Robotics Studio, Spring 2024

Assignment #3

Kyle Abrahm (KWA11)

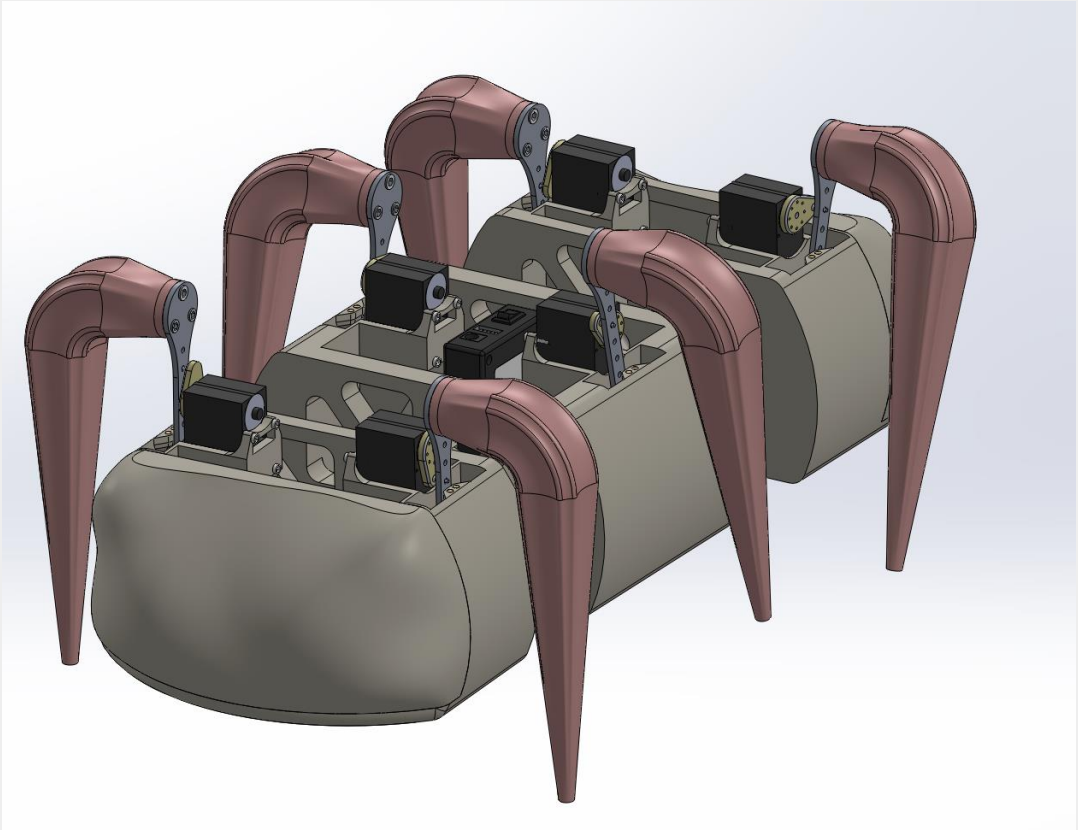
Feb 21, 2024, 3:00PM

Grace Hours: 0 hours used, 0 added, 122 remaining

ANTROID

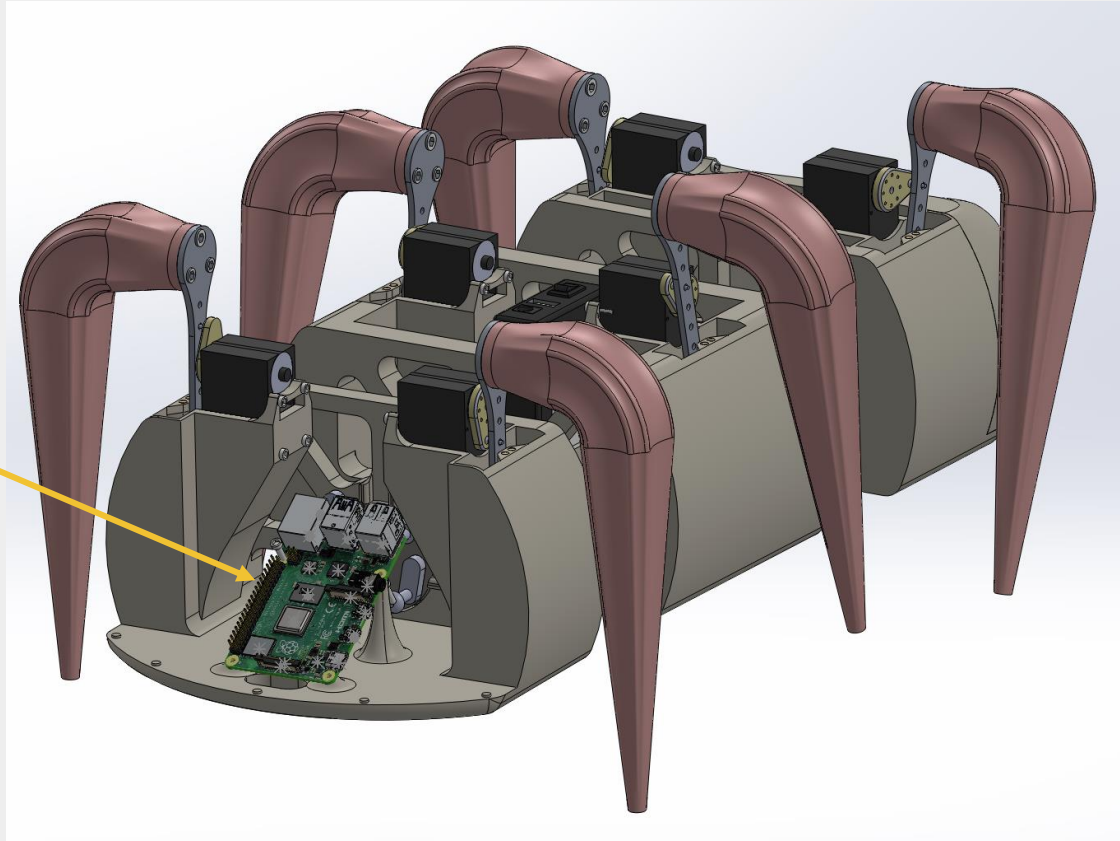
Isometric

Antroid has 6 legs that lift the robot above the ground. The unique sliding bracket leg design makes the legs move in an ellipse pattern. The Robot is split into three different sections which house the raspberry pi, battery, DC converter, and servo controller. The front and back are organic shapes and the sides are curved.

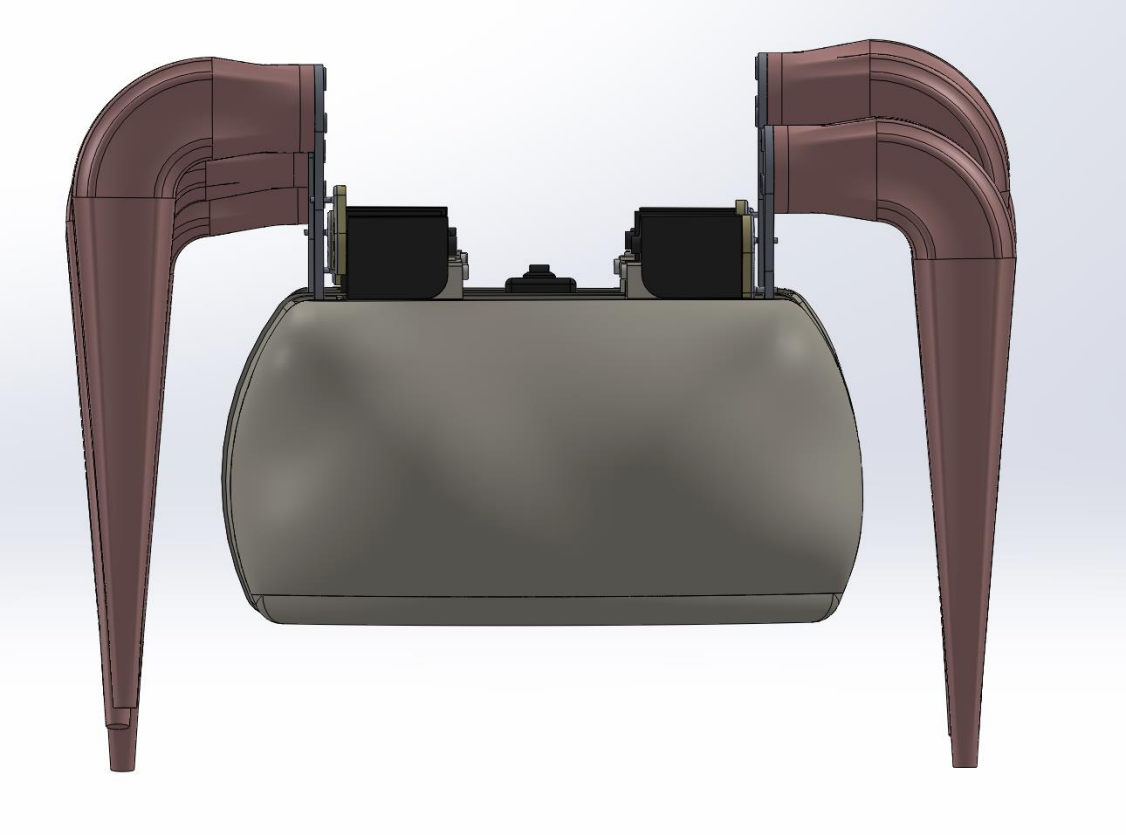


Isometric

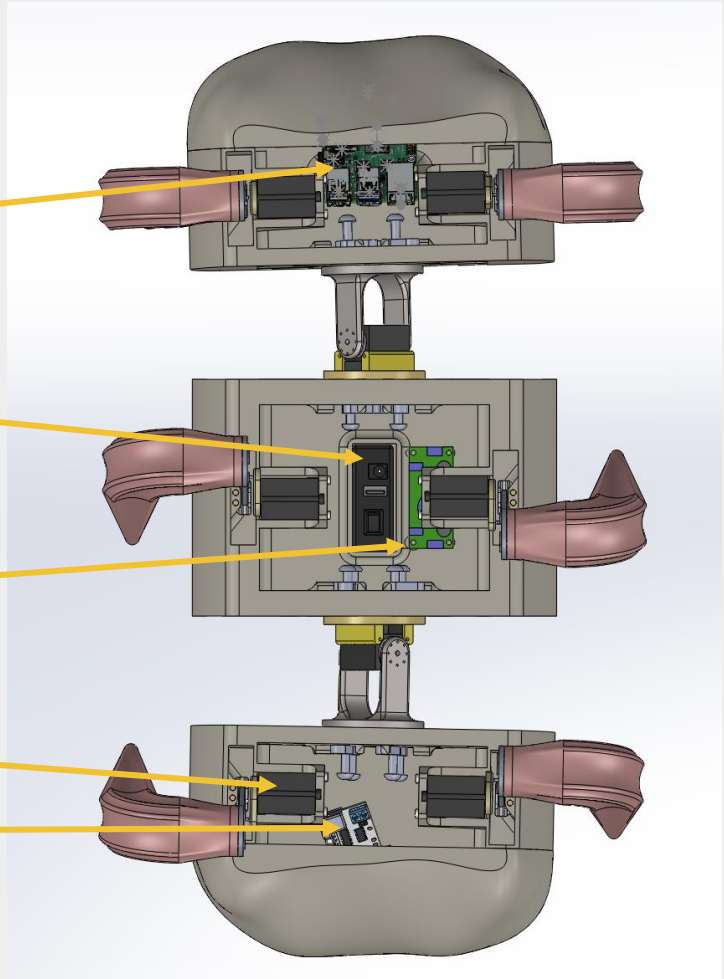
With the cover easily removed through magnetic connection, we can access the raspberry pi. Note that the raspberry pi is placed at an angle. This allows for easier cable management and cooling underneath



Front View

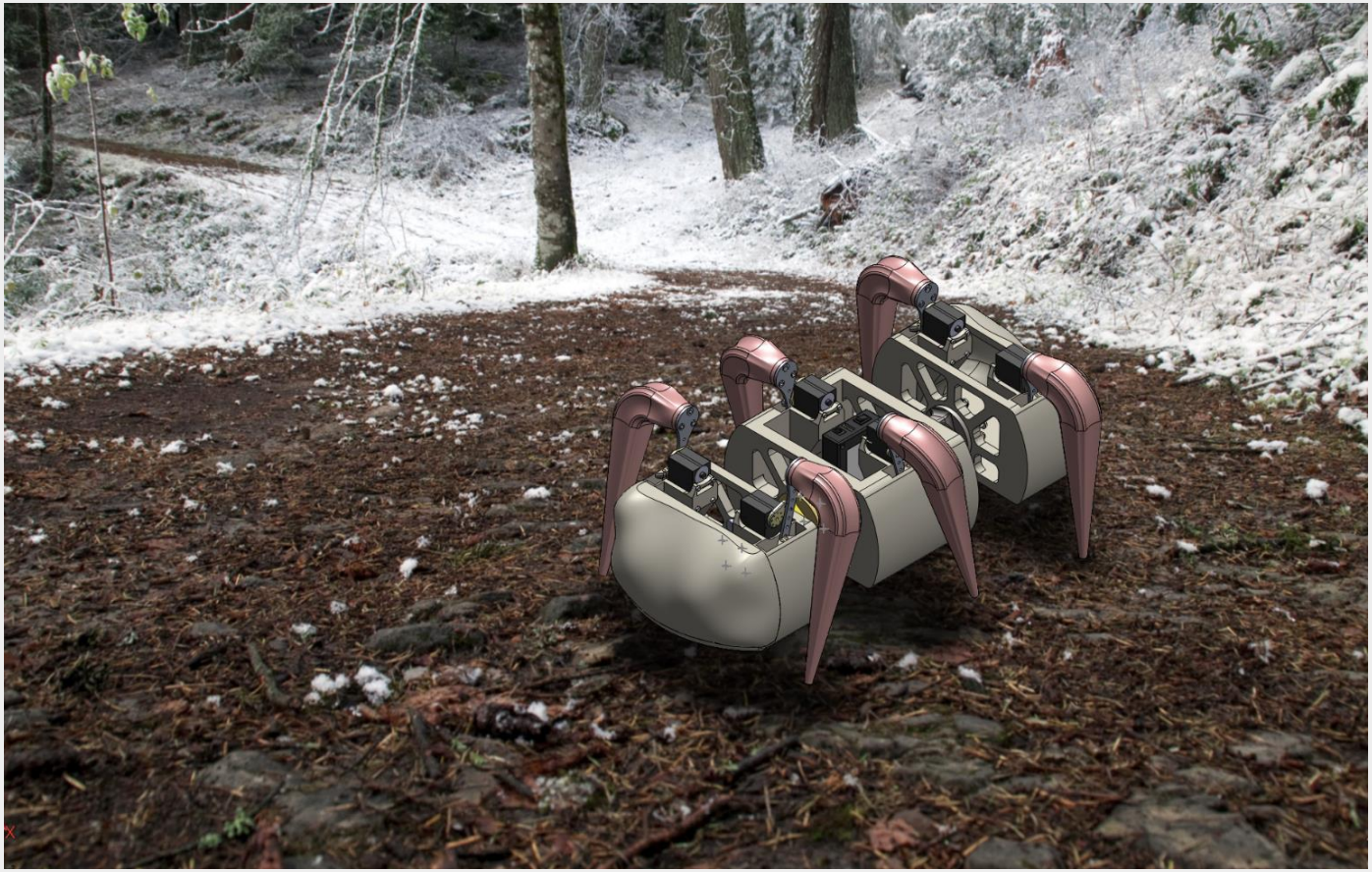


Top View

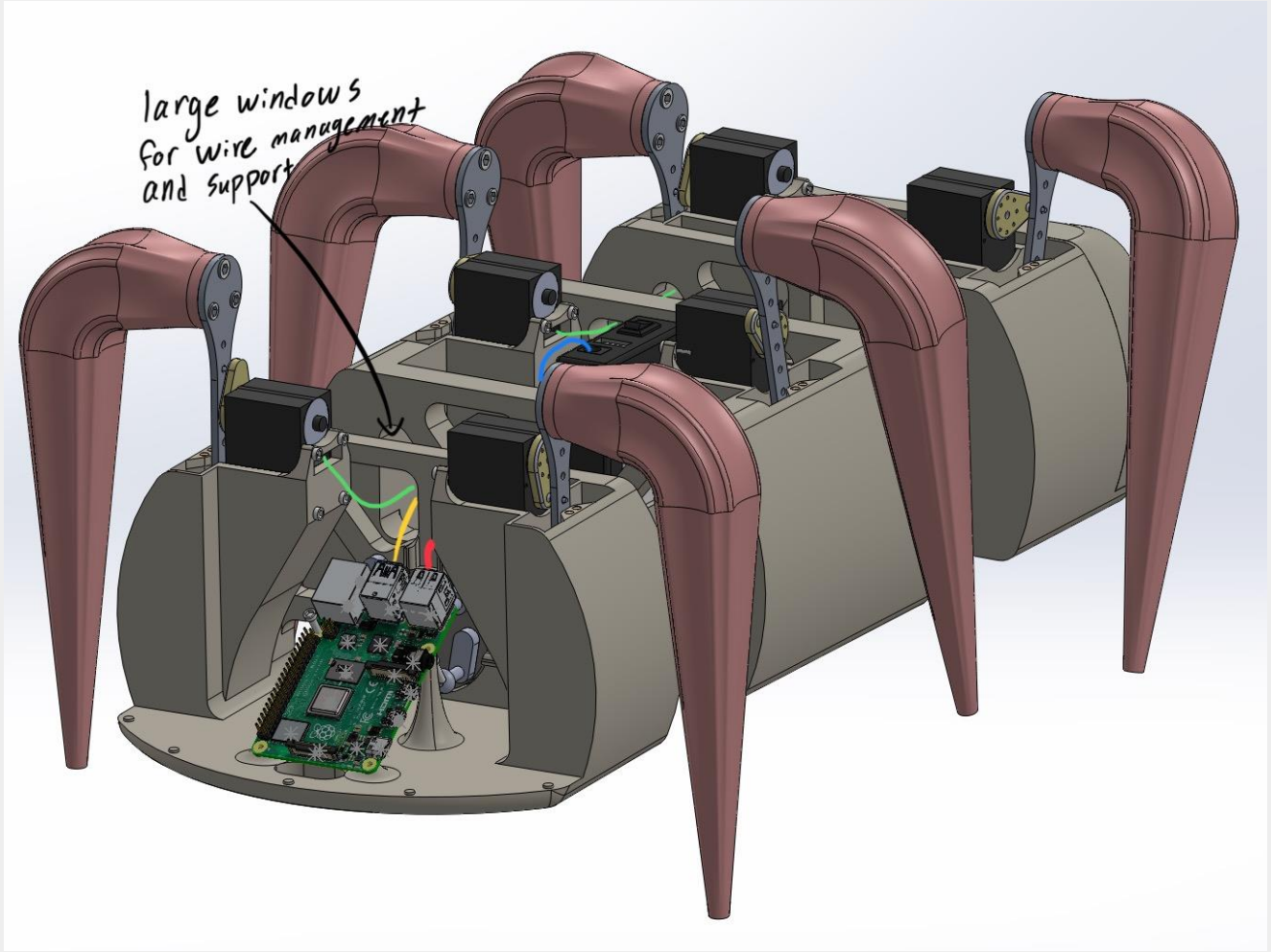


Photorealistic Rendering

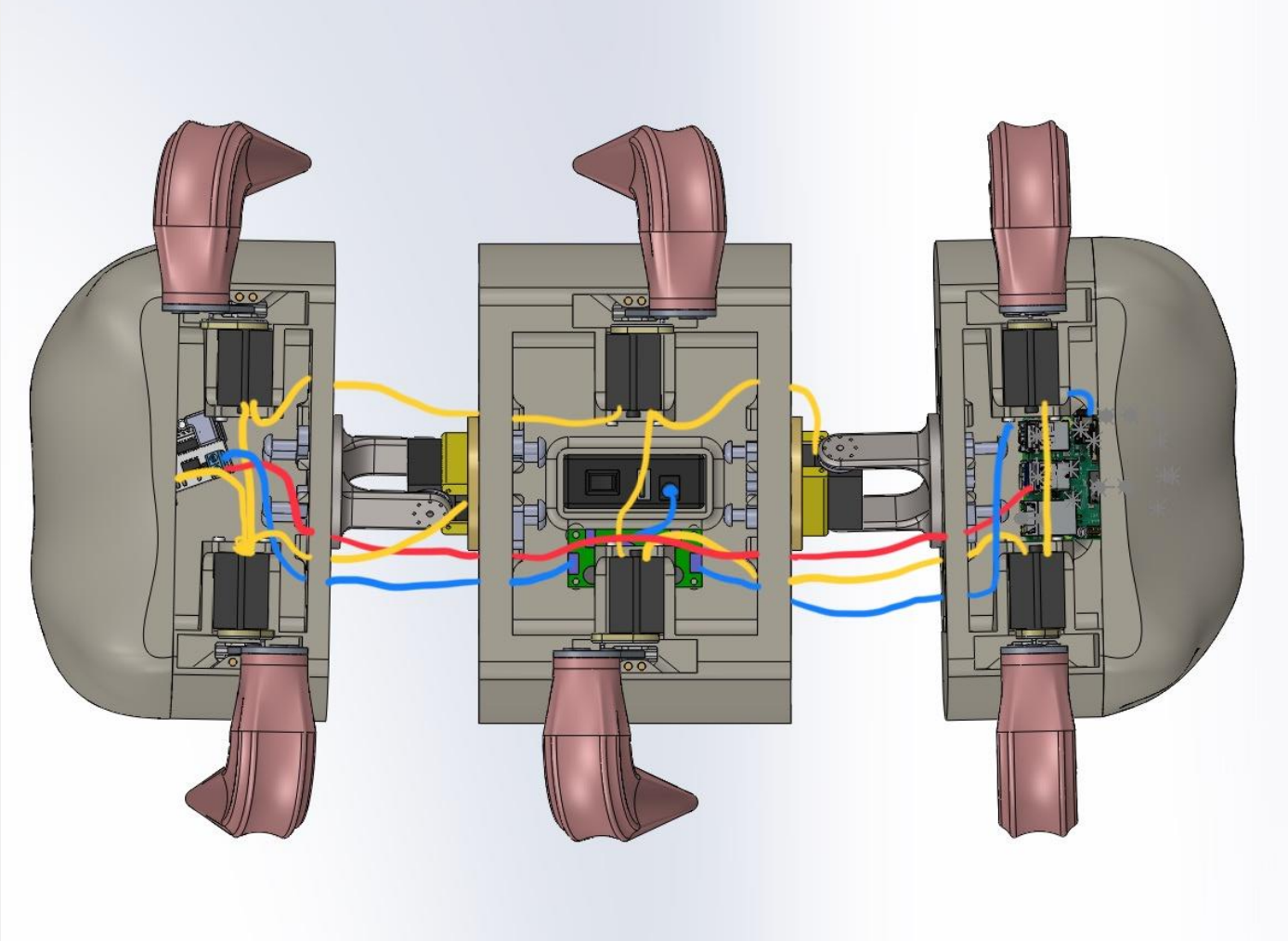
Context Rendering



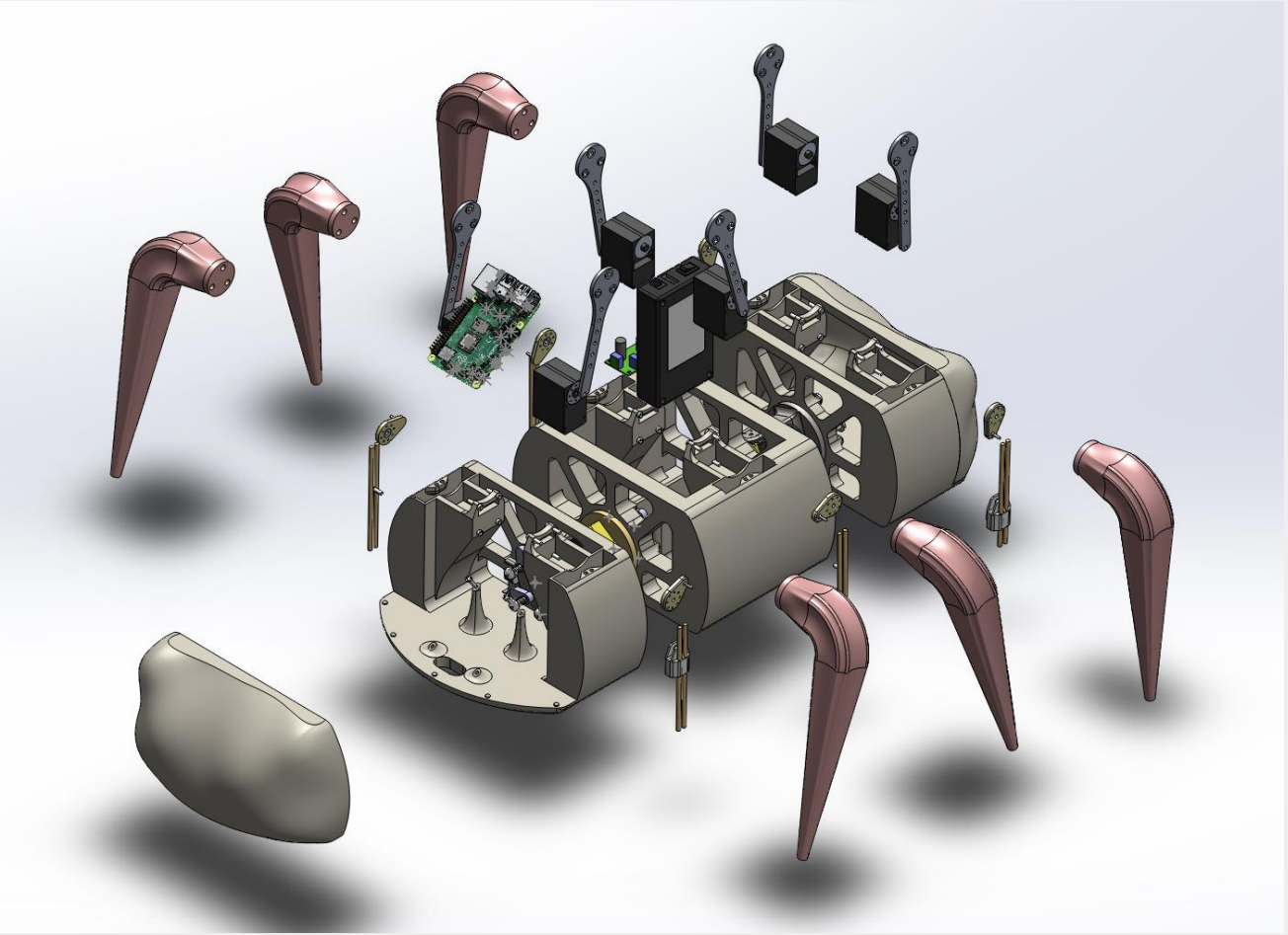
Wiring



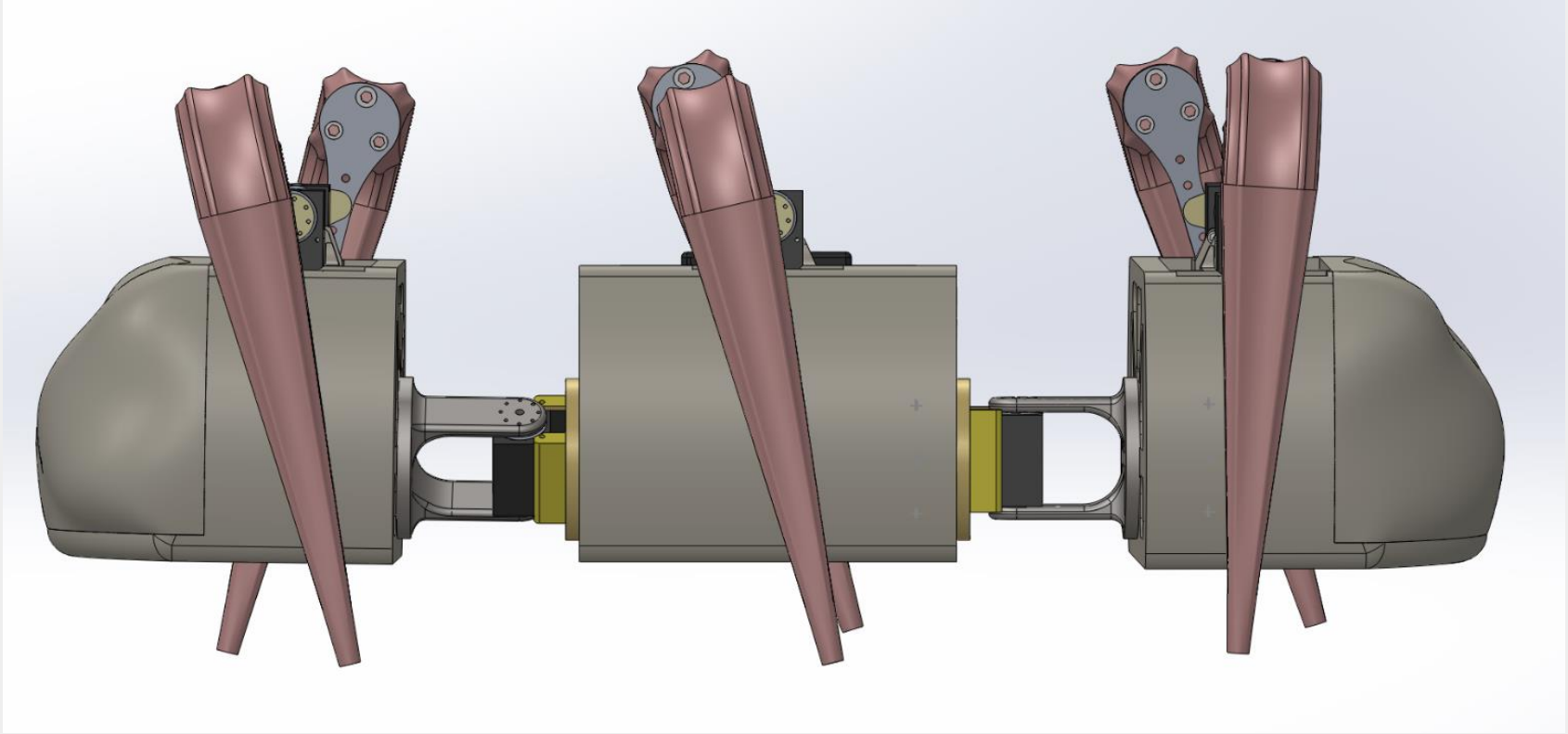
Wiring



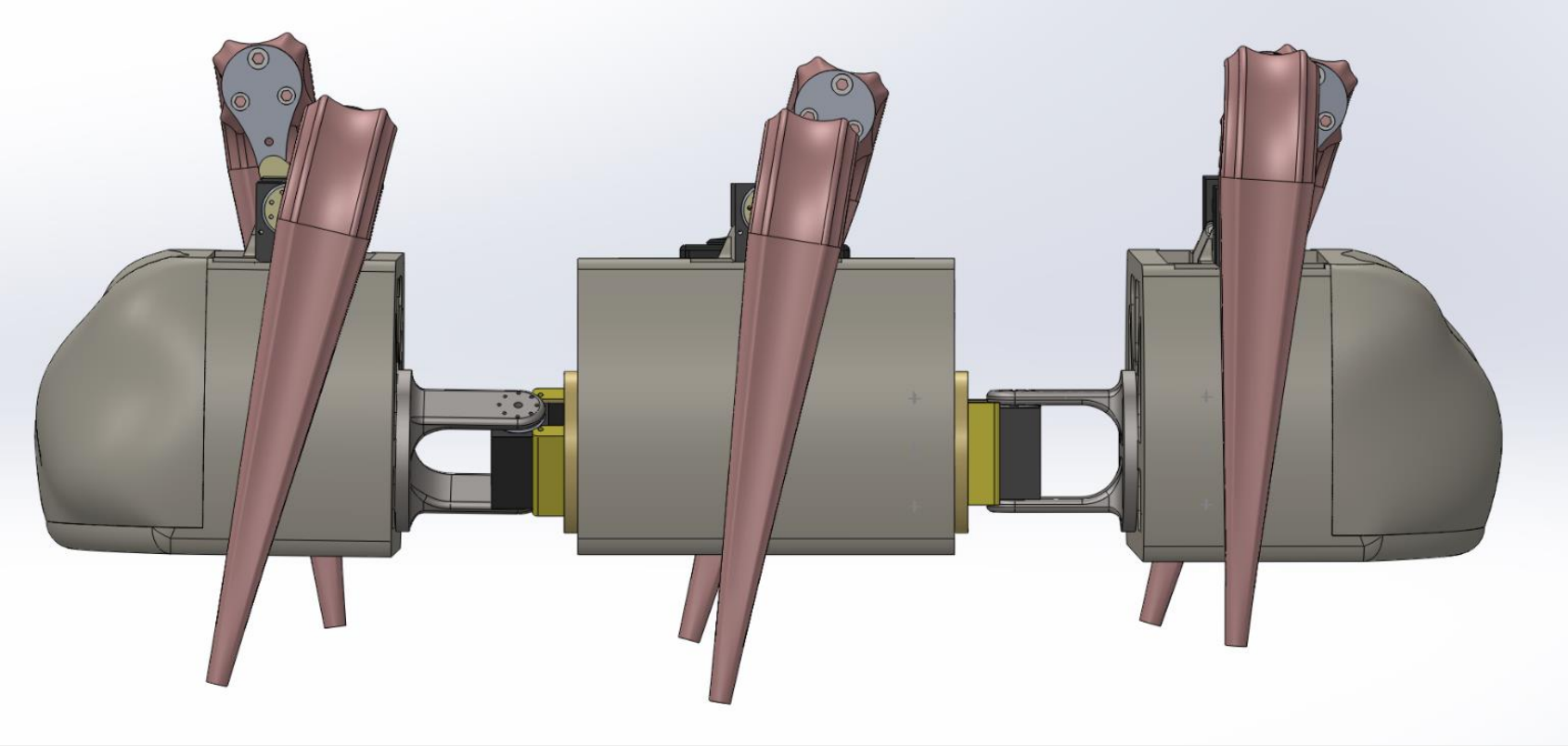
Exploded



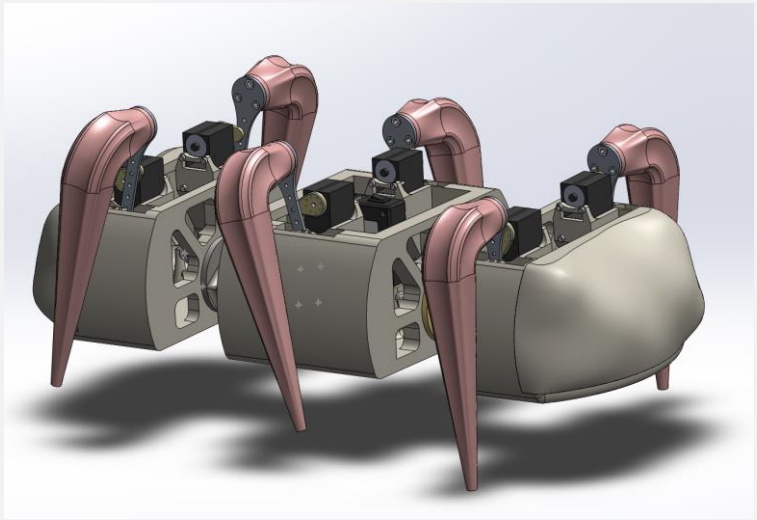
Walking 1



Walking 2

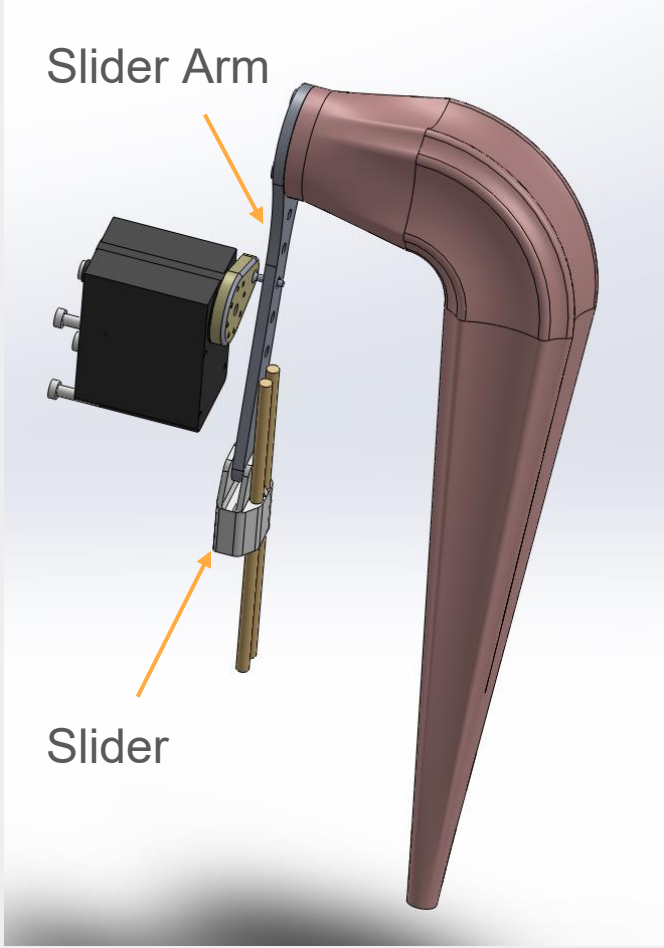


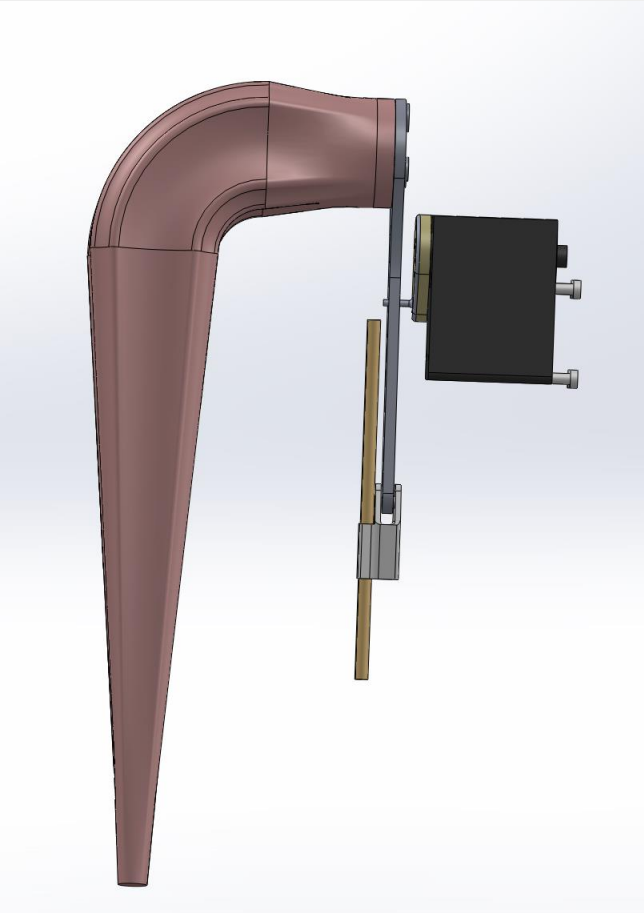
Elliptical Walking Motion



https://drive.google.com/file/d/1mlwJ0SZse2XOSk8SMcfa2UfC_Kp9OVIp/view?usp=sharing

Close-up of elliptical leg mechanism

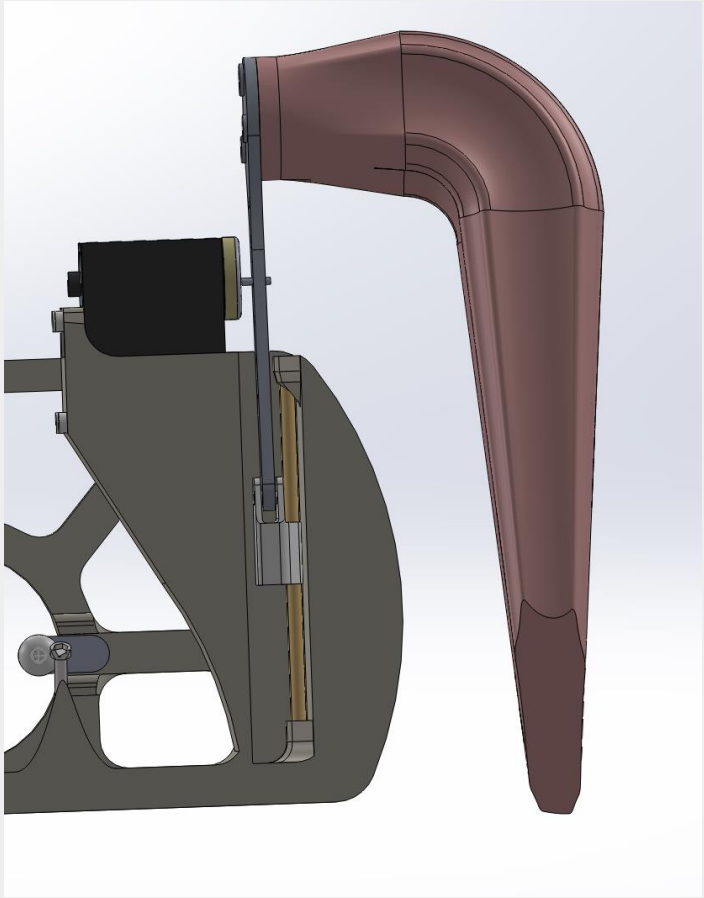


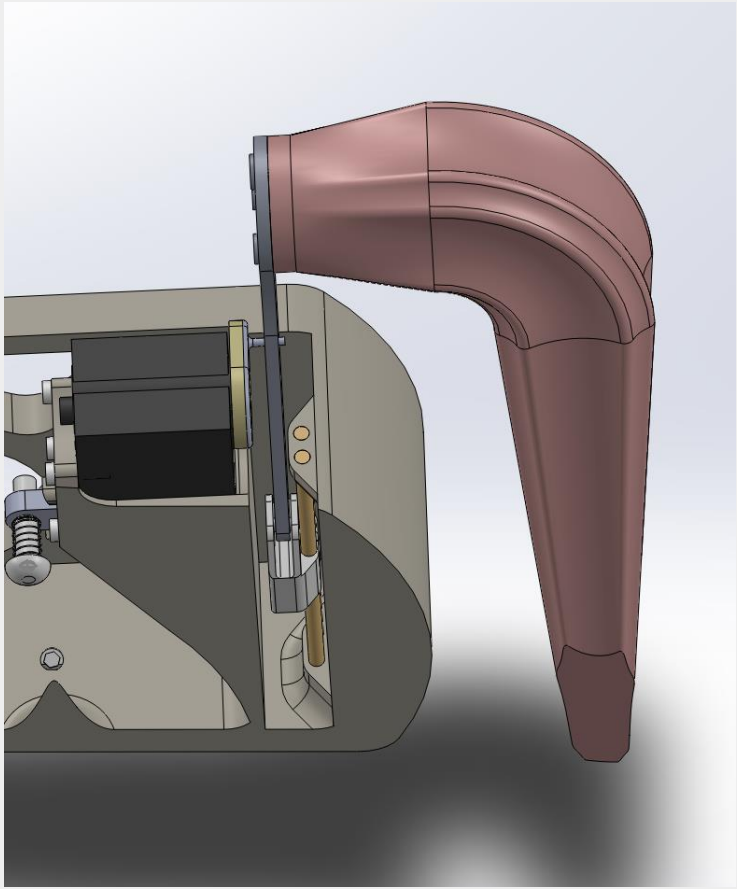


Two linear rods define the path of the slider and create a very strong base

The slider arm will be water cut aluminum

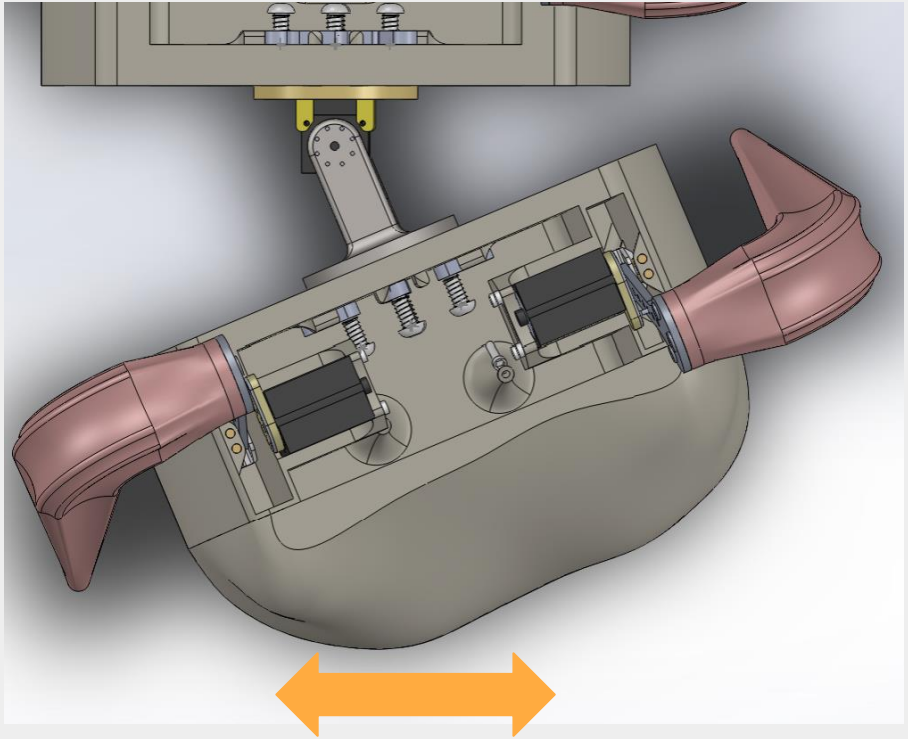
Close-up of elliptical leg mechanism

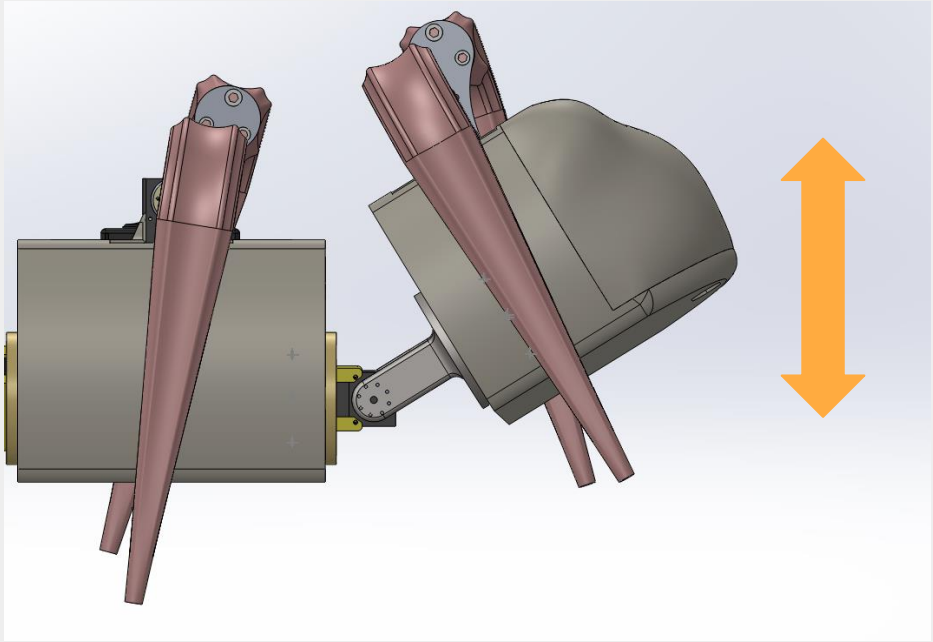




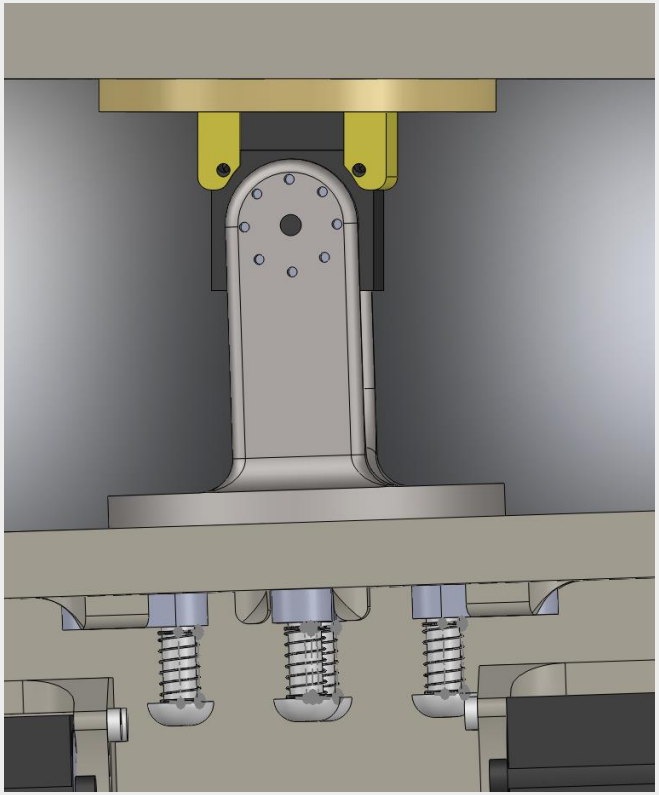
Head Movement

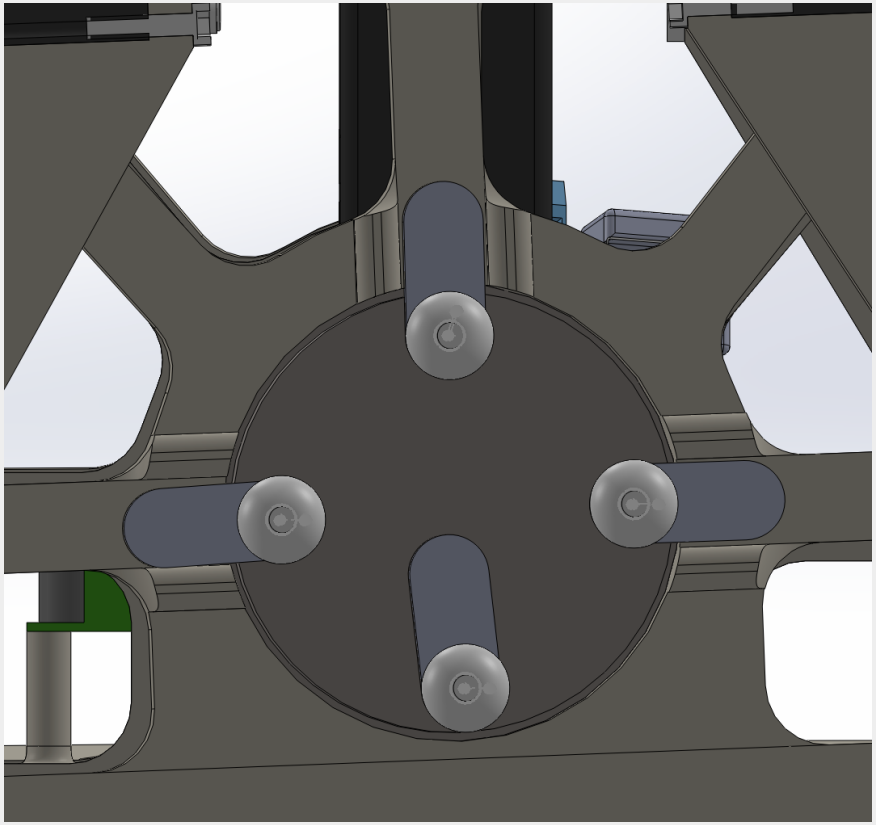
Choose between tilting the outer sections up and down or left and right



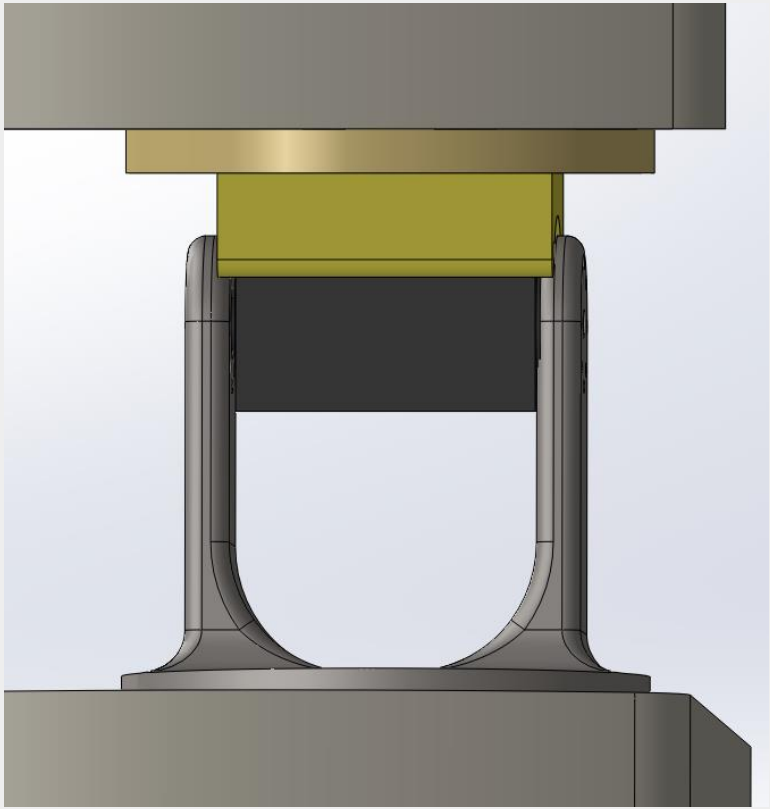


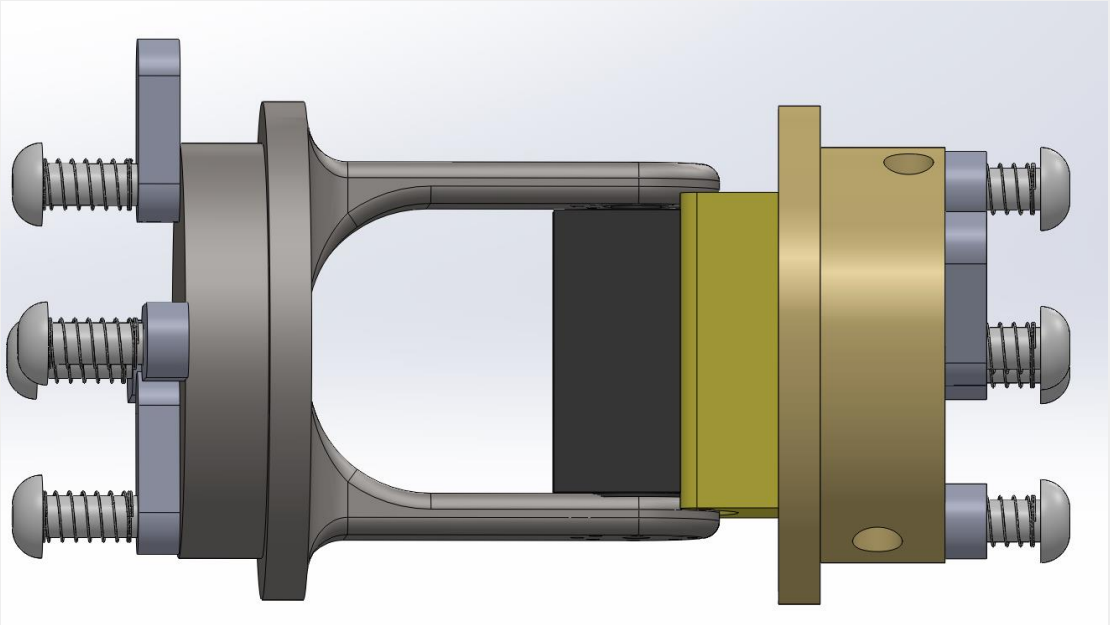
Close-up of Rotating Motor





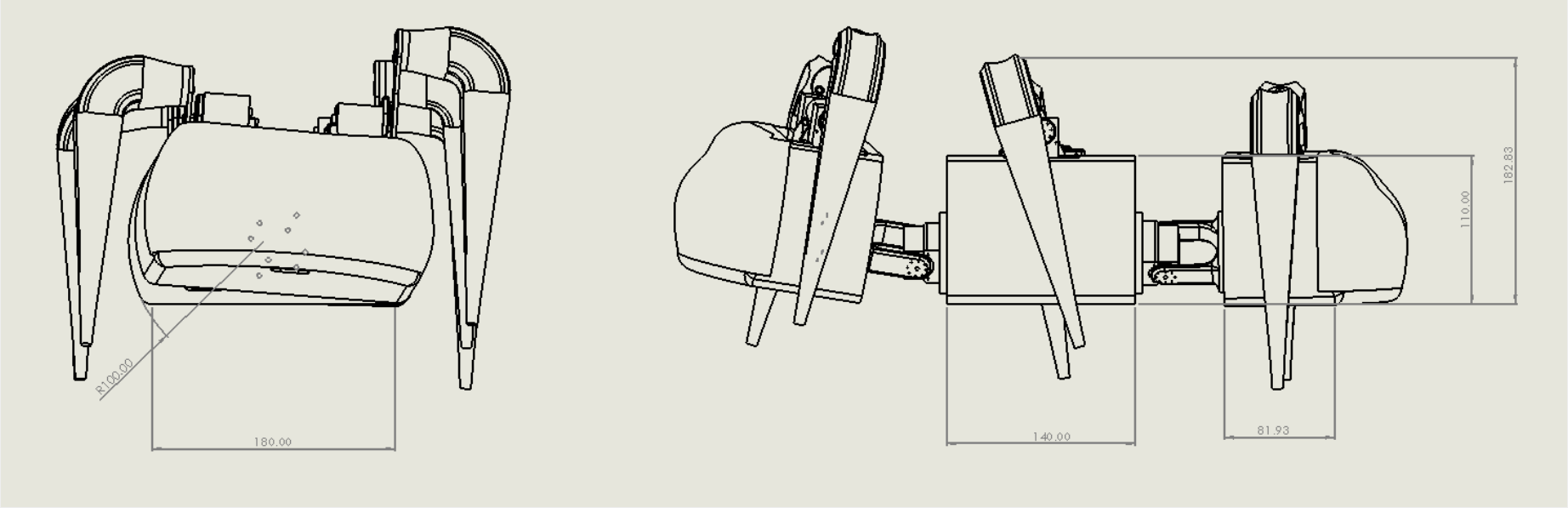
Close-up of Rotating Motor



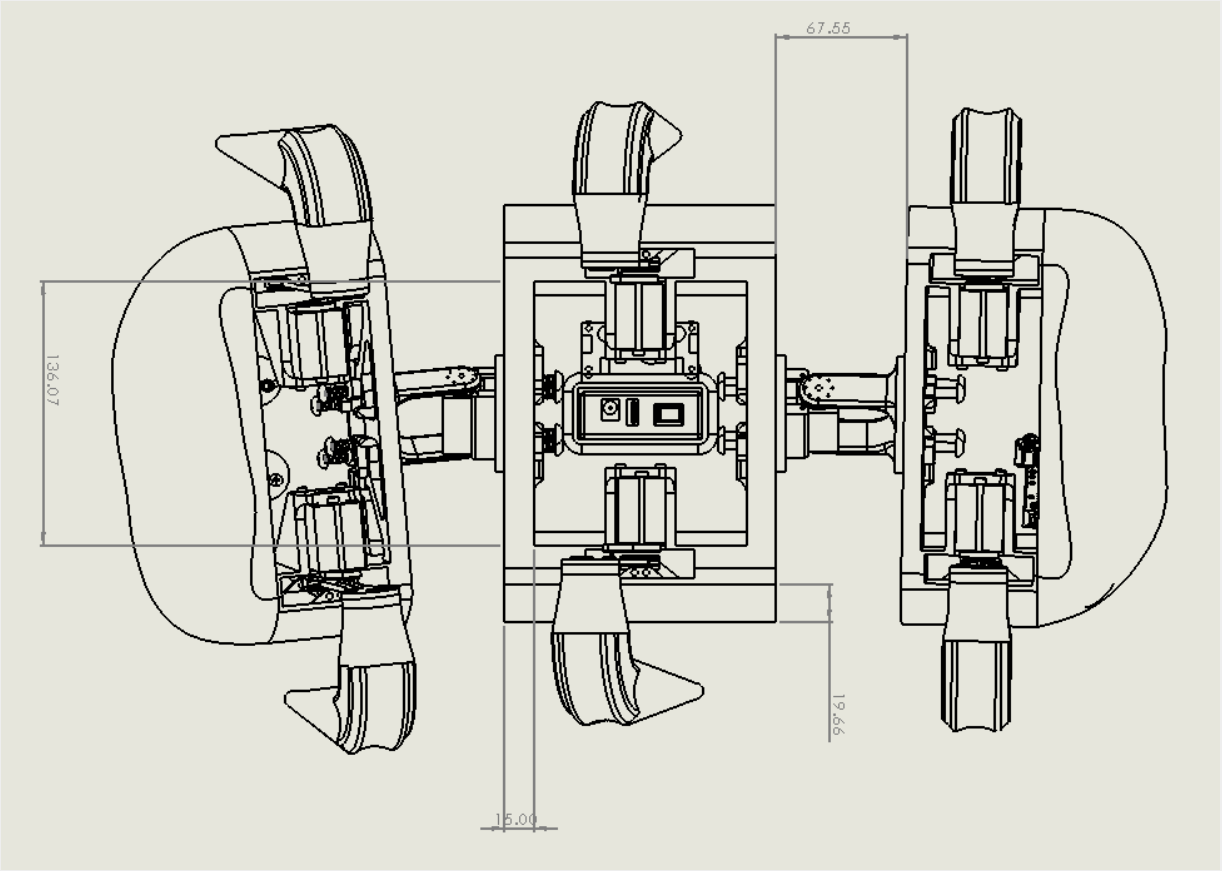


Similar to Serrated Locking Plates, this design has three pins that can activated to lock the rotating mechanism

Dimension



Dimension



Key Specs

Mass = 5126.60 grams

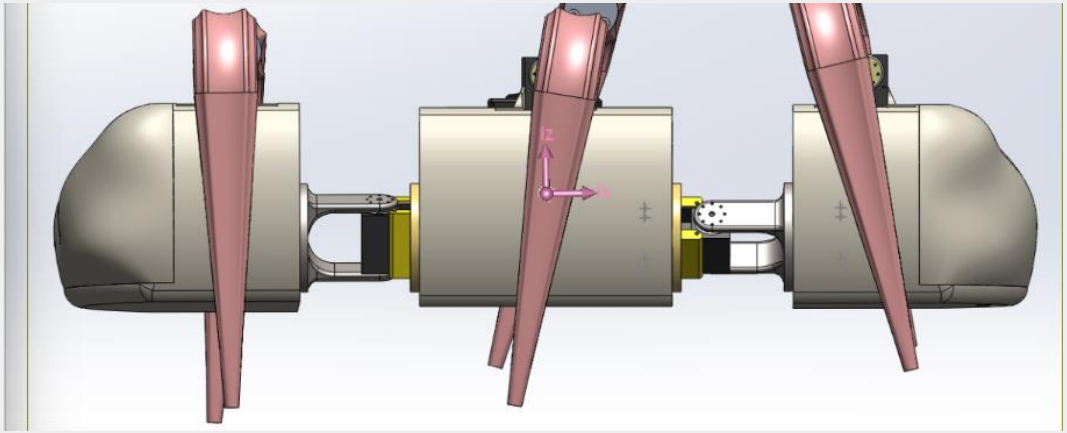
Volume = 5082876.24 cubic millimeters

Surface area = 1140549.87 square millimeters

Center of mass: (millimeters)
X = -92.33
Y = 50.70
Z = 662.76

Principal axes of inertia and principal moments of inertia: (grams * square mill
Taken at the center of mass.

Ix = (0.00, 0.02, 1.00)	Px = 44408839.86
Iy = (1.00, 0.02, 0.00)	Py = 117101598.27
Iz = (-0.02, 1.00, -0.02)	Pz = 140942134.28



The weight is not accurate. From my calculations, the mass is near 2,500 grams. Solidworks is saying the mass of the legs are each 650 grams which is not the case.

Step length: 2.75cm
Motors: 30 RPM
Speed 82.5cm/min

Discussion Board

Kyle Abrahm
2:23am

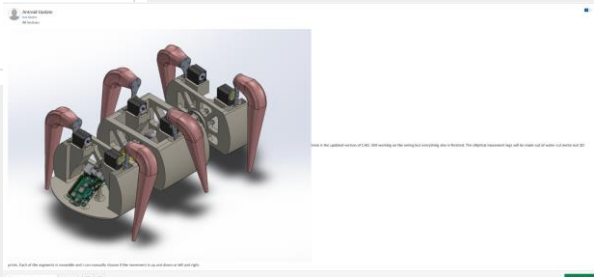
You did a great job making the rabbit look organic and reducing the number of sharp angles. I am curious, what is the connection between the "shoulder" and the main torso? I see you have used your 8 motors in the legs. Will the connection be a free-floating axle? Or is this part rigidly connected?

Kyle Abrahm
2:25am

I love this design! The metallic look is super clean and perhaps you could accomplish the aesthetic with the water cutter and aluminum. Have you attempted to make the legs look more organic? They look blocky and could benefit from some curves.

Kyle Abrahm
2:29am

This design looks fantastic! I love the central plate that organizes and structurally supports each component. Have you looked into the center of gravity for this design? With your Raspberry Pi and battery so far to the right, I imagine balancing with your bipedal design could be quite difficult.



Rubric

1. 5 Points Title slide complete → **Slide 1 5/5**
2. 5 Points overall aesthetics, layout and formatting of the slides → **Slide 1-22 5/5**
3. 8 Points posting some rendering of your robot on the discussion board at least 24h in advance of deadline, and commenting on at least three other's postings → **Slide 21 8/8**
4. 10 Points 3D Renderings in perspective → **Slide 2-5 10/10**
5. 10 Points Key components included → **Slide 5 10/10**
6. 10 Points organic shape (no straight edges) → **Slide 6 10/10**
7. 10 Points photorealistic rendering → **Slide 6 10/10**
8. 10 Points context rendering → **Slide 7 10/10**
9. 10 Points animation → **Slide 15 5/10**
10. 10 Points exploded view → **Slide 21 10/10**
11. 10 Points key specs listed including speed → **Slide 21 5/10**
12. 10 Points multiple poses shown → **Slide 11-14, 16 10/10**
13. 10 Points detail close-up shown → **Slide 14,15,17,18 10/10**
14. 10 Points side views with main dimensions → **Slide 19 8/10**
15. 10 Points if you share your design history with us in Fusion 360 through our scripts. → **0/10**