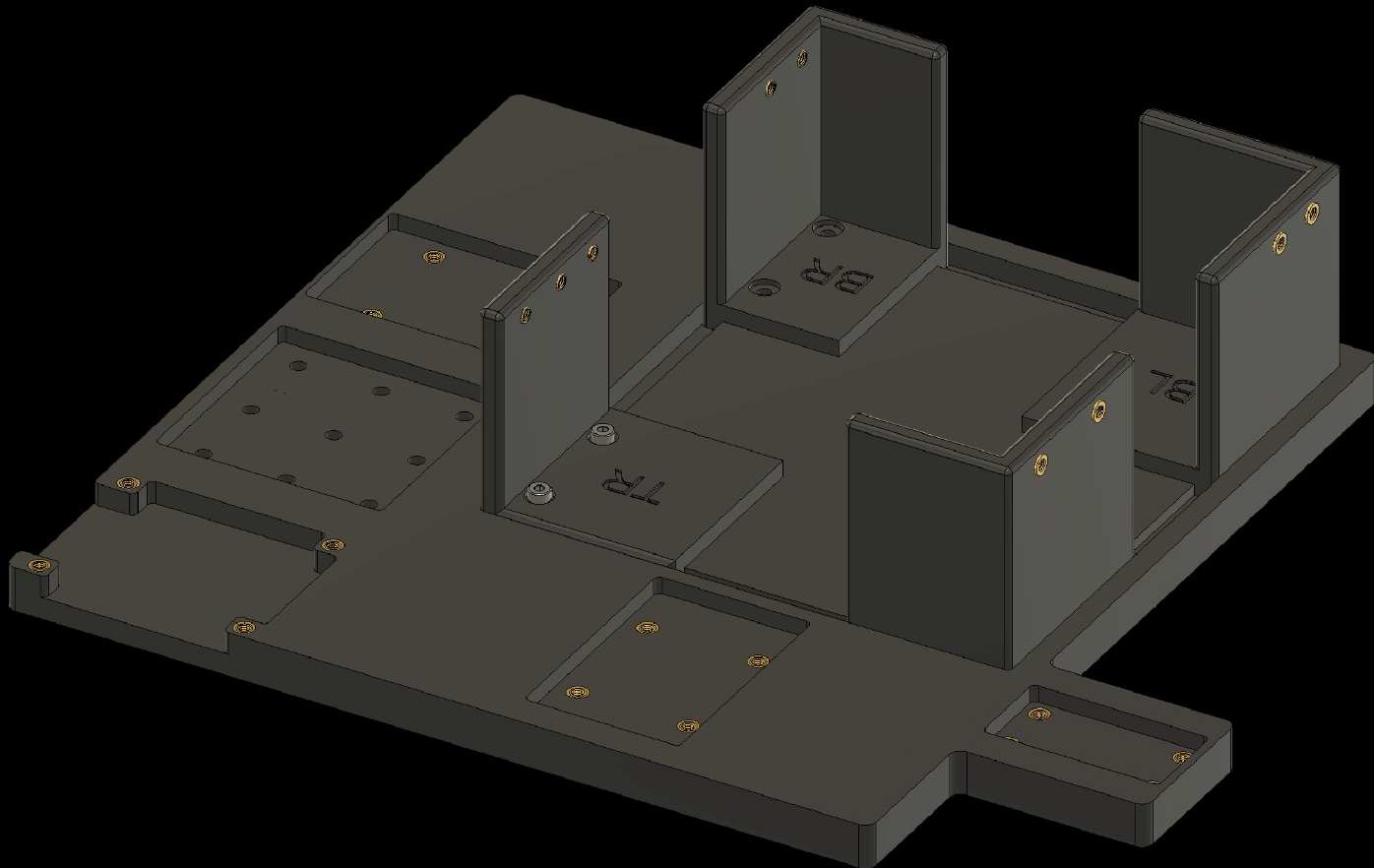
4. Attaching Components to the Baseplate

4.4 Attach Corner 4 to the baseplate



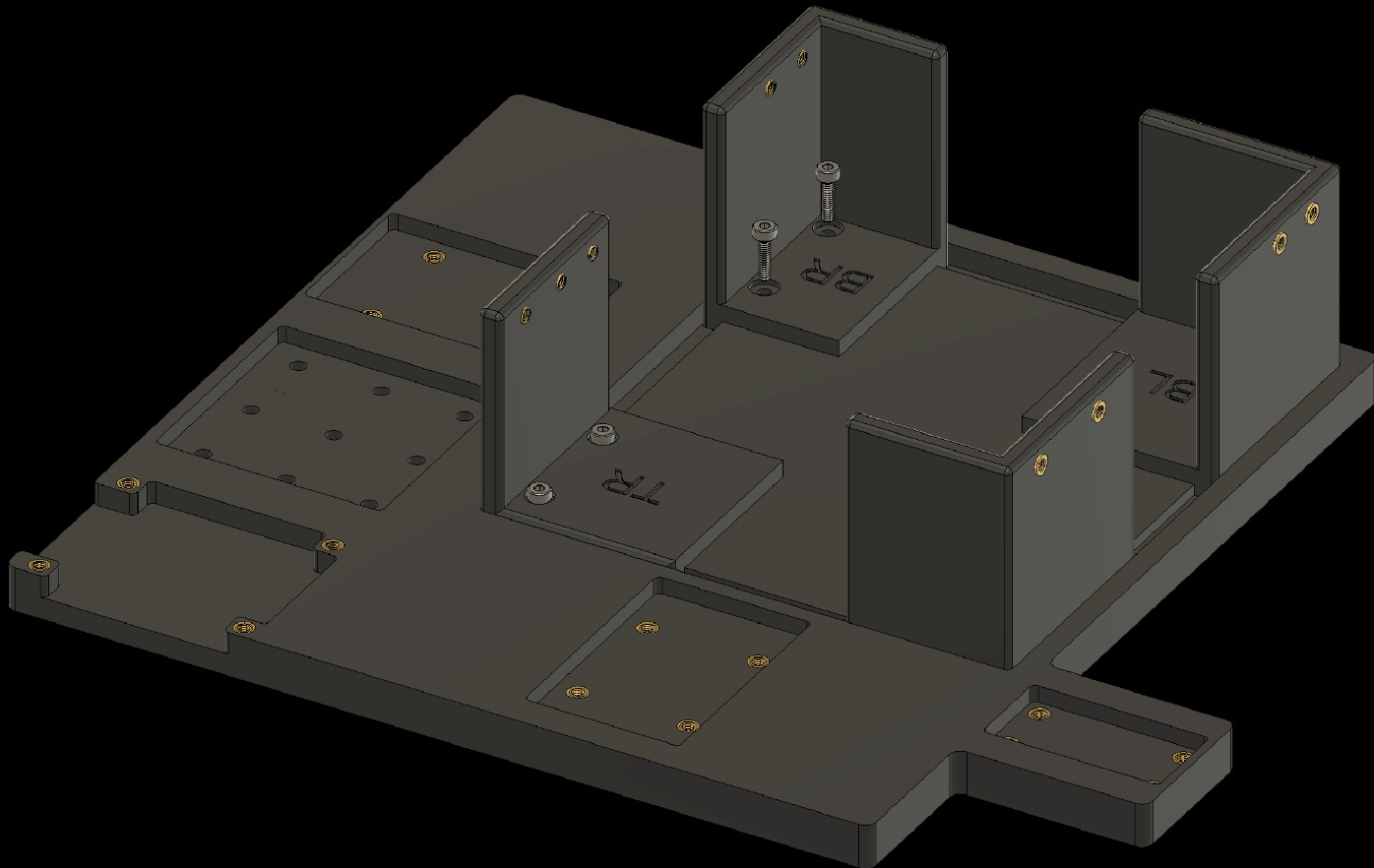
4. Attaching Components to the Baseplate

4.4 Attach Corner 4 to the baseplate



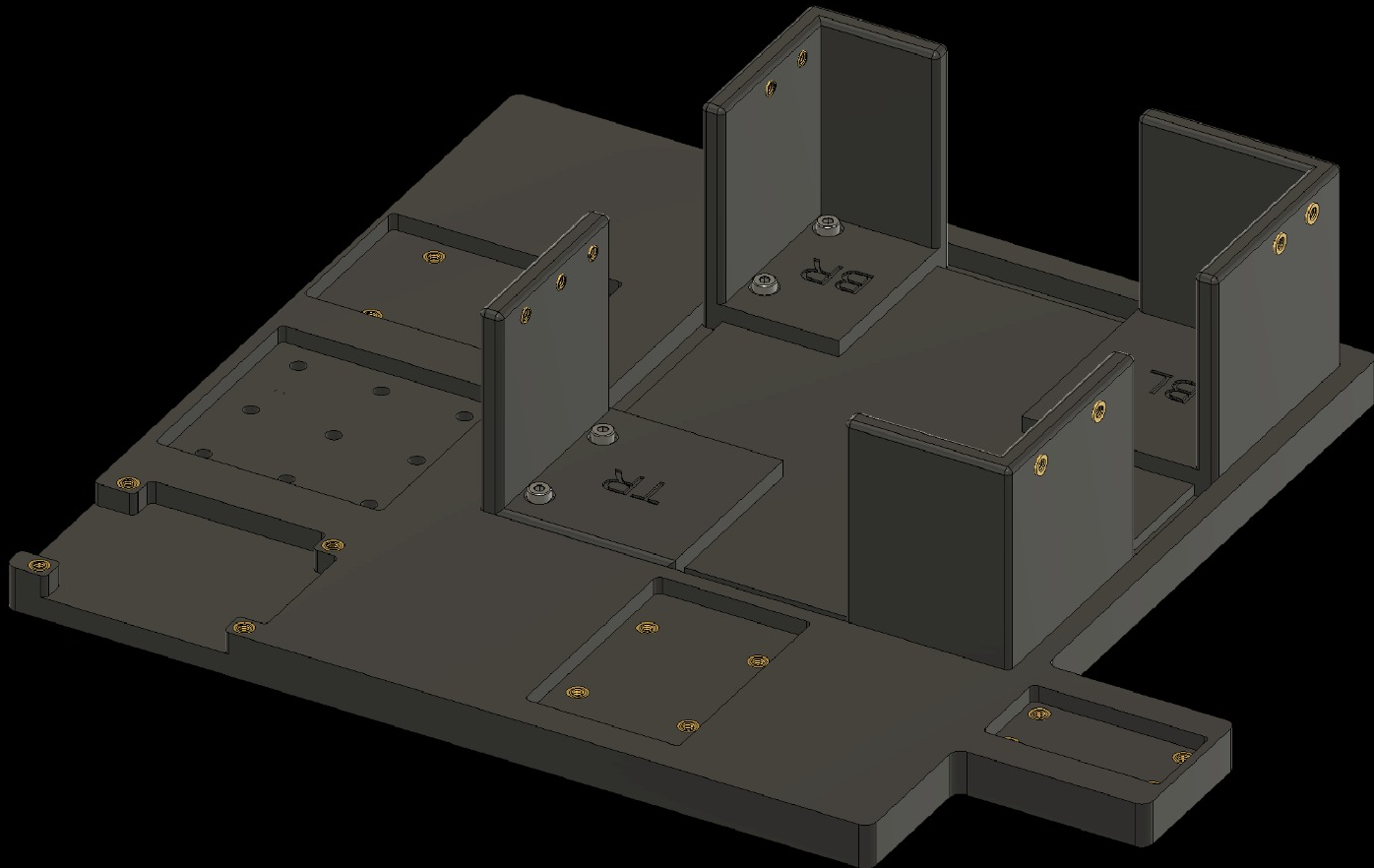
4. Attaching Components to the Baseplate

4.4 Attach Corner 4 to the baseplate



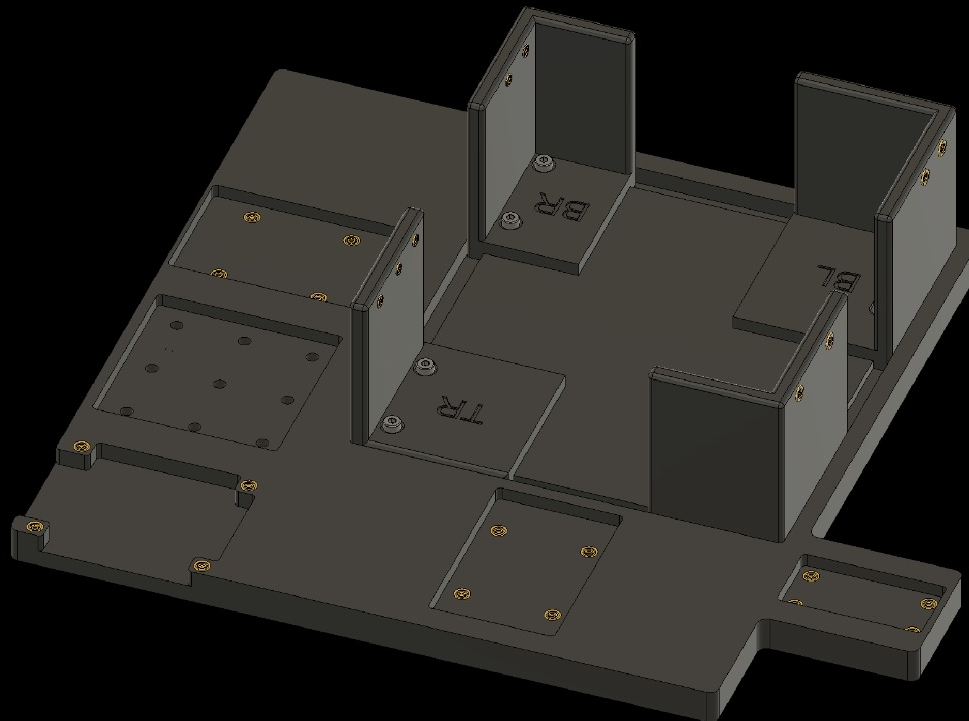
4. Attaching Components to the Baseplate

4.4 Attach Corner 4 to the baseplate



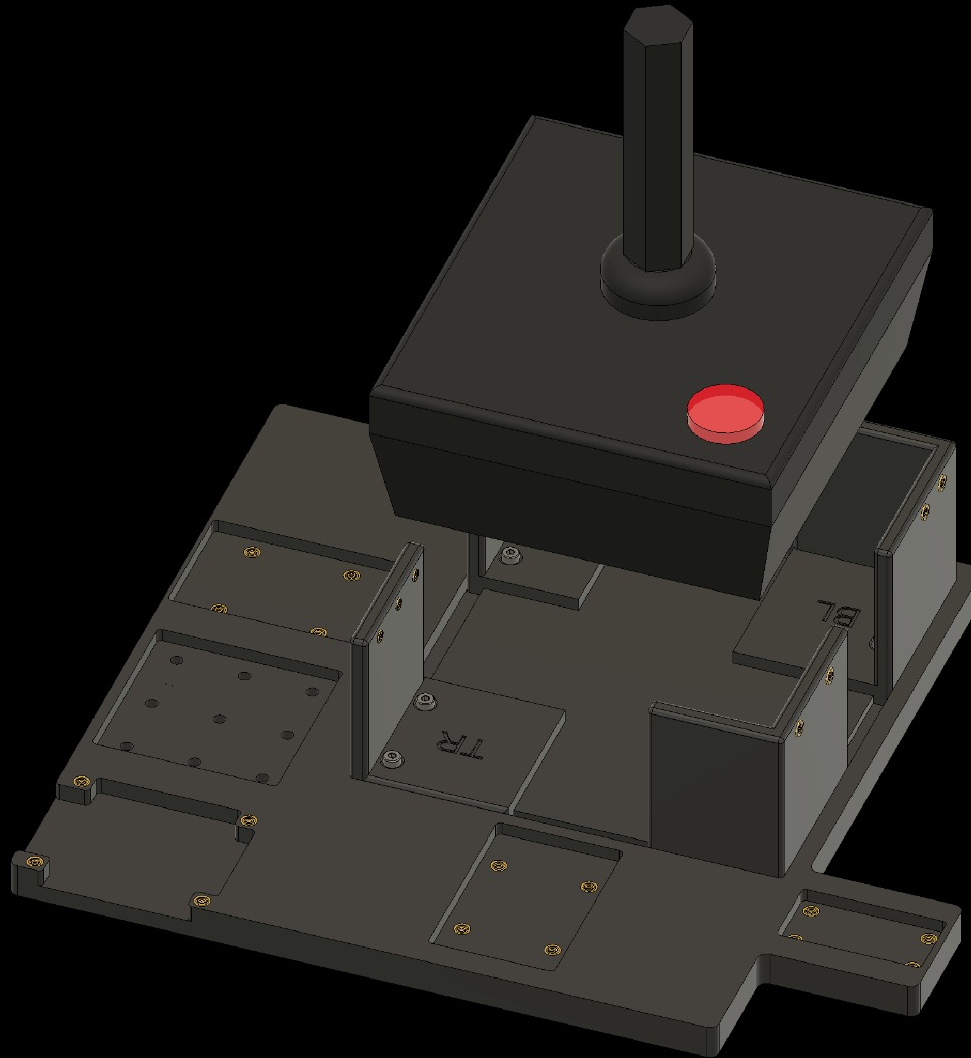
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



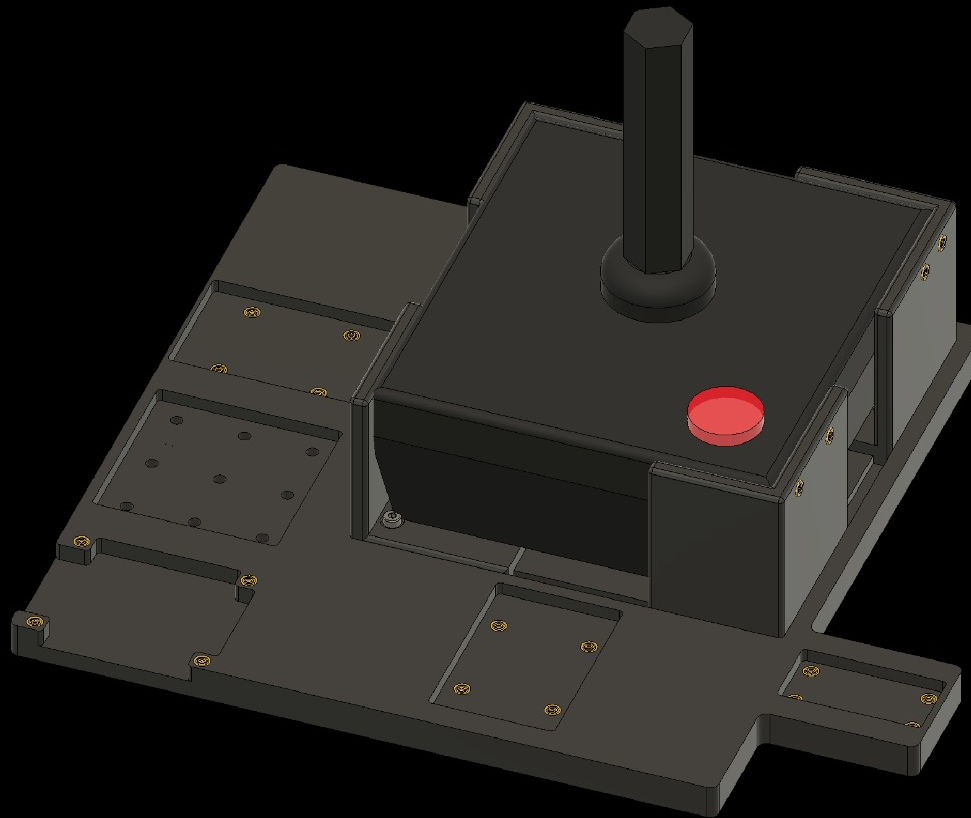
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



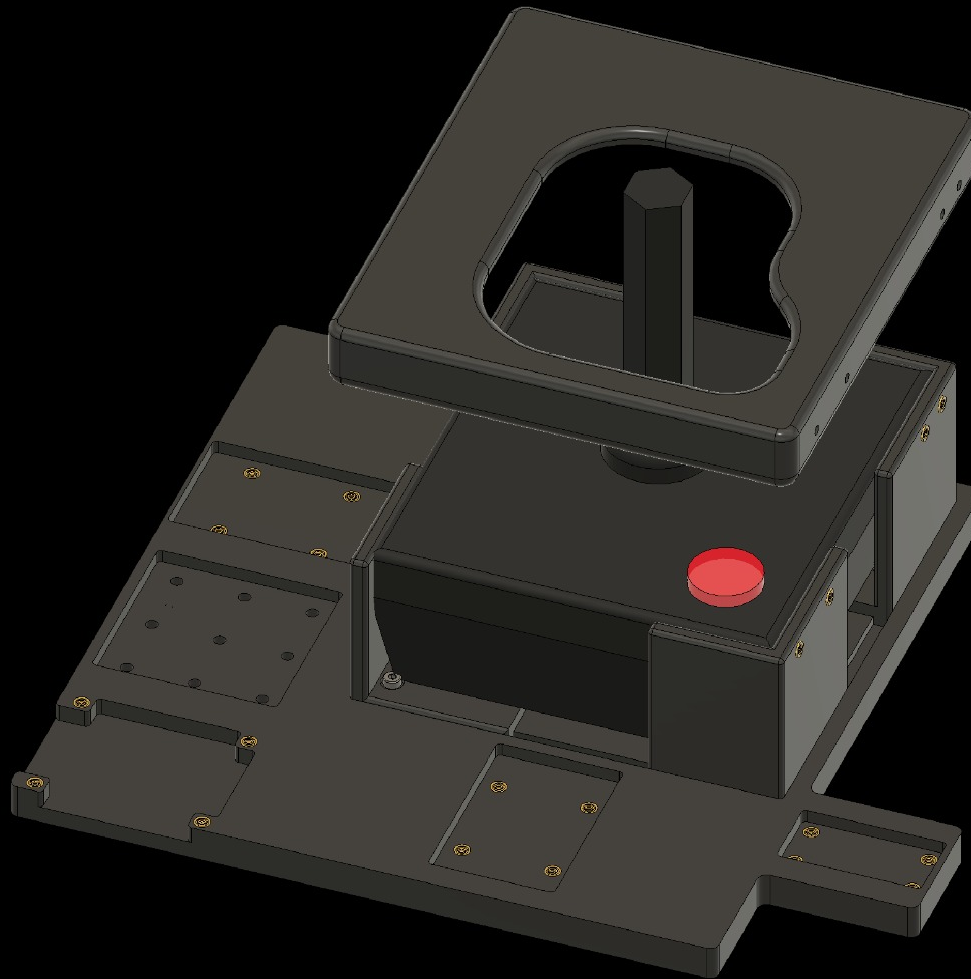
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



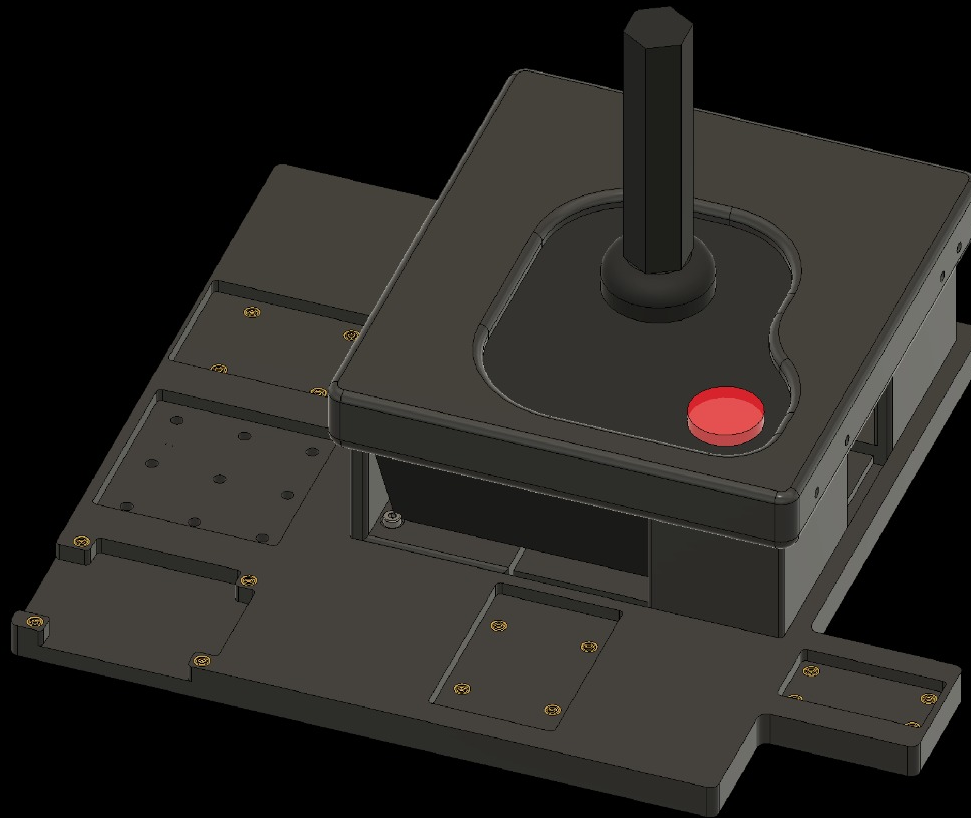
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



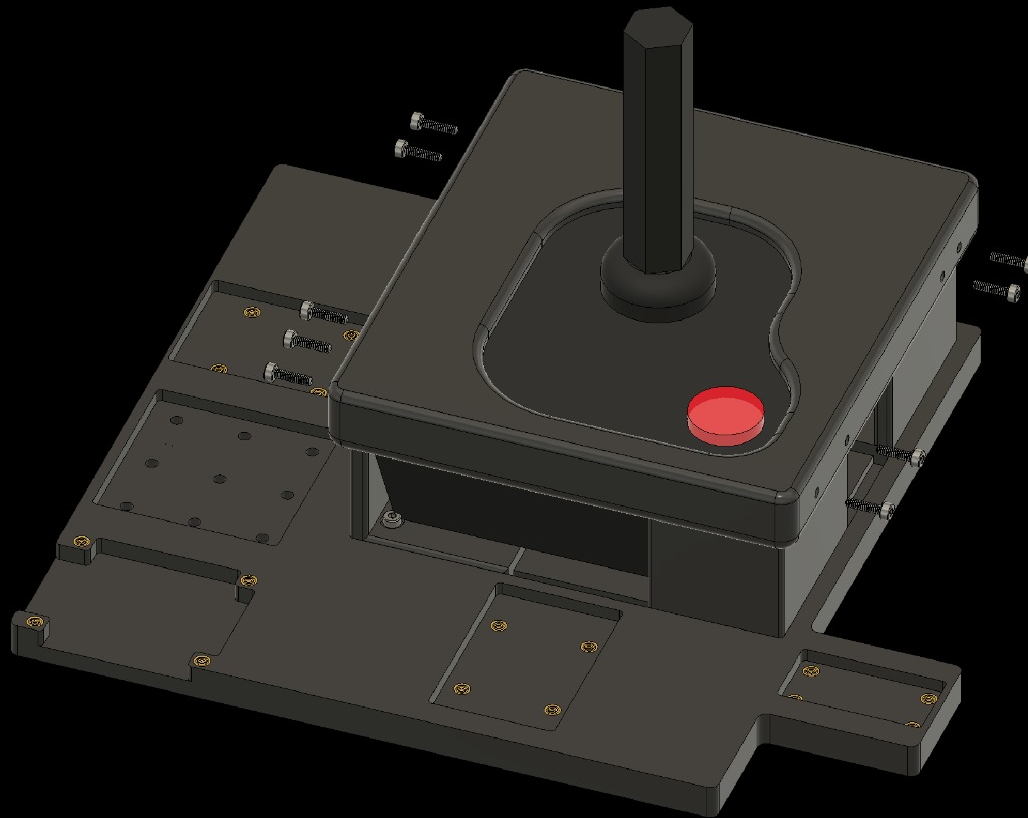
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



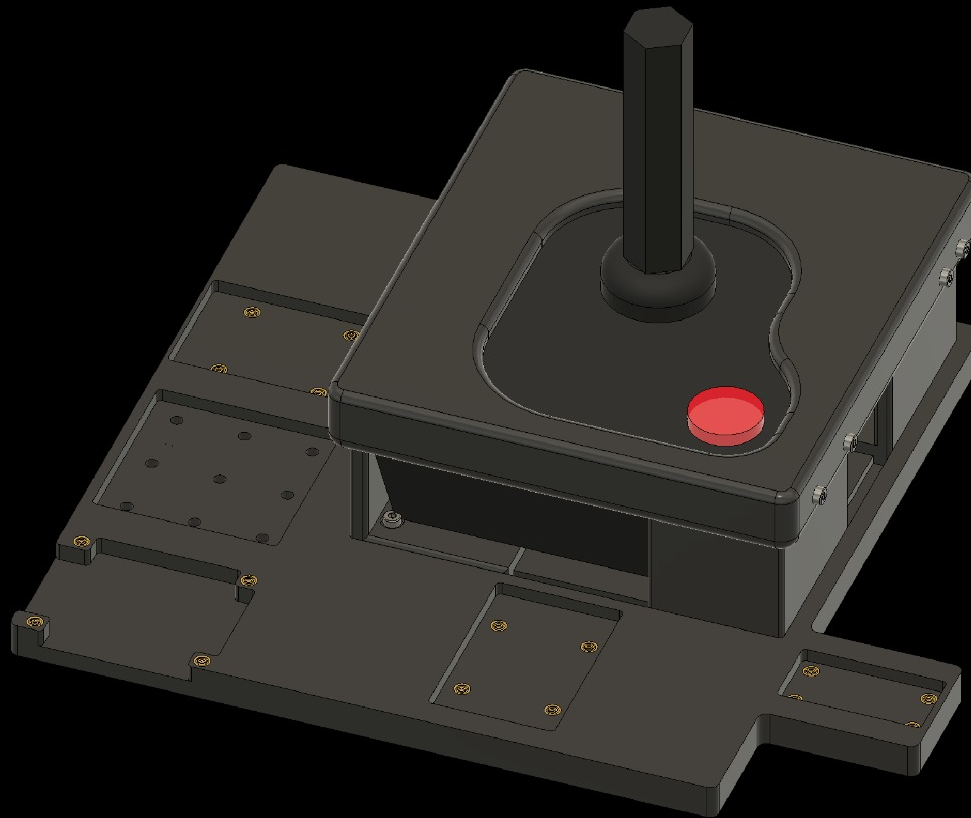
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



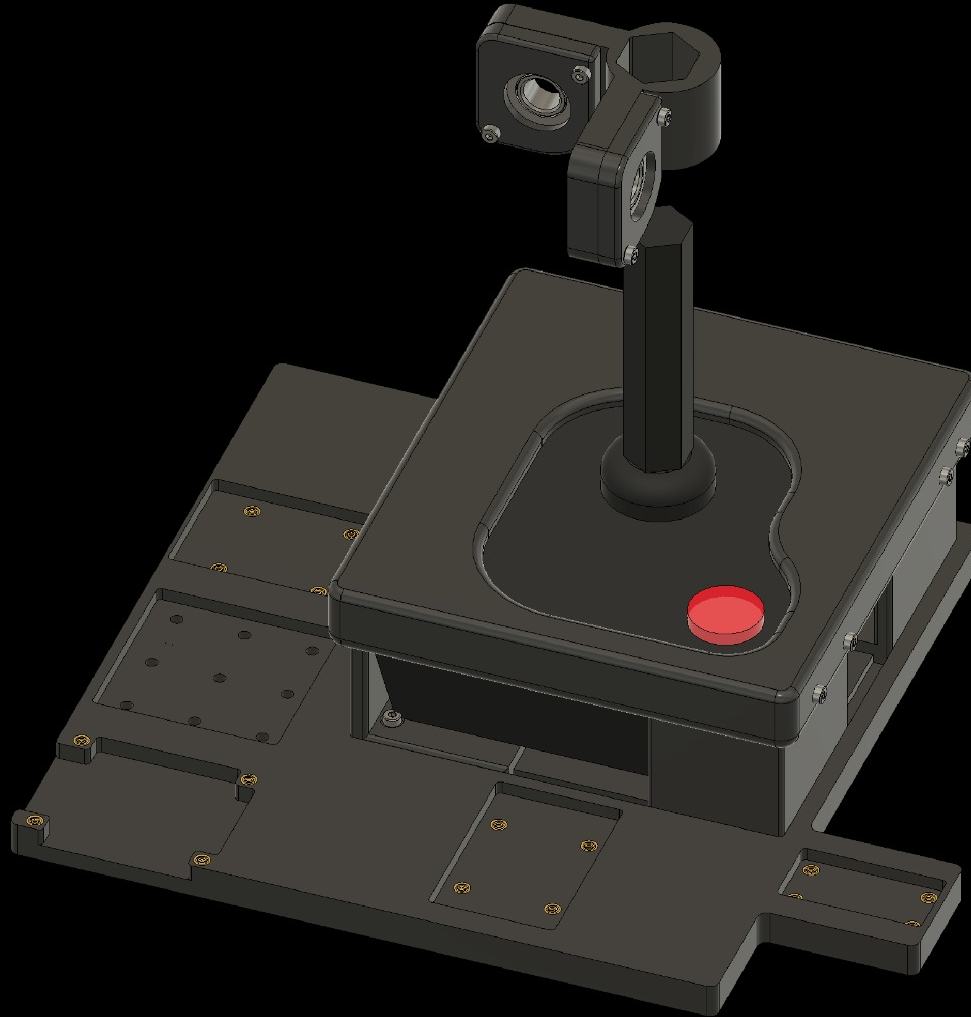
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



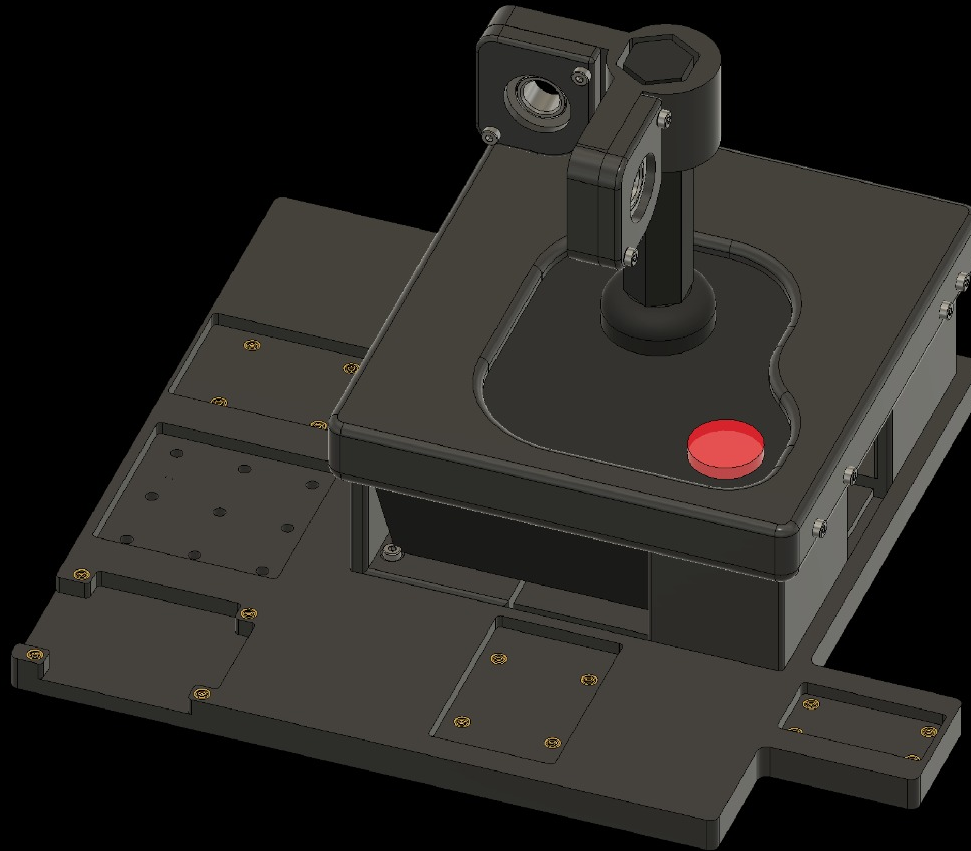
4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



4. Attaching Components to the Baseplate

4.5 Attach the CX40+ Controller to the baseplate



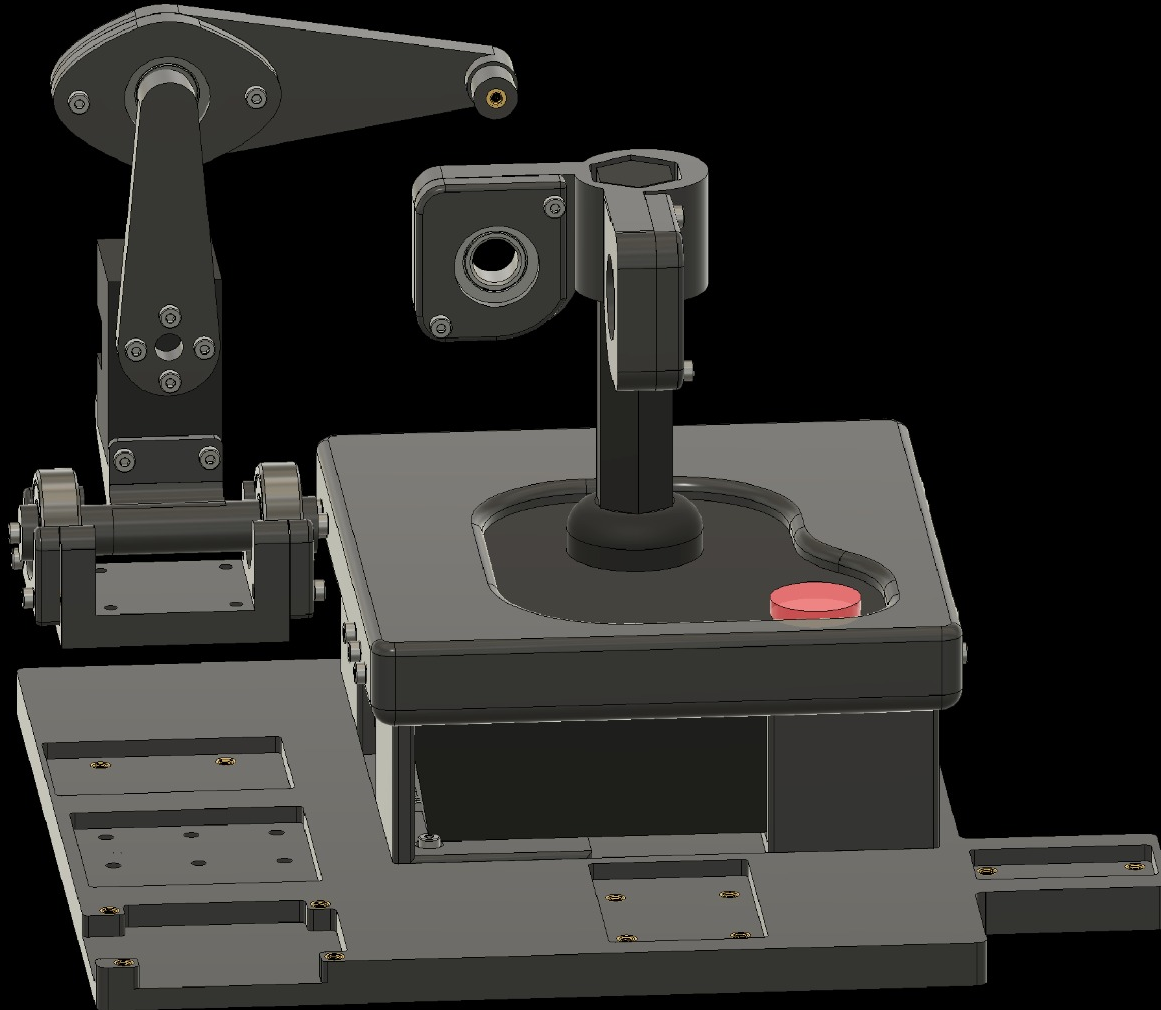
4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



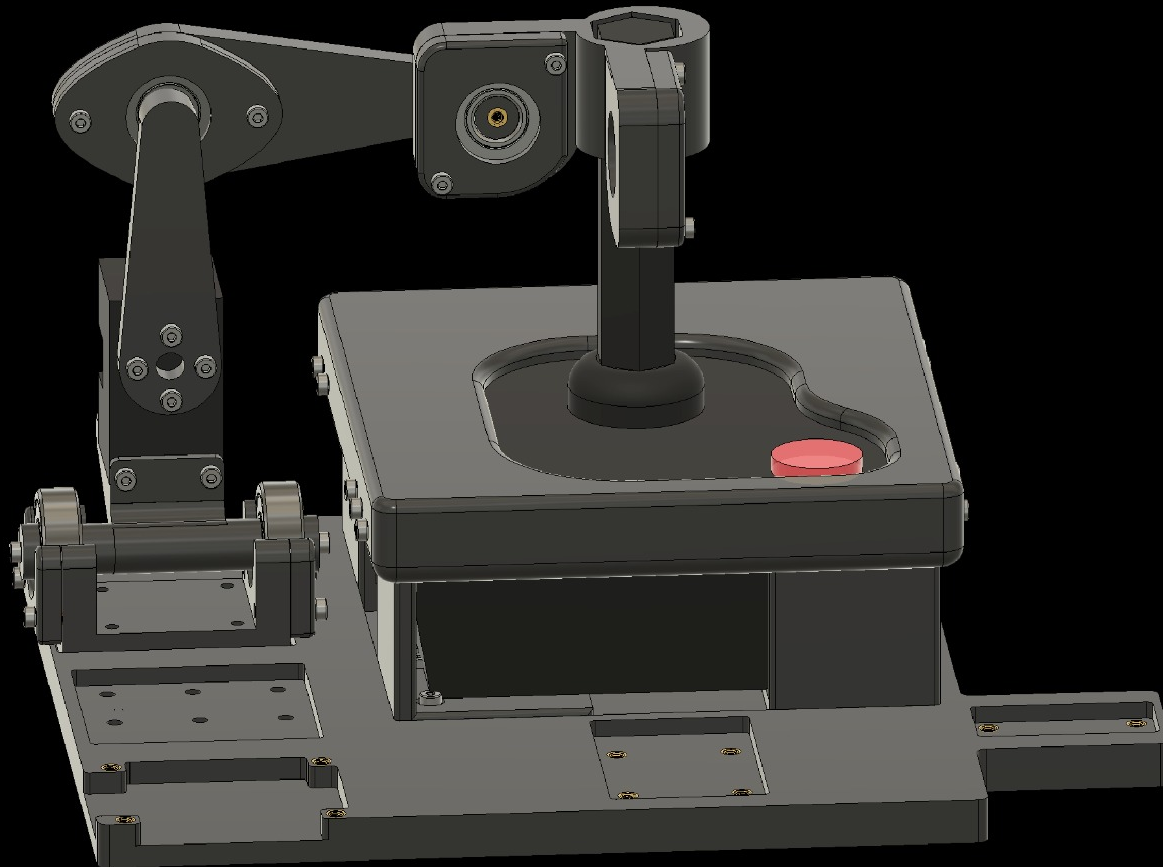
4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



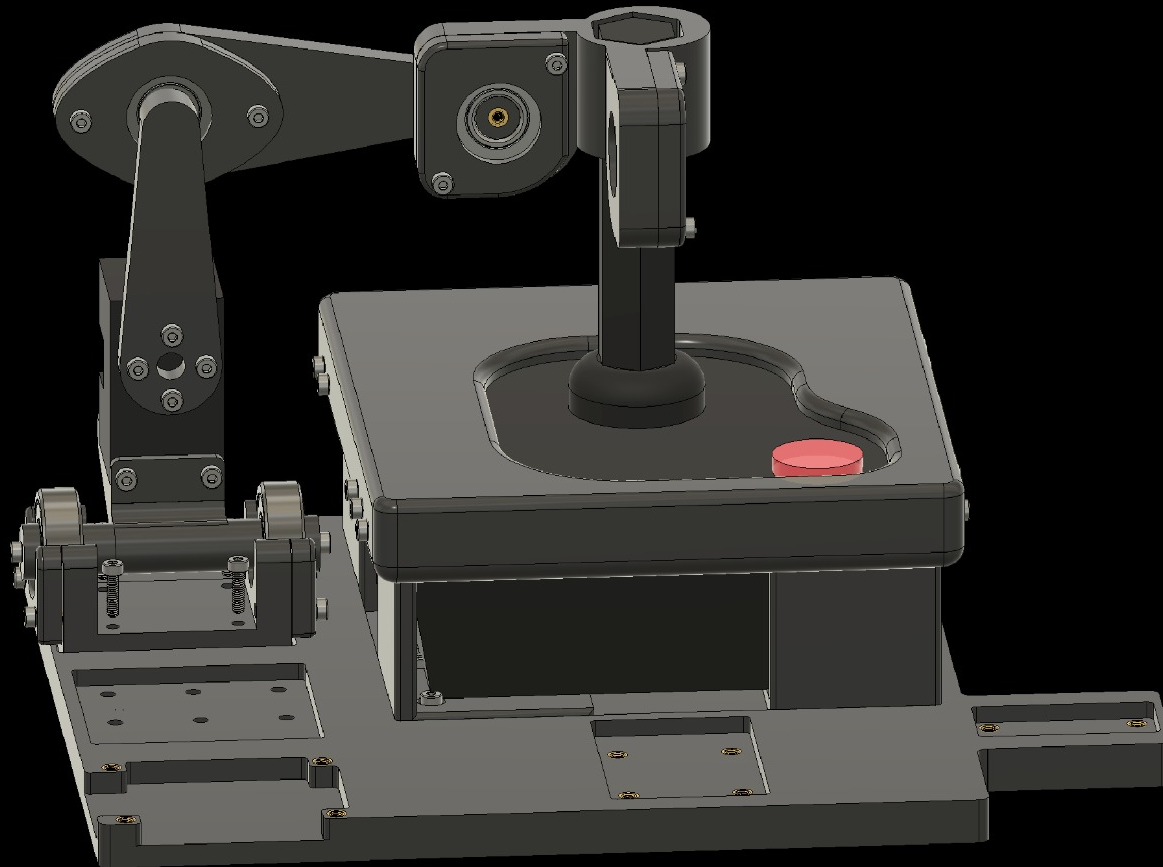
4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



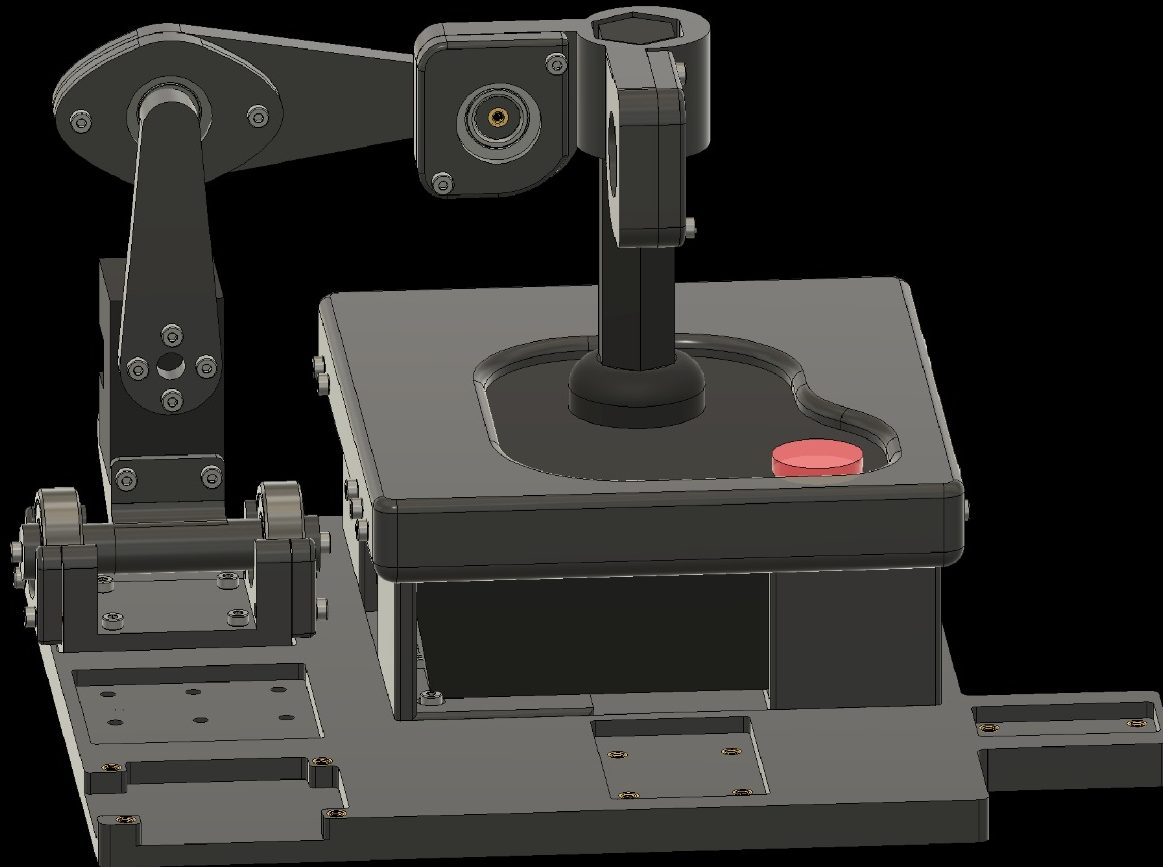
4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



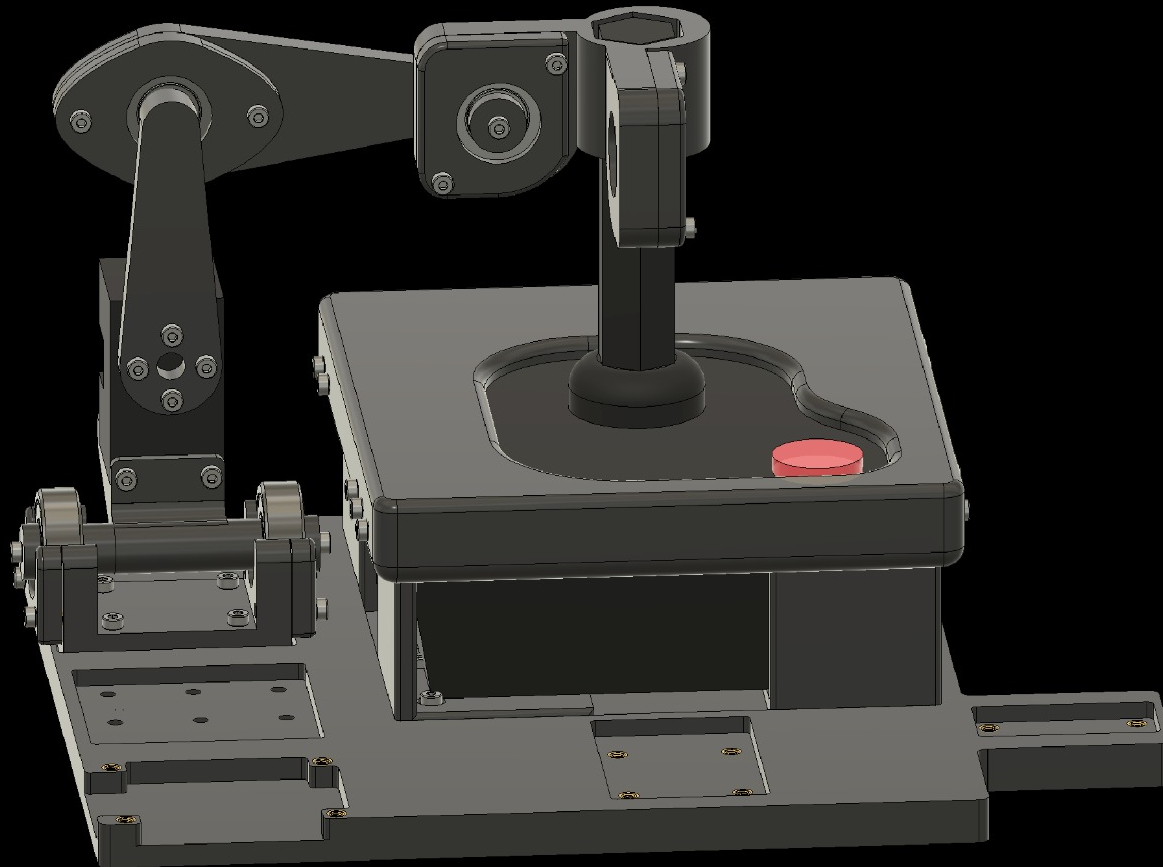
4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



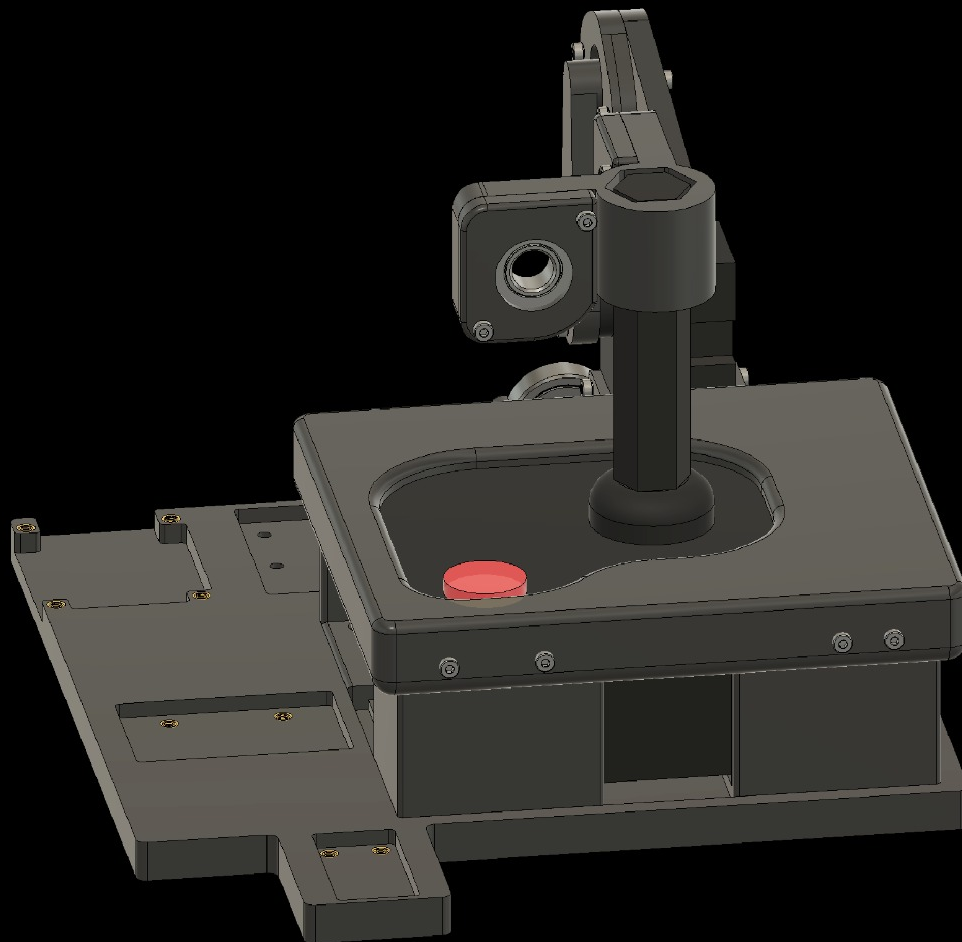
4. Attaching Components to the Baseplate

4.6 Attach the Left-Right Arm to the baseplate



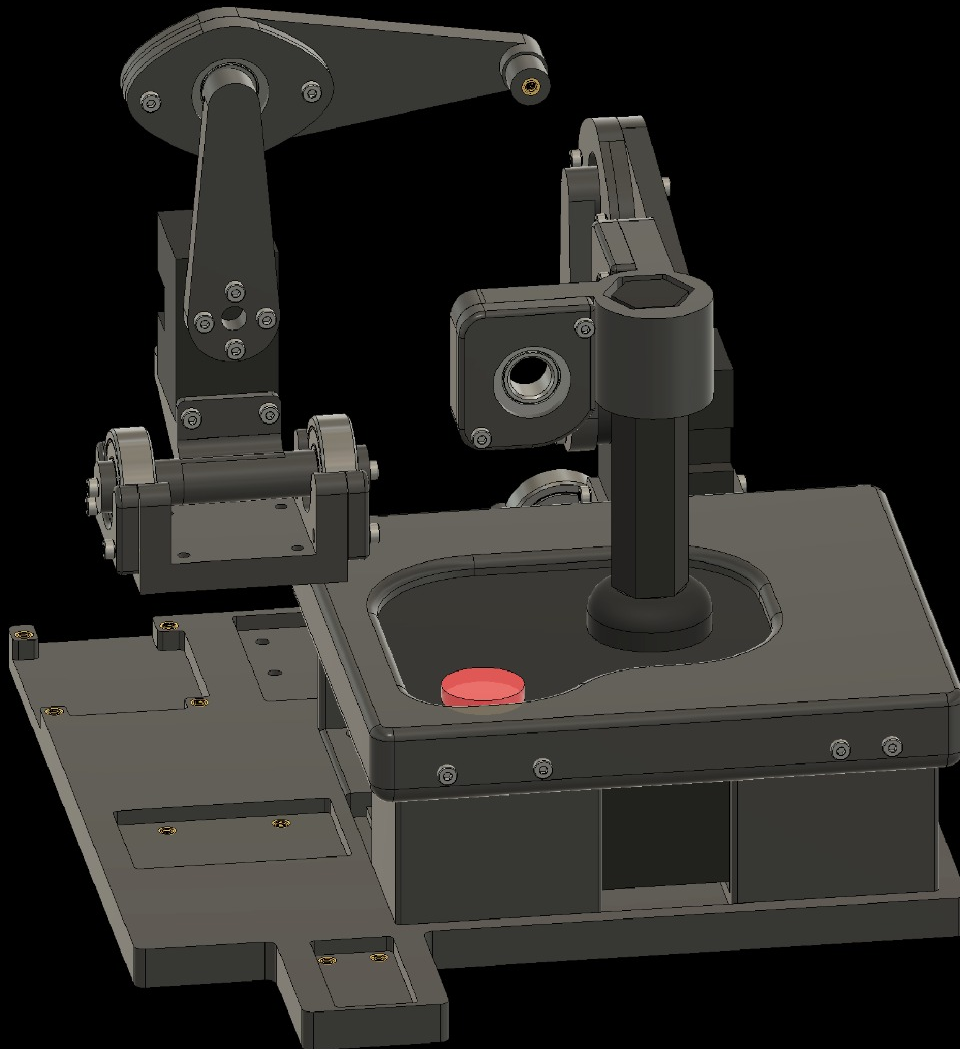
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



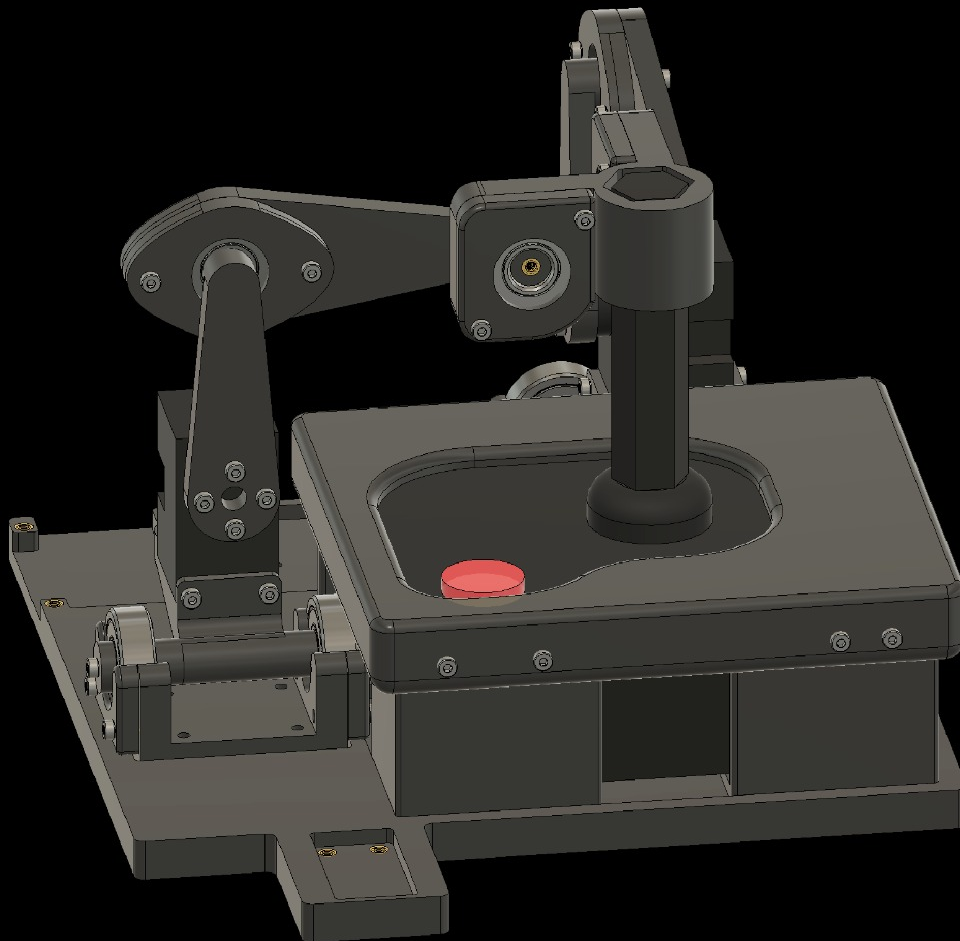
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



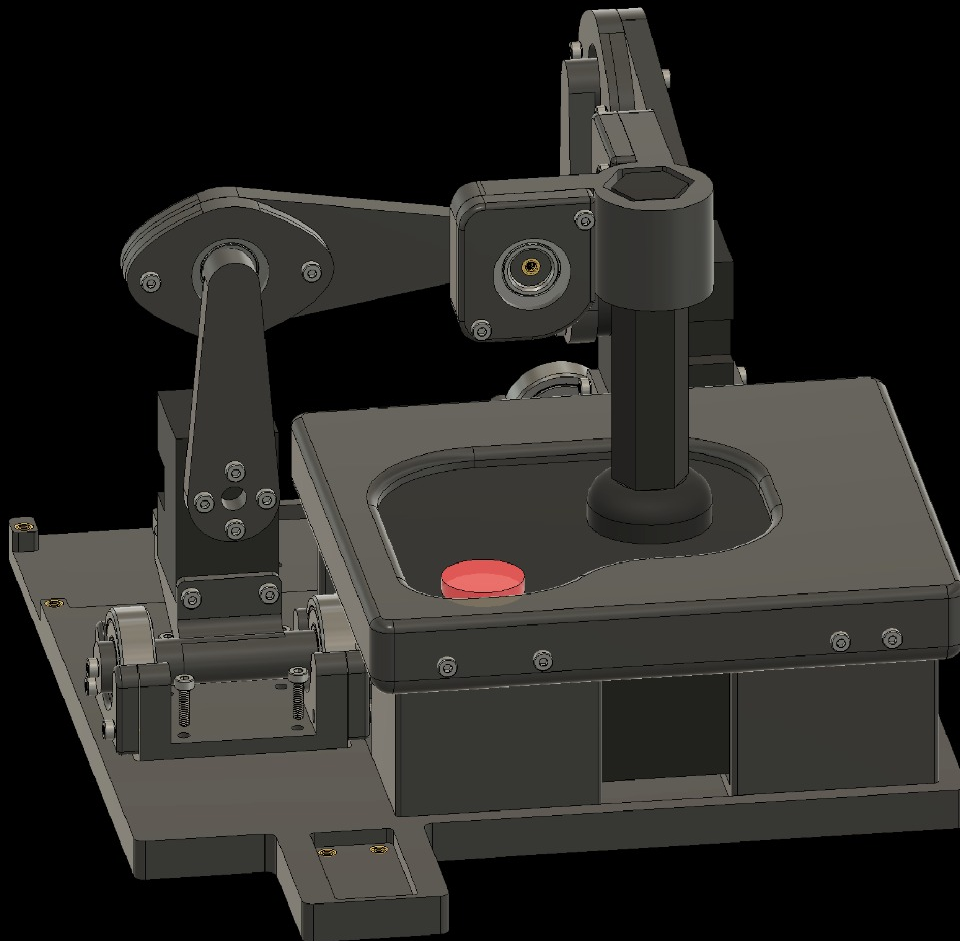
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



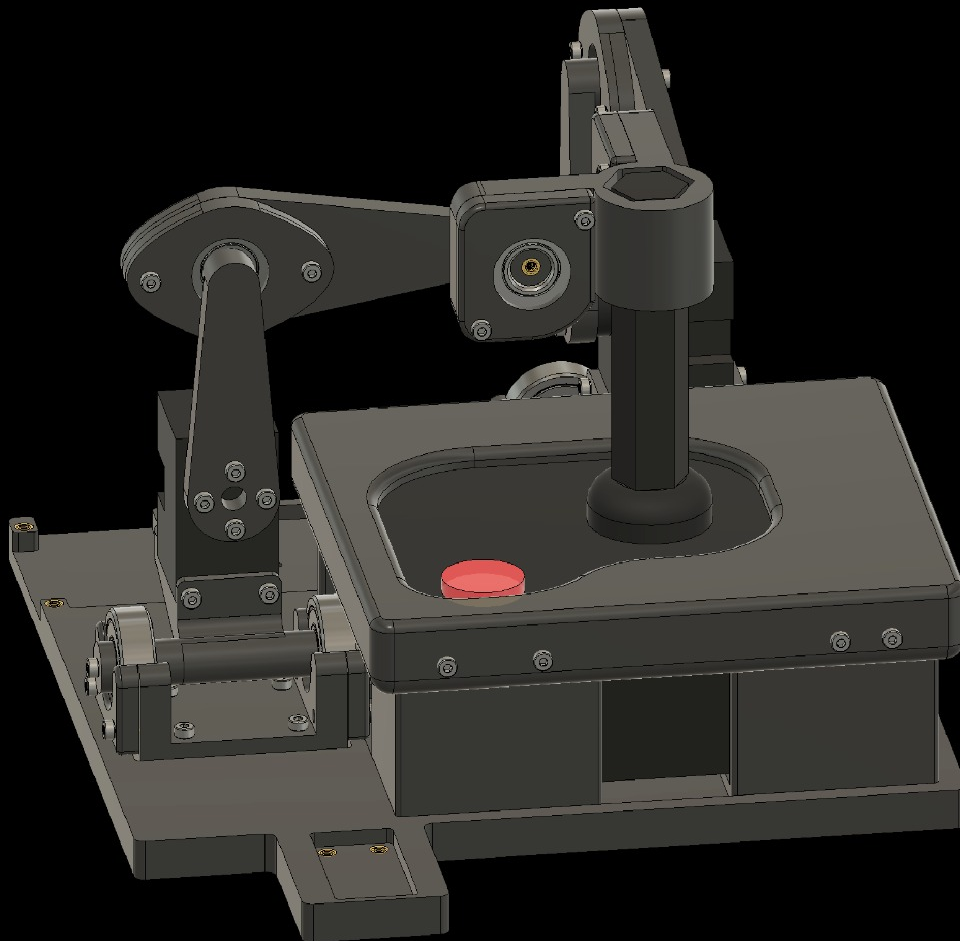
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



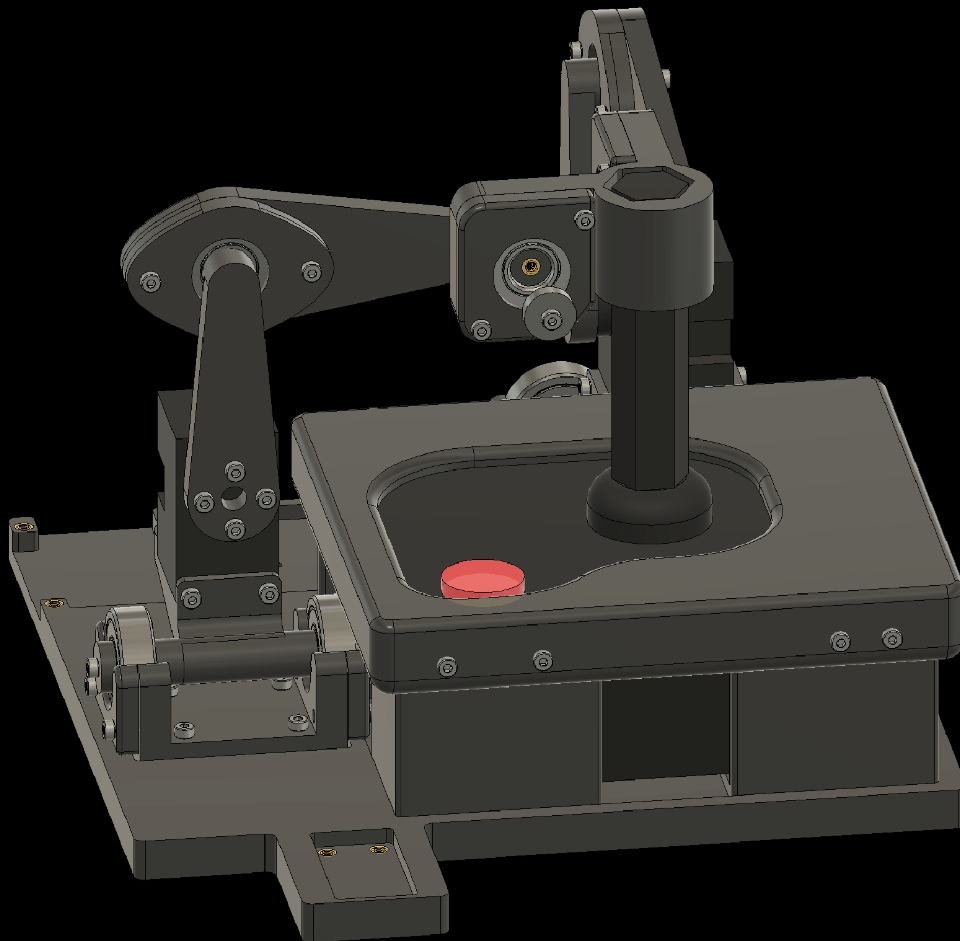
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



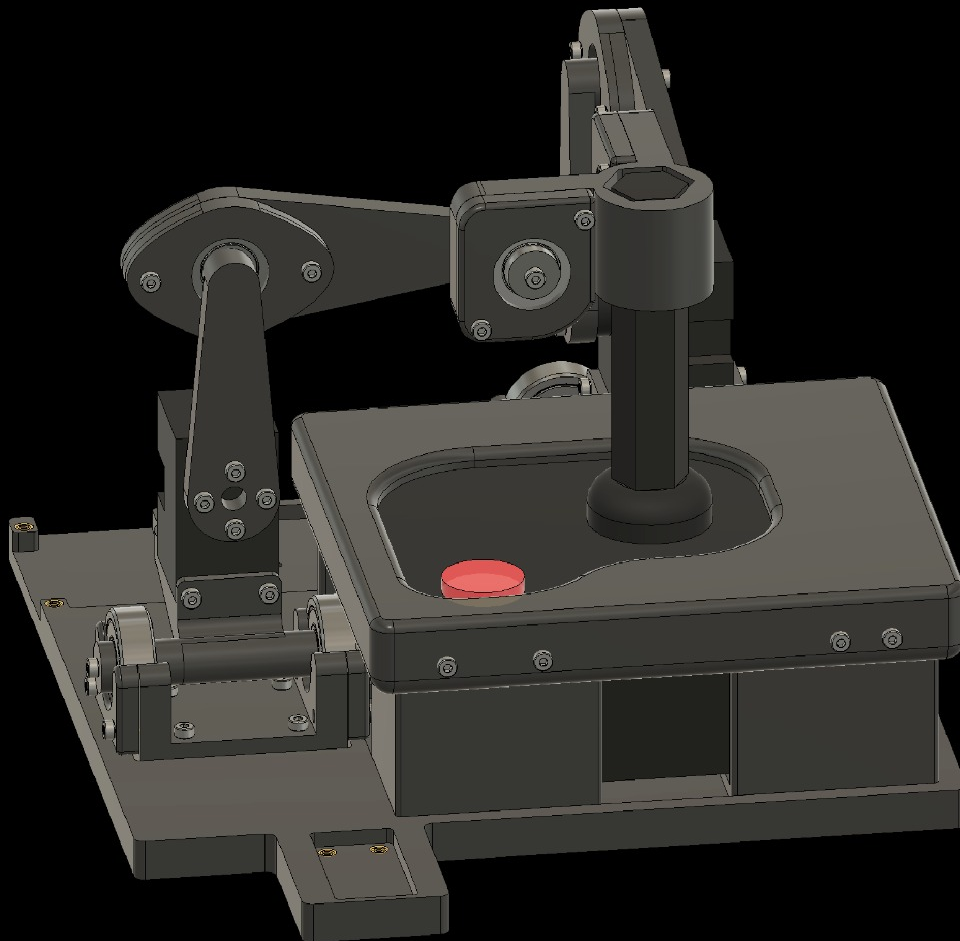
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



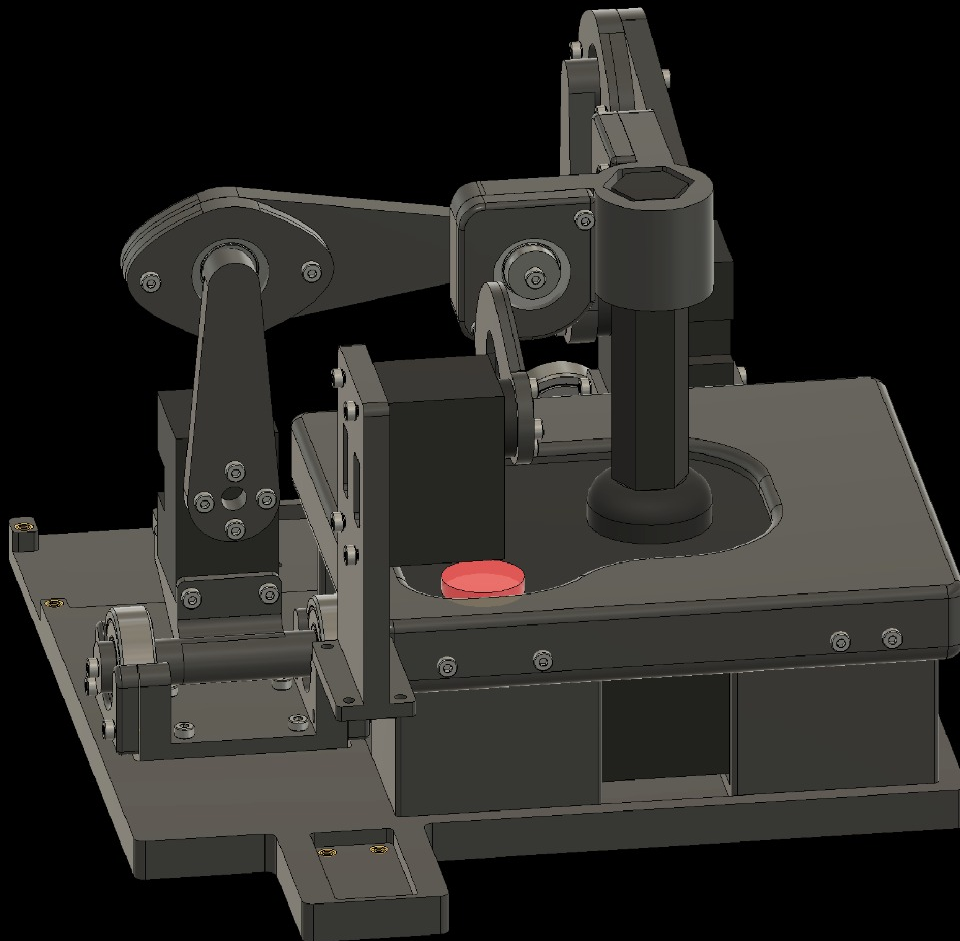
4. Attaching Components to the Baseplate

4.7 Attach the Up-Down Arm to the baseplate



4. Attaching Components to the Baseplate

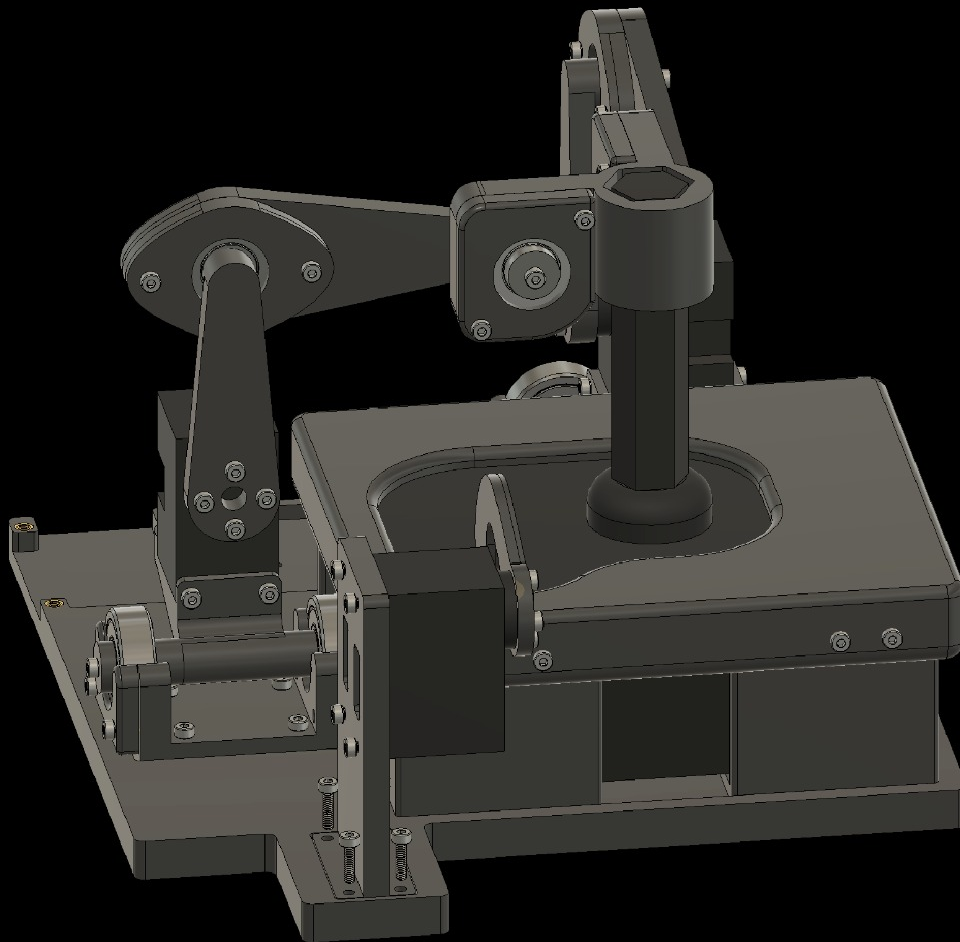
4.8 Attach the Fire Finger to the baseplate



4.8 Attach the Fire Finger to the baseplate

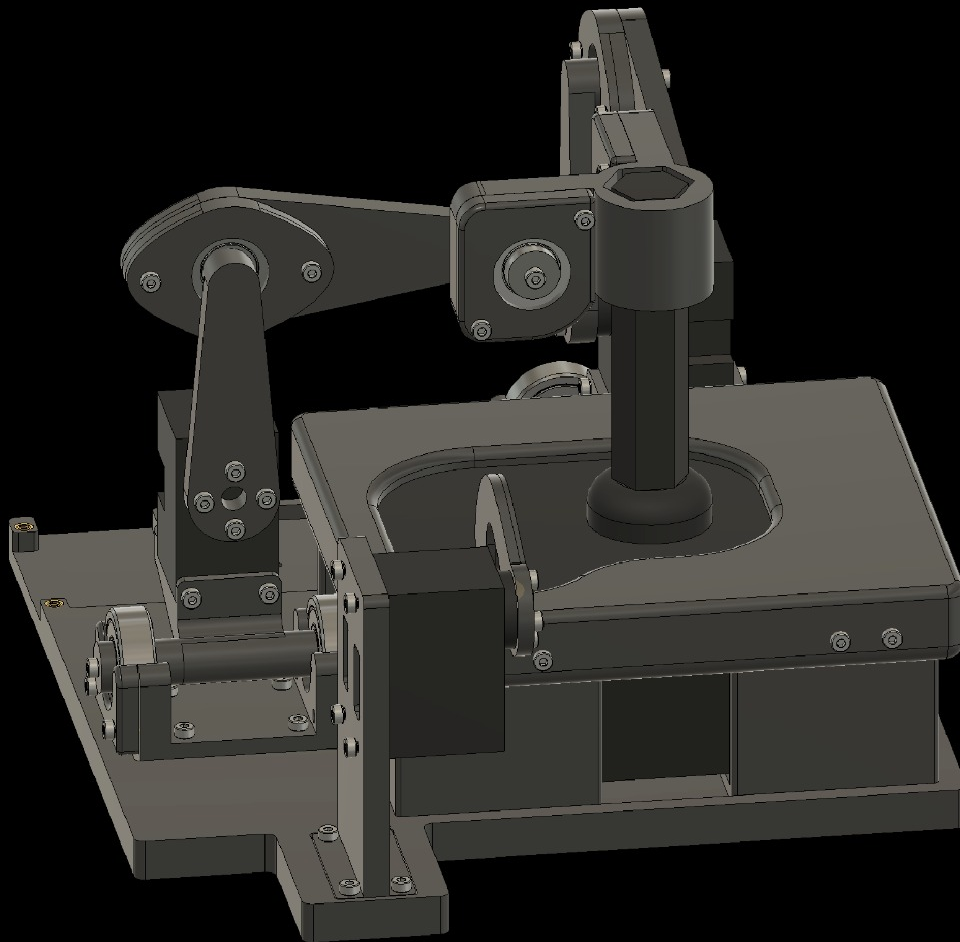
4. Attaching Components to the Baseplate

4.8 Attach the Fire Finger to the baseplate



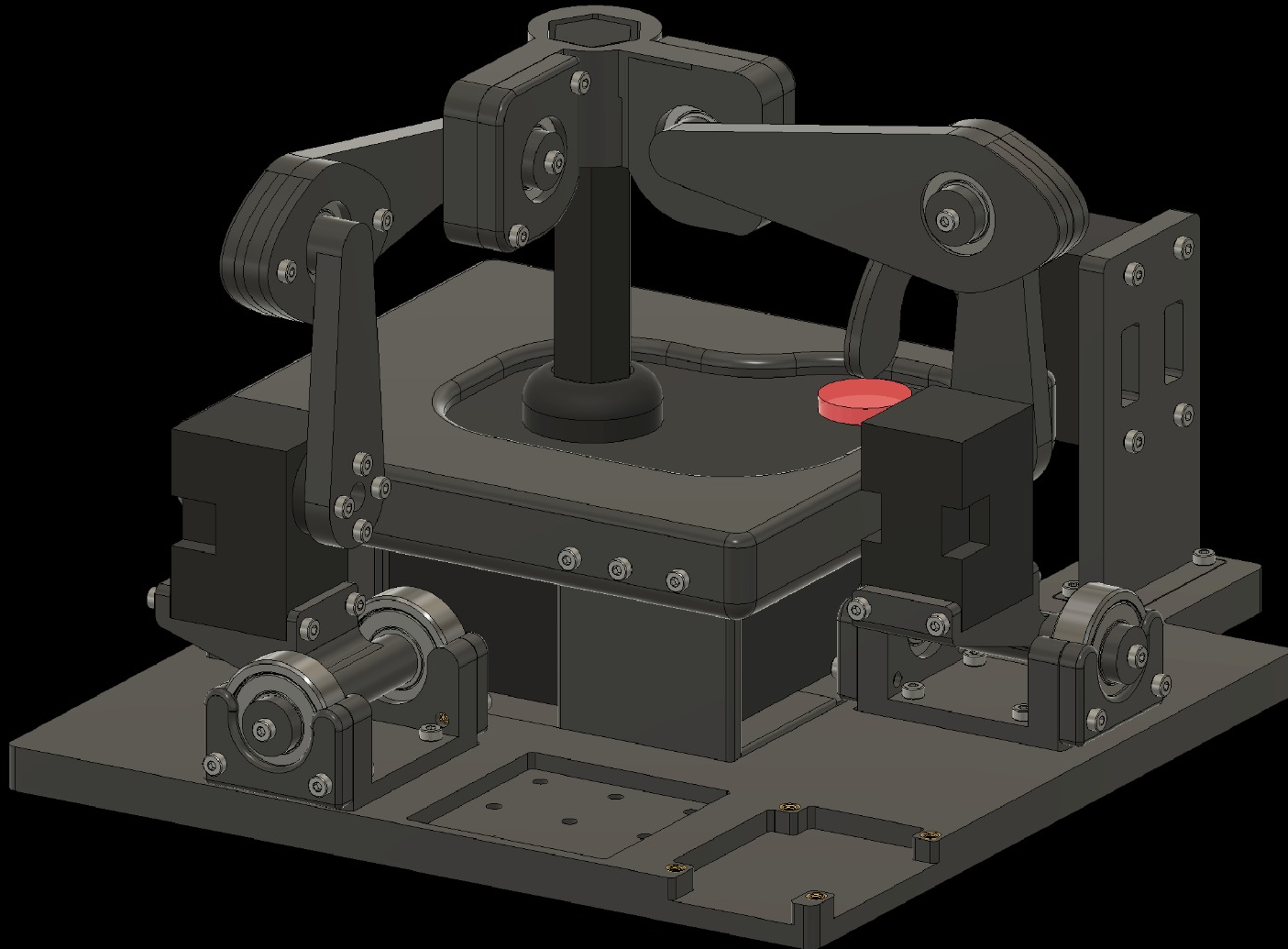
4. Attaching Components to the Baseplate

4.8 Attach the Fire Finger to the baseplate



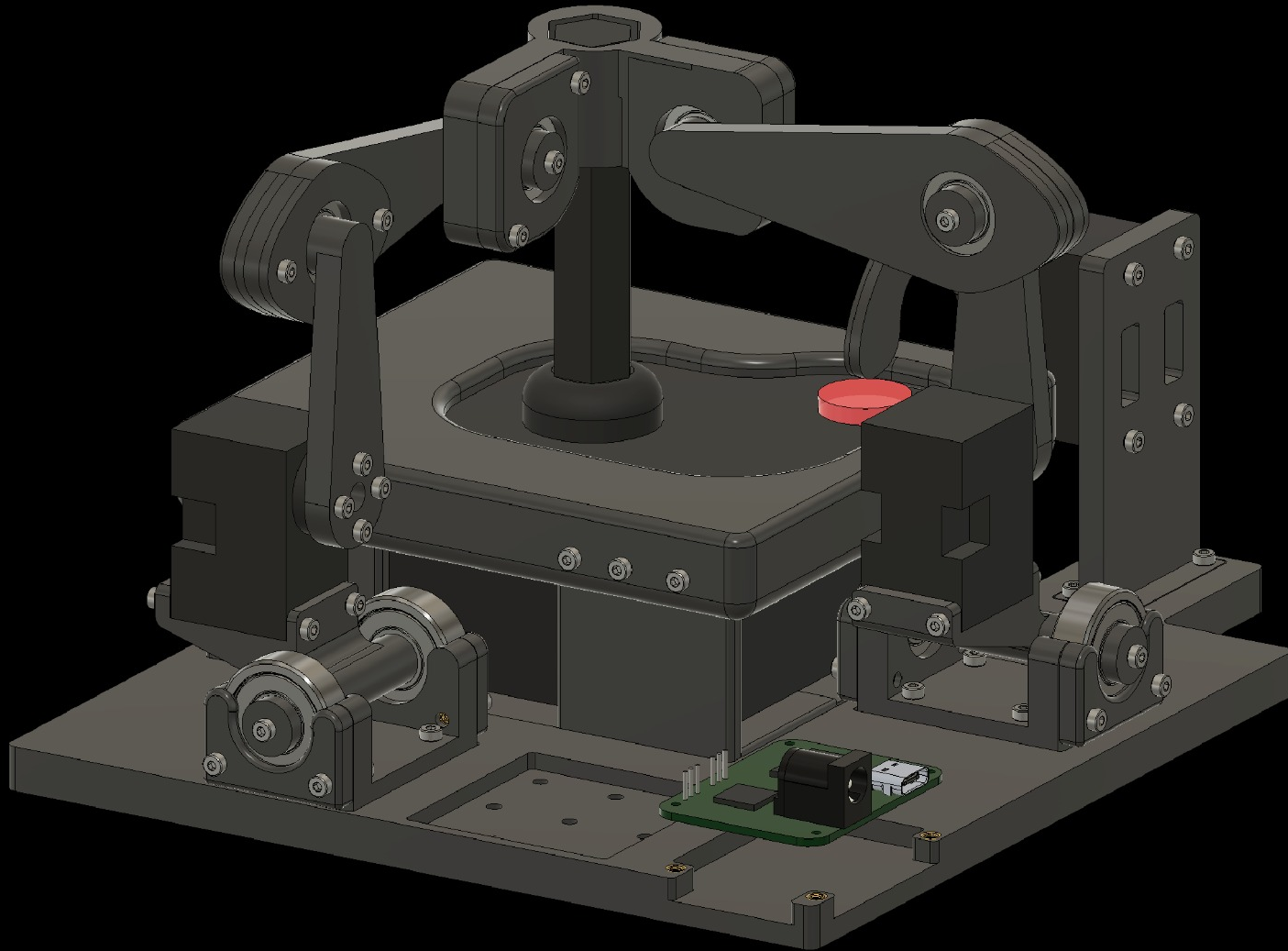
4. Attaching Components to the Baseplate

4.9 Attach the Waveshare Serial Bus Servo Drive Board to the baseplate



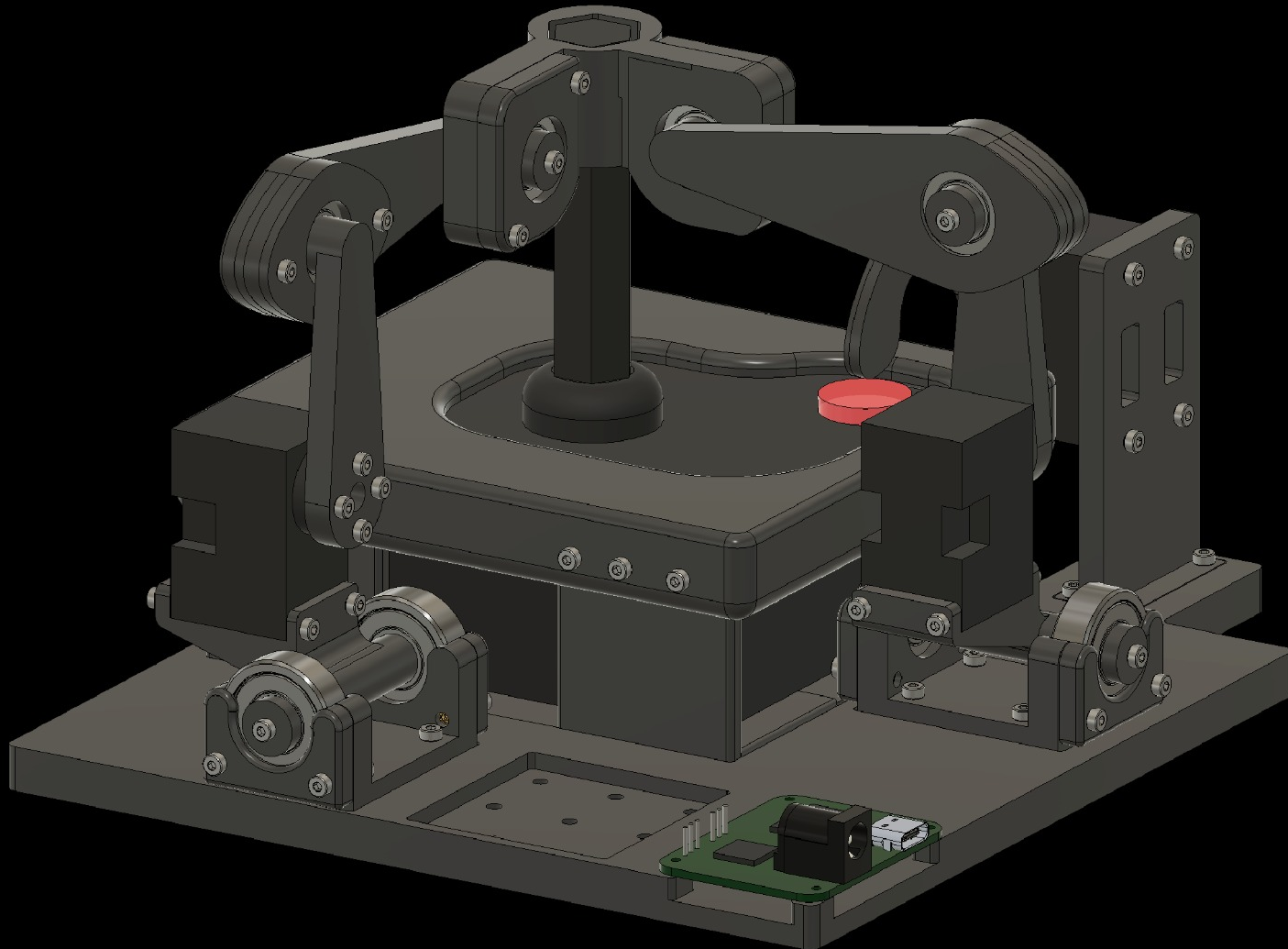
4. Attaching Components to the Baseplate

4.9 Attach the Waveshare Serial Bus Servo Drive Board to the baseplate



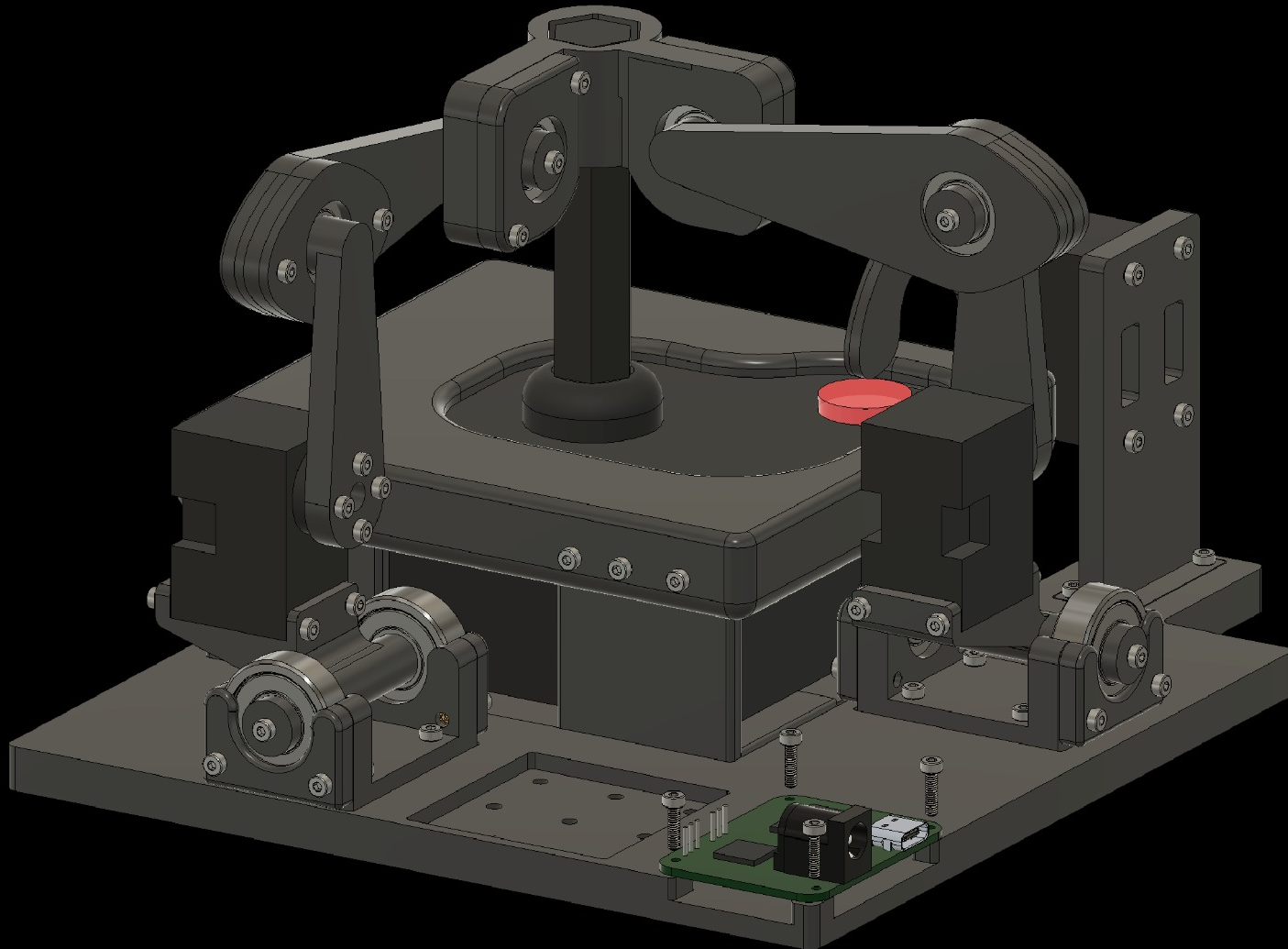
4. Attaching Components to the Baseplate

4.9 Attach the Waveshare Serial Bus Servo Drive Board to the baseplate



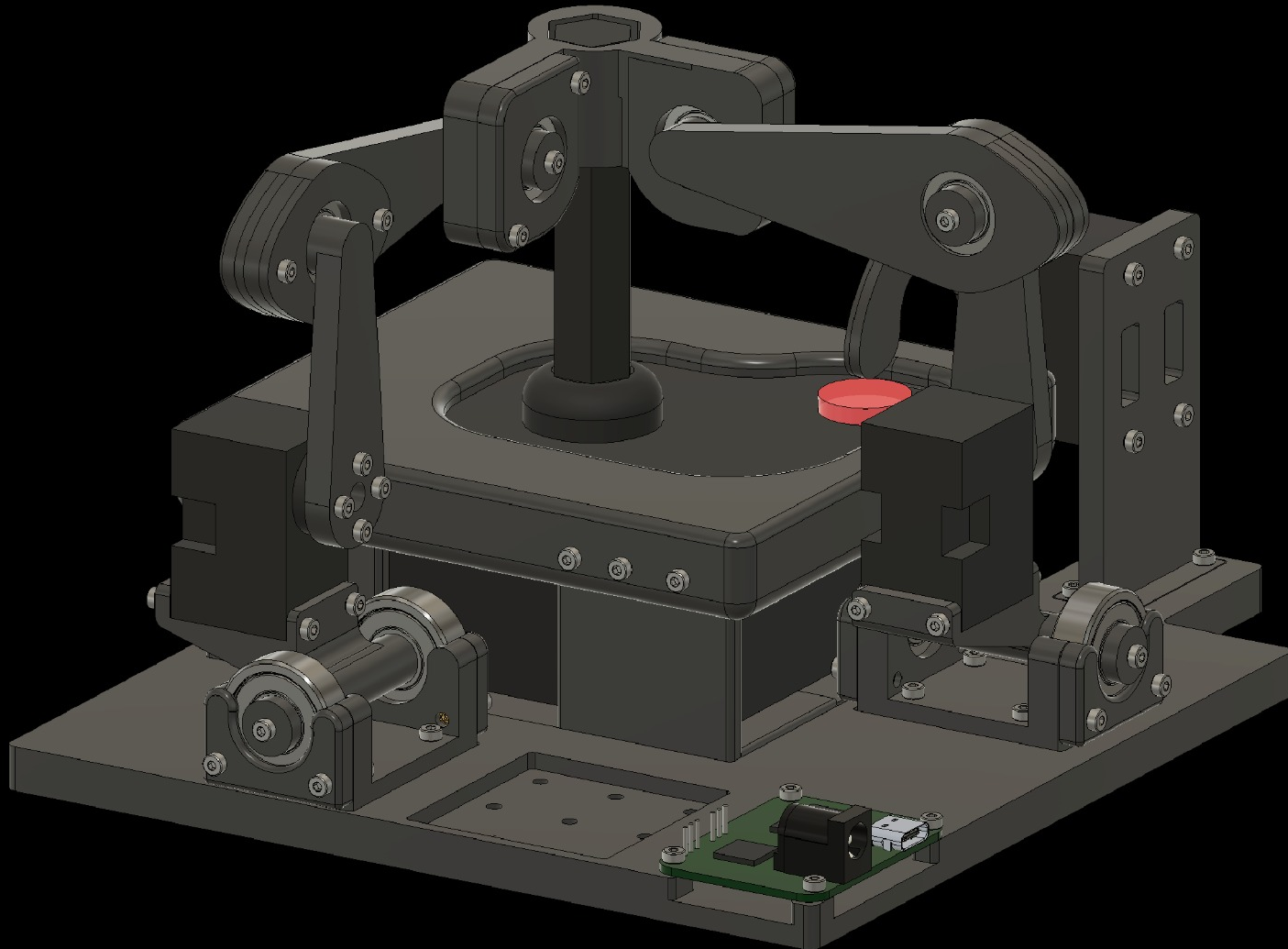
4. Attaching Components to the Baseplate

4.9 Attach the Waveshare Serial Bus Servo Drive Board to the baseplate



4. Attaching Components to the Baseplate

4.9 Attach the Waveshare Serial Bus Servo Drive Board to the baseplate

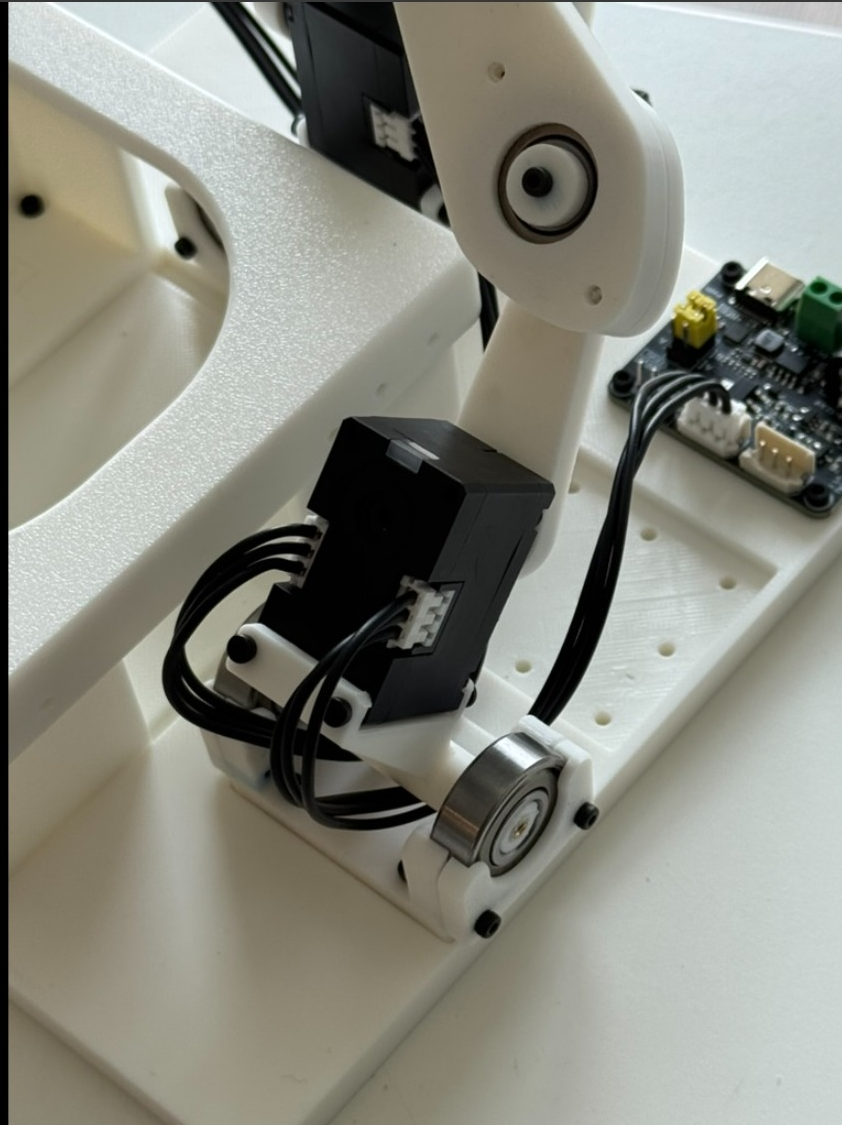


5. Wiring the Components

Finally, connect the Dynamixel servos to each other and to the WaveShare Serial Bus Servo Drive Board as shown on the next slides. The wires that ship with the Dynamixels do not fit the connector on the WaveShare board. Trim the outer edge of the connector on the board with a flat screwdriver so it fits.

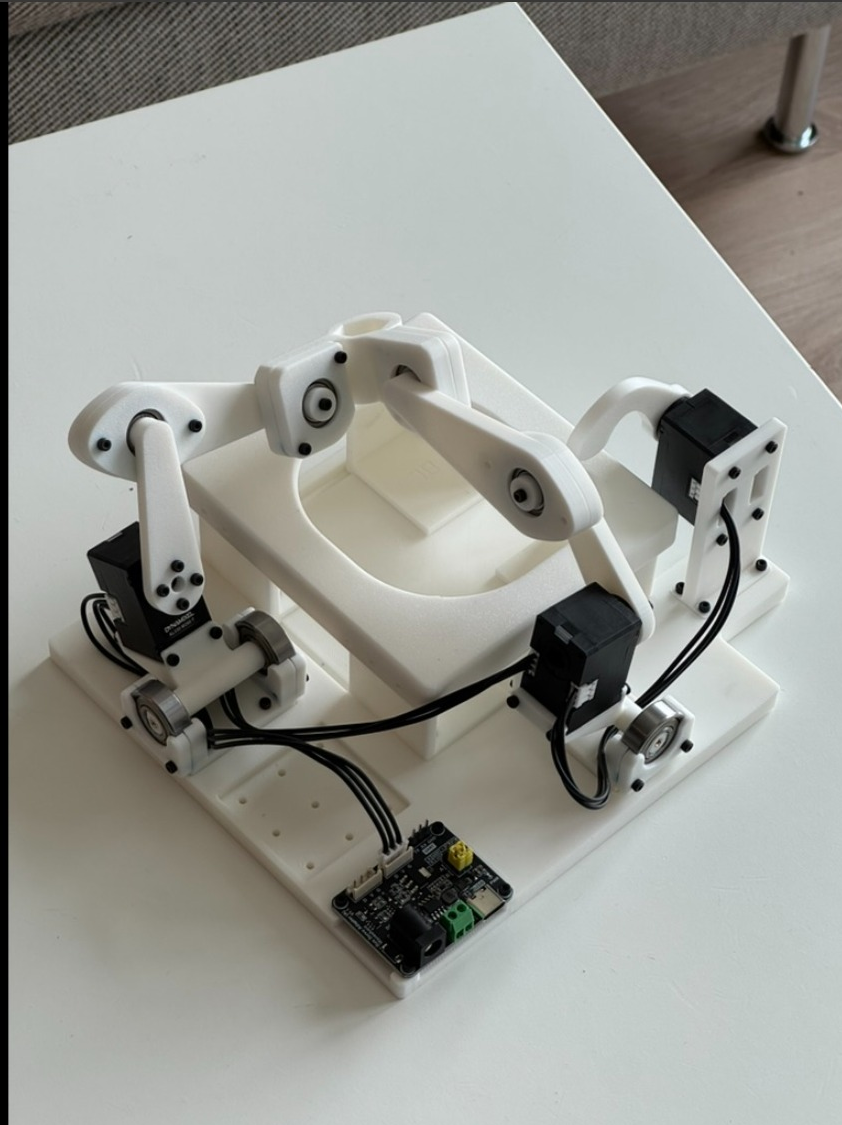
Pay close attention to the orientation of the wire when connecting to the board in the next picture; it's common to connect it the wrong way. If it doesn't match, rotate it by 180 degrees so it matches the picture.

5. Wiring the Components



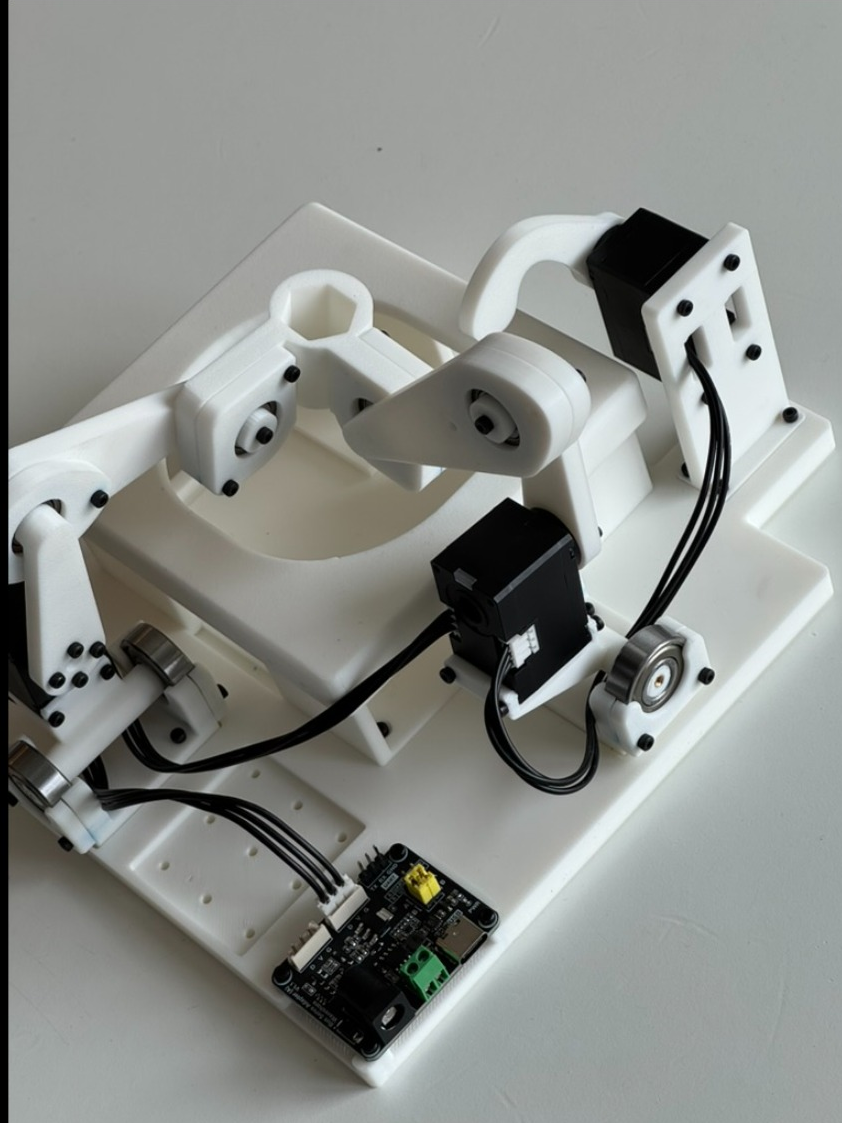
Wiring Diagram 1

5. Wiring the Components



Wiring Diagram 2

5. Wiring the Components



Wiring Diagram 3

6. Testing the Robotroller

To use the Robotroller to recreate the Upperbound 2025 demo, see [this guide](#).

To use the Robotroller as used in the RLC 2026 paper, see [this guide](#).