

Parts Appendix

This is a compilation of the parts used for our project. For each item, there is a serial number along with necessary details and a link to the Fusion file, which can be downloaded.

PT-00001

Name: 89015K237_Multipurpose 6061 Aluminum Sheet

Amount: 1

Description: PT-00001 is a piece of 6061 aluminum used for the footrest of the robot. <https://a360.co/4mqJc3O>

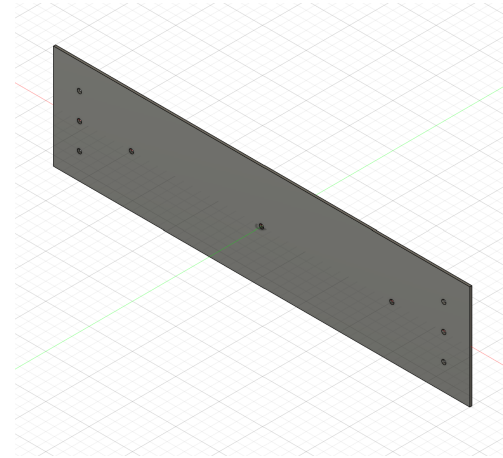


Fig 1.1. The 3D view of PT-00001 with the holes drilled.

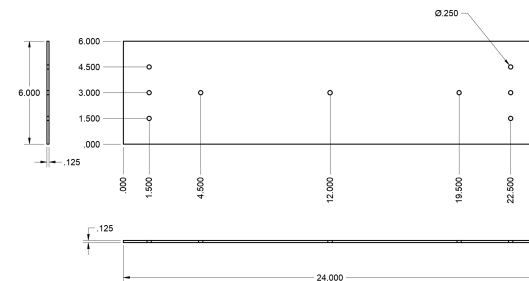


Fig 1.2. The dimensions of PT-00001.

PT-00002

Name: Back Doors

Amount: 2

Description: PT-00002 is the left and right door that can open and close to access the inside of the box where the electronics and battery are stored. The door has a fan built in to allow for electronics cooling. <https://a360.co/43wCOAp>

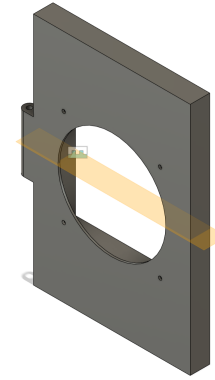


Fig 2.1. The 3D view of PT-00002.

PT-00003

Name: Door knob

Amount: 1

Description: PT-00003 is the left & right door knobs that can secure the door closed access to the inside of the box where the electronics and battery are stored. <https://a360.co/3ZnEmdv>

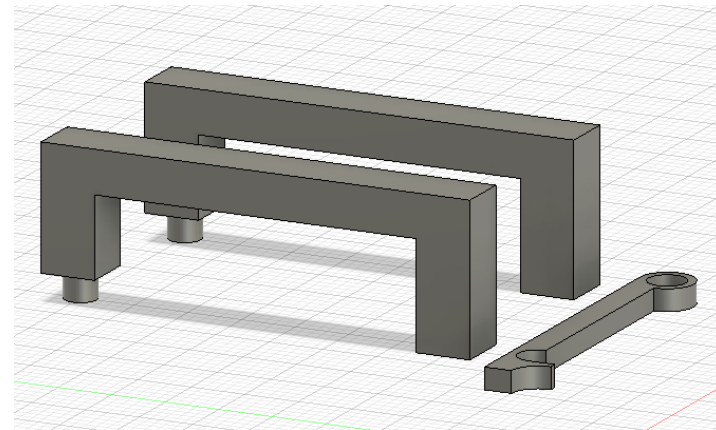


Fig 2.2 The 3D view of PT-00003.

PT-00004

Name: Battery_Holder

Amount: 1

Description: PT-00004 is used to secure the battery in place and to hold the battery charger in place. There is one battery holder which secures only the battery. The other holder secures the battery and also holds the battery charger. Both parts are 3D printed using PLA. <https://a360.co/3YQ8loU>

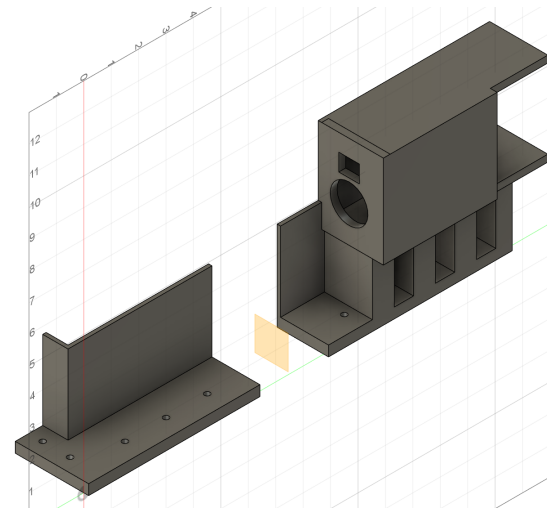


Fig 4.1. The 3D view of PT-00004.

PT-00005

Name: Bottom_Shelf

Amount: 1

Description: PT-00005 is 3D printed using PLA and holds the motor controllers, relays, and motor signal conversion PCB. The extrusions surrounding the motor controllers secure them in place along with screws. The screws for the PCB hold the PCB elevated off the shelf. The extrusions on the side secure the shelf in place when placed in the shelf holders. The extrusion on the bottom secures the two halves together since, due to printer constraints, this part needed to be printed in two halves split down the middle. <https://a360.co/430JCGm>

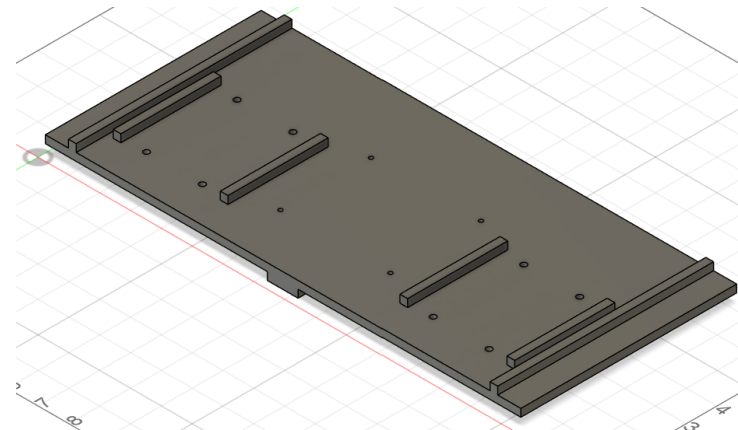


Fig 5.1. The 3D view of PT-00005.

PT-00006

Name: Front Cover Plastic

Amount: 1

Description: PT-00006 is a plastic cover which protects the battery and wiring components from interference by the patient or user when the robot is at rest or in use.

<https://a360.co/3EYlxqB>

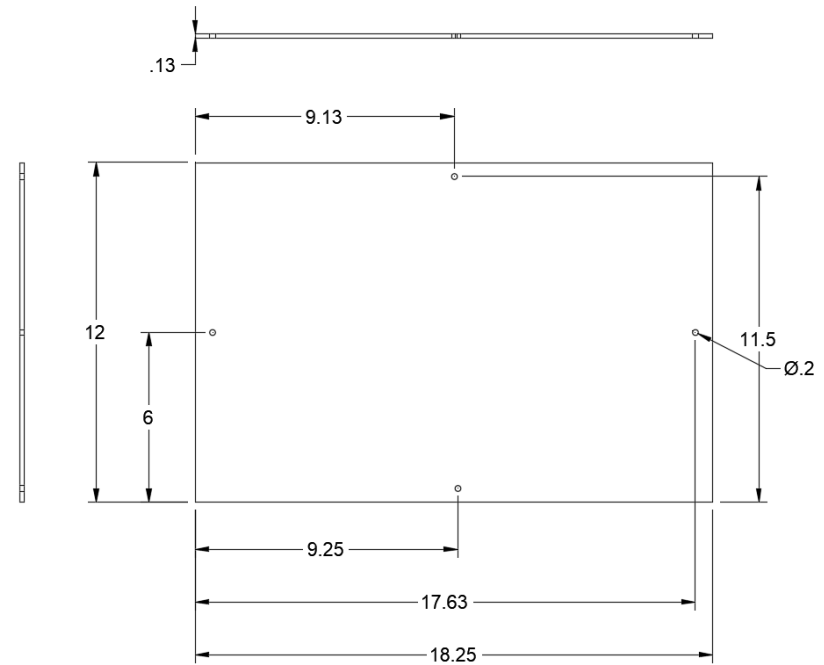


Fig 6.1. The dimensions of PT-00006.

PT-00007

Name: PIR cover

Amount: 1

Description: Covers the PIR sensor on the front of PT-00015.
<https://a360.co/4dtlQqc>

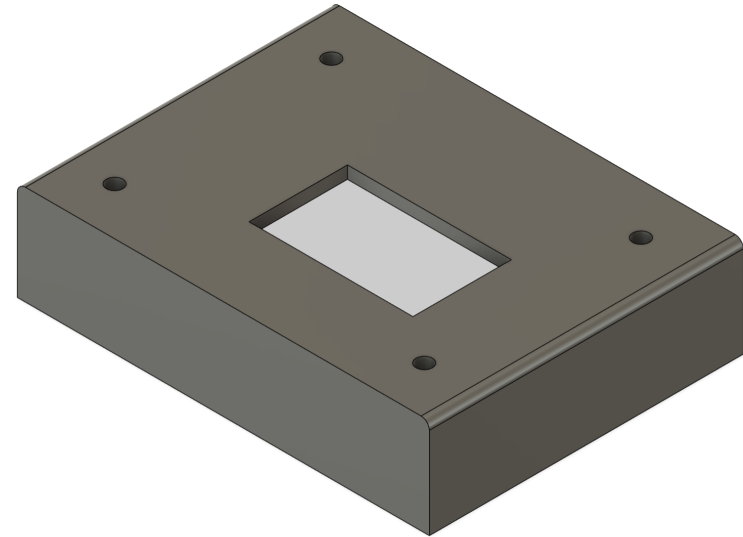


Fig 7.1. The 3D view of PT-00007

PT-00008

Name: LiDAR_Stand

Amount: 1

Description: PT-00008 is the stand that holds the plate for the LiDAR on the Robot for rigid support, so the LiDAR plate does not move during operation. <https://a360.co/43A3u39>

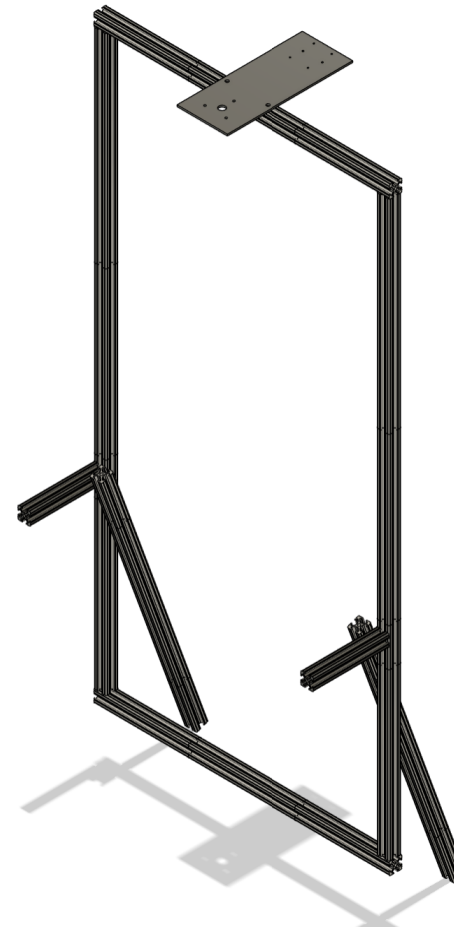


Fig 8.1. The 3D view of PT-00008

PT-00009

Name: Light and LiDAR Plate with Holes

Amount: 1

Description: PT-00009 is a plate attached to the top of the robot. It is used to hold both the LiDAR sensor on the bottom side and the warning light on the top side. This plate allows the light to be easily seen by the patient, operator, and passersby, and it maximizes the vision of the LiDAR sensor.
<https://a360.co/44E04xq>

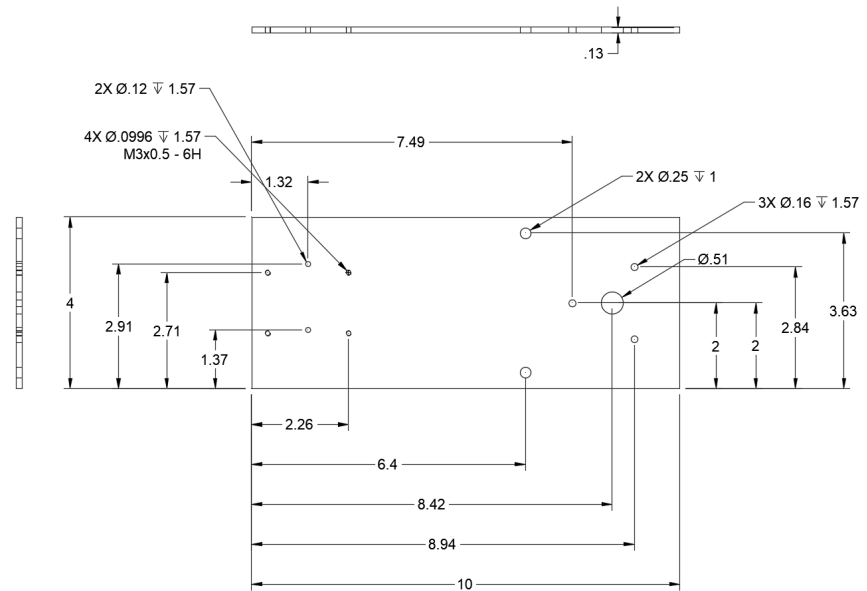


Fig 9.1. The dimensions of PT-00009.

PT-00010

Name: Navigation Markers

Amount: 4

Description: Holders for navigation beacons and their batteries around the building for the localization of the robot. One is also placed on top of the wheelchair with a transmitter attached. <https://a360.co/3FhWSx7>

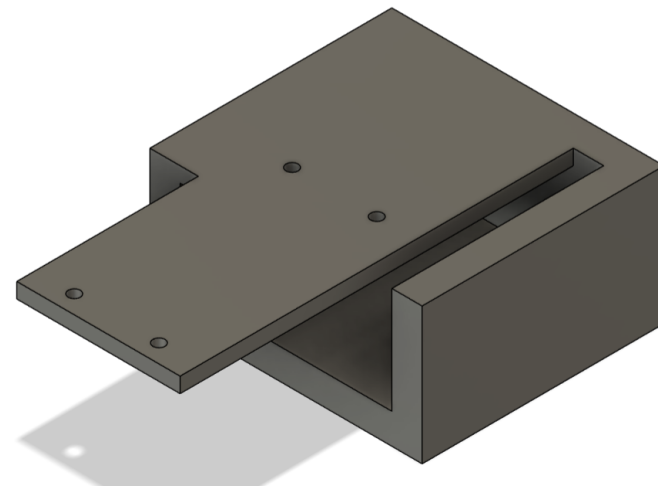


Fig 10.1. The 3D view of PT-00010.

PT-00011

Name: Motor pad - Left

Amount: 1

Description: PT-00011 was created to both adjust the height of the back wheels and add conversion so the motors can be attached with the 80/20 on the robot.

<https://a360.co/4kuJZPn>

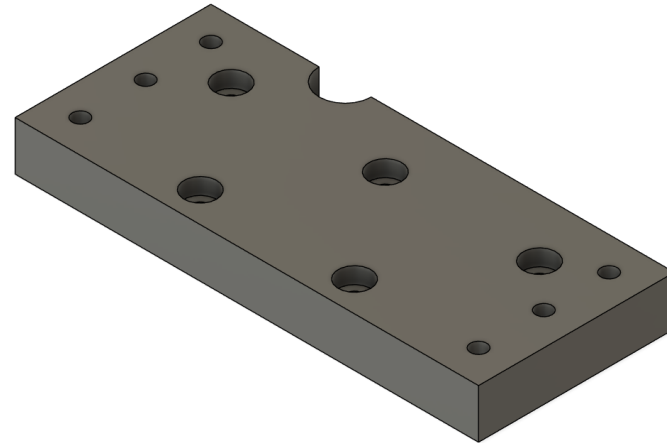


Fig 11.1. The 3D view of PT-00011.

PT-00012

Name: Motor pad - Right

Amount: 1

Description: PT-00012 is the same as PT-00011 but is mirrored to be able to attach the right motor also.

<https://a360.co/4j5wmVx>

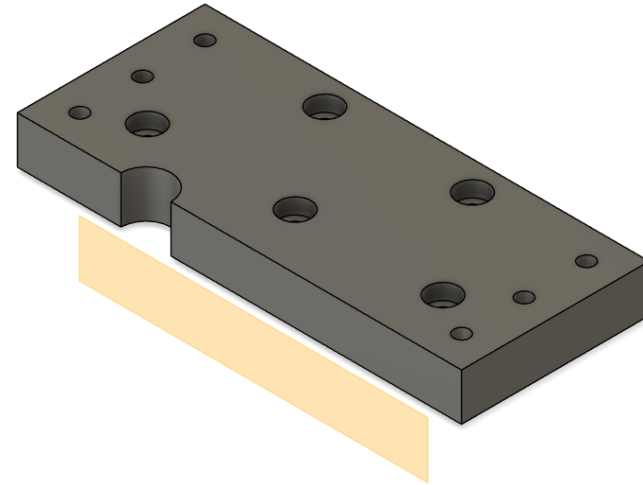


Fig 12.1. The 3D view of PT-00012.

PT-00013

Name: Shelf_Holder

Amount: 1

Description: PT-00013 is a 3D printed part that was designed to hold shelves with multiple shelf levels. The shelf holder allows for fans to be held on the outside to cool the electronics that the shelves will hold. <https://a360.co/4jdKIU2>

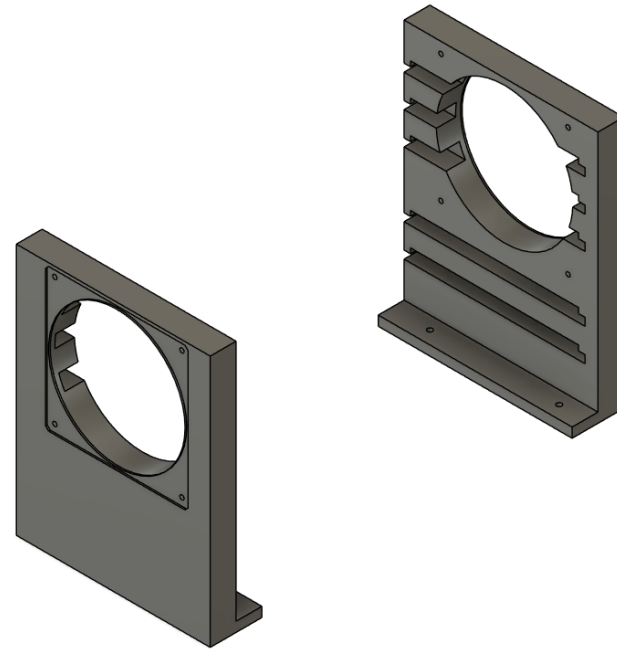


Fig 13.1. The 3D view of PT-00013.

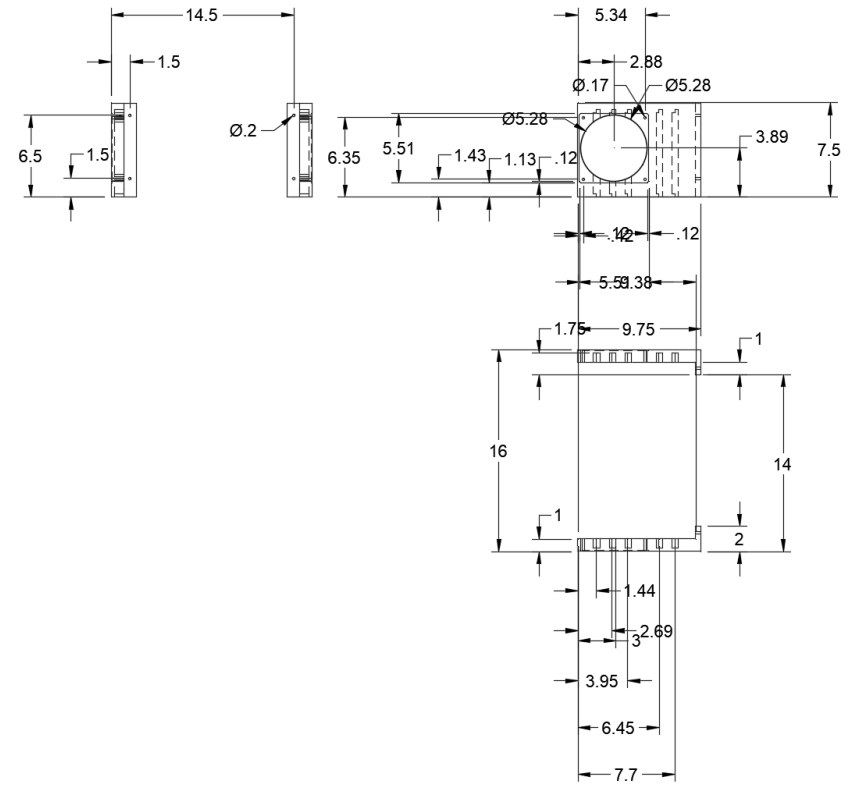


Fig 13.2. The dimensions for PT-00013.

PT-00014

Name: Side Cover Plastic

Amount: 1

Description: PT-00014 is a cut piece of plastic that has been modified multiple times. This part is designed to protect sensitive parts within the box of the robot. The part was modified to also include sensors, a charging port, and hole for the fans on the robot. <https://a360.co/3SvlVQx>

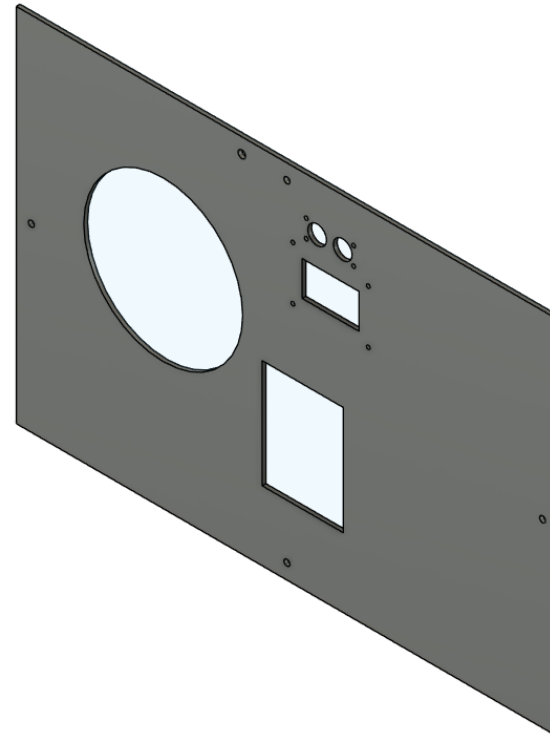


Fig 14.1. The 3D view of PT-00014.

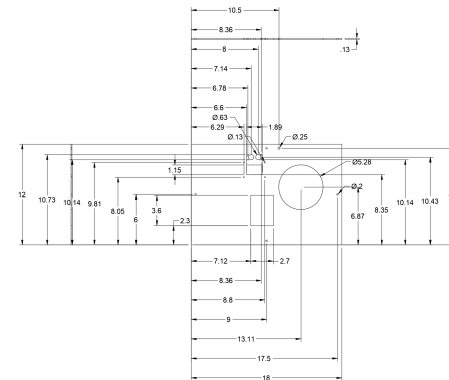


Fig 14.2. The dimensions of PT-00014.

PT-00015

Name: Front Sensor Holder

Amount: 1

Description: Attaches to the screen stand pole and holds the PIR and ultrasonic sensors for the front.

<https://a360.co/3Zlr9Su>

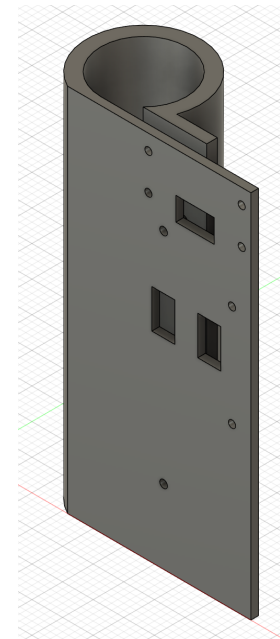


Fig 15.1. The 3D view of PT-00015.

PT-00016

Name: Top_Shelf

Amount: 1

Description: PT-00016 is a 3D printed part that is designed to hold electronics within the box of the wheelchair.

<https://a360.co/4jT4PYG>

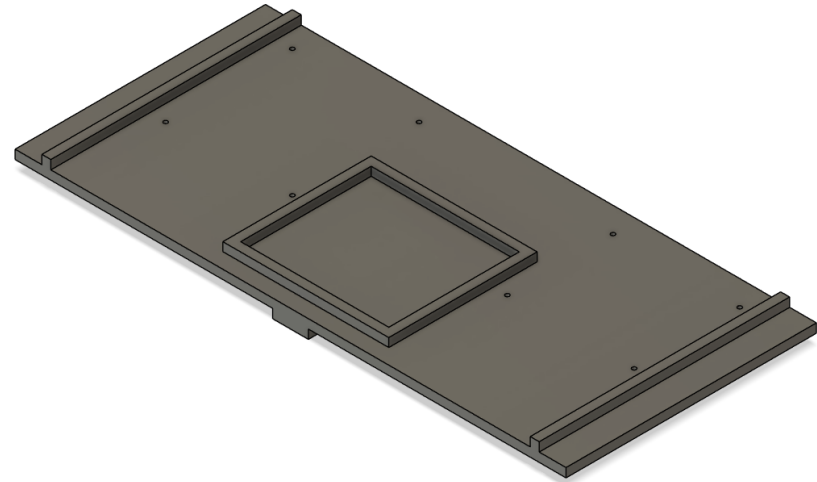


Fig 16.1. The 3D view of PT-00016.

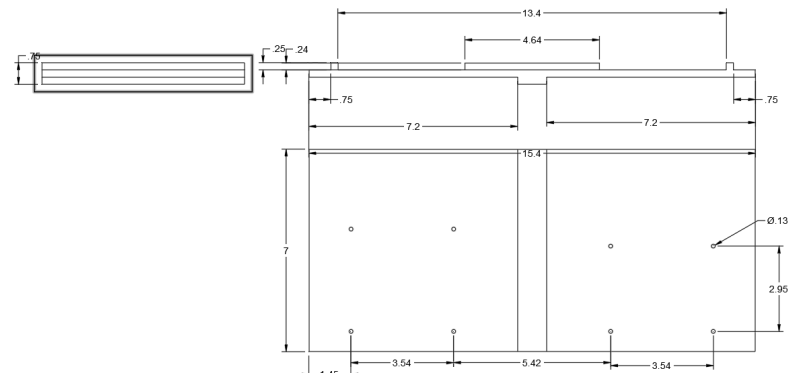


Fig 16.2. The Dimensional view of PT-00016.

PT-00017

Name: 89015K48_Multipurpose 6061 Aluminum Sheet

Amount: 1

Description: This is the base plate for the robot. On top of this rests the box and the chair with the light/LiDAR stand.
<https://a360.co/3H0GgKS>

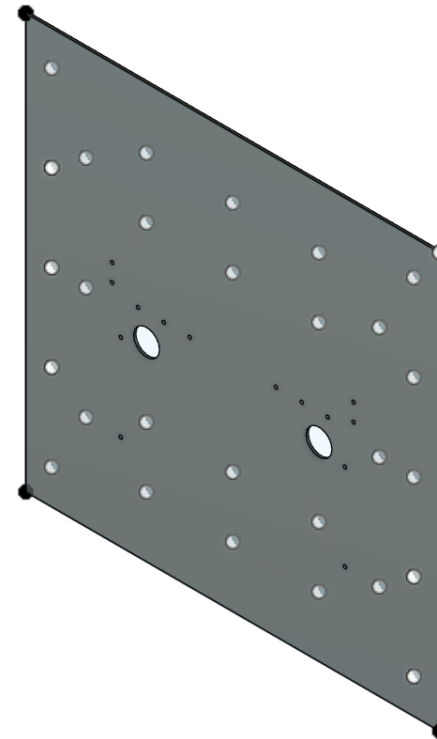


Fig 17.1. The 3D view of PT-00017.

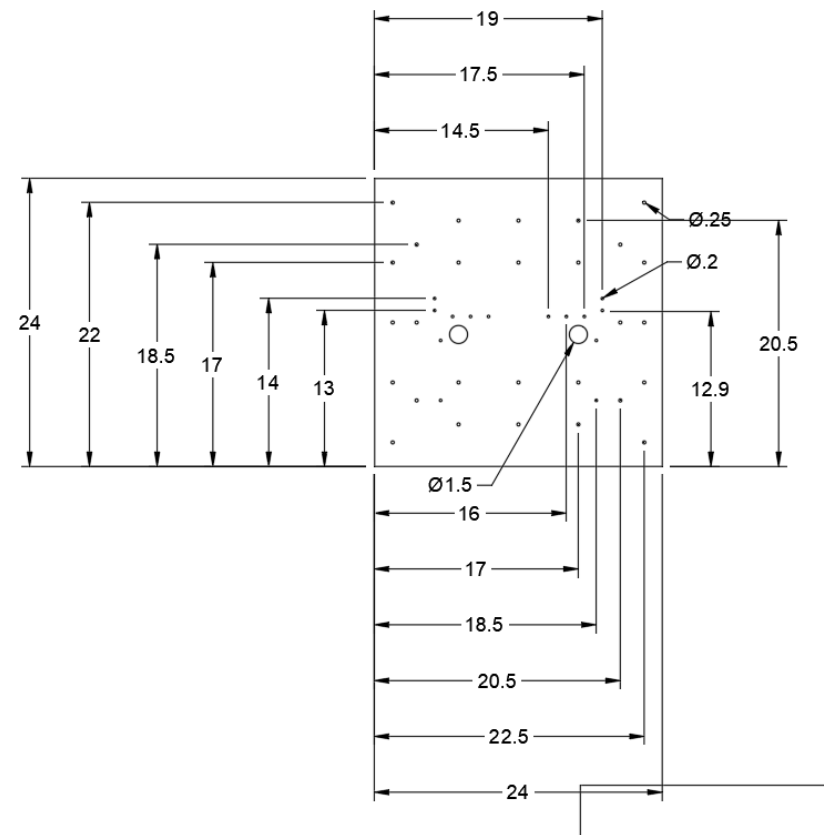


Fig 17.2. The dimensions of PT-00017.

PT-00018

Name: 80/20 Triple Rail T-Slotted Framing Rails

Amount: 2

Description: These are two pieces of triple-wide (3" x 1") 80/20. Attached to these pieces are the drive and castor wheels, and the base and footrest plates.

<https://a360.co/4mpexnj>

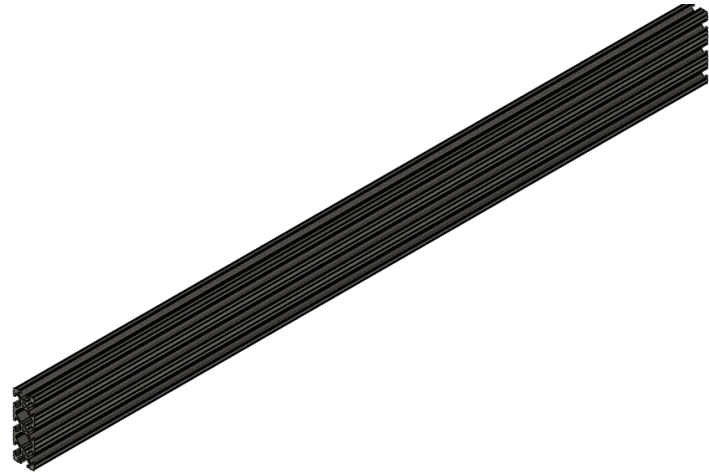


Fig 18.1. The 3D view of PT-00018.

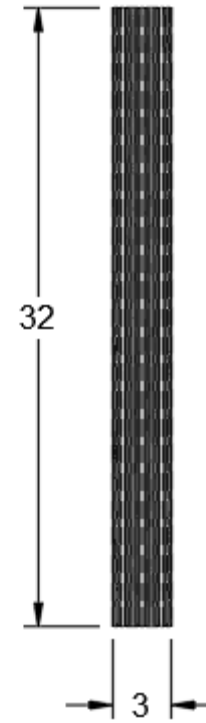


Fig.18.2. The dimensions of PT-00018.

PT-00019

Name: Back PIR

Amount: 1

Description: Holds a PIR and ultrasonic sensor on the back of the robot. <https://a360.co/3YP6shC>

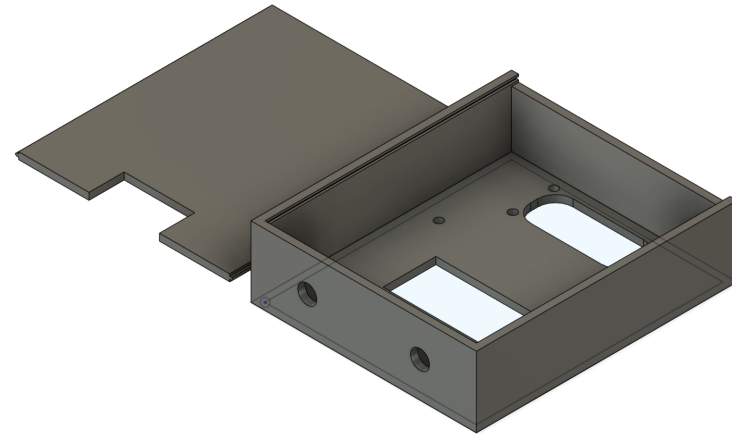


Fig 19.1. The 3D view of PT-00019.

PT-00020

Name: Joystick Holder Lid

Amount: 1

Description: The lid to the PT-00034 that holds the PT-00038. <https://a360.co/4k3FVFX>

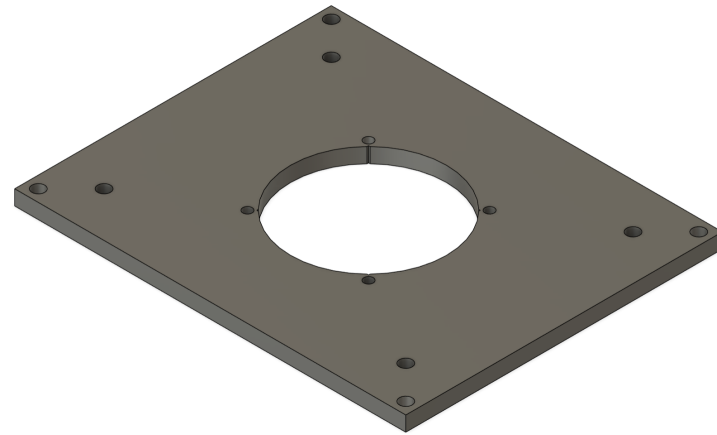


Fig 20.1. The 3D view of PT-00020.

PT-00021

Name: 10in 80/20

Amount: 4

Description: These 10" pieces of 80/20 are used to construct the box frame of the robot. <https://a360.co/4mAY0Nk>

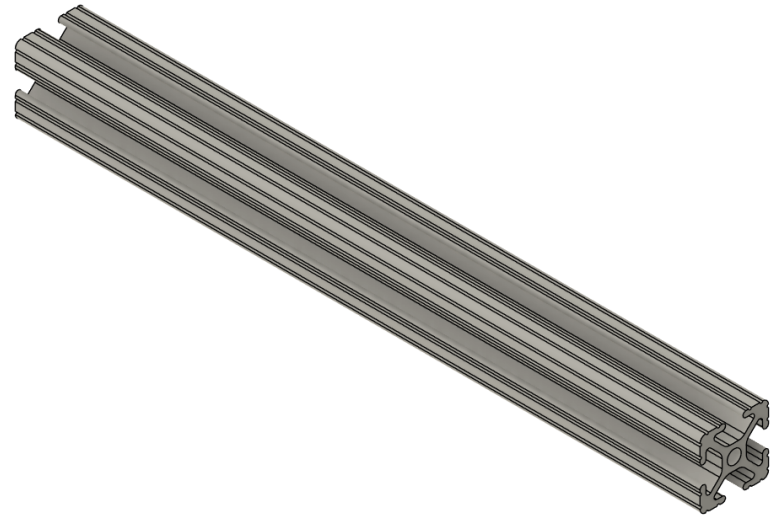


Fig 21.1. The 3D view of PT-00021.

PT-00022 Name: 16in 80/20 Amount: 5 Description: These 16" pieces of 80/20 are used to construct the box frame of the robot. https://a360.co/3H0fMZP	Fig 22.1. The 3D view of PT-00022.
PT-00023 Name: 18in 80/20 Amount: 6 Description: These 18" pieces of 80/20 are used to construct the box frame of the robot; specifically, these comprise the length and width of the box. https://a360.co/4mnpFkv	Fig 23.1. The 3D view of PT-00023.

PT-00024

Name: 45 in 80/20

Amount: 2

Description: These 45" pieces of 80/20 are used for the light stand. These comprise the longer side of the stand, which runs perpendicular to the floor. <https://a360.co/4jXtGdP>

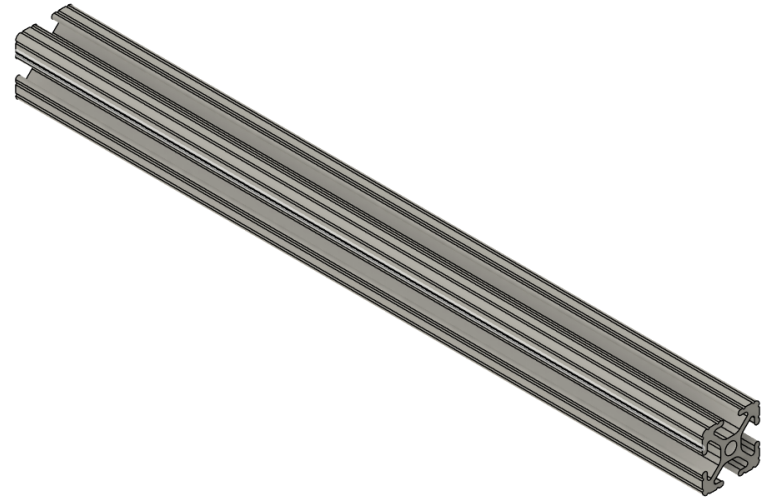


Fig 24.1. The 3D view of PT-00024.

PT-00025

Name: 80/20 Footrest lift

Amount: 3

Description: This is a 22" piece of 80/20 used for the light stand. <https://a360.co/4jXtGdP>

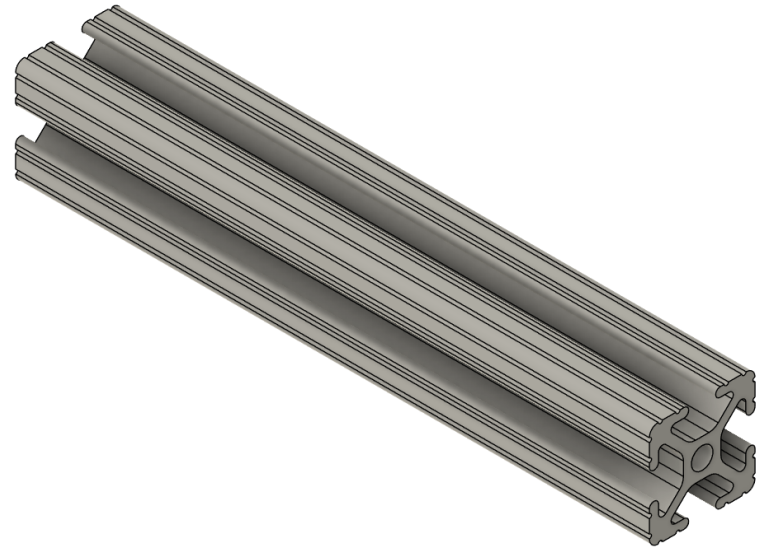


Fig 25.1. The 3D view of PT-00025.

PT-00026

Name: Slide-in Economy T-Nut, Centered Thread

Amount: 82

Description: These nuts are used to screw components into the 80/20. They slide in the center groove of the 80/20 (pictured right) and from there, aluminum pieces, wall covers, and more can be secured in the design. [3382 | 1/4-20 Slide-in Economy T-Nut - Centered Thread](#)



Fig 26.1. The 3D view of PT-00026.

PT-00027

Name: 22in 80/20

Amount: 2

Description: These two pieces of 80/20 aluminum run diagonally along the side of the chair. They provide additional support for the light and LiDAR stand and prevent wobbling.

<https://a360.co/4kwGsjz>

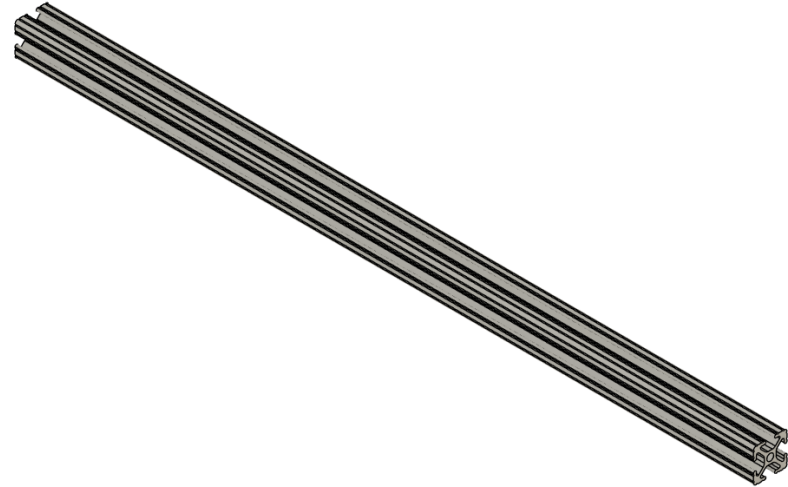


Fig 27.1. The 3D view of PT-00027.

PT-00028

Name: 21 in 80/20

Amount: 1

Description: This 21" piece of 80/20 is used underneath the joystick holder to provide additional support so the joystick is held stable in space. <https://a360.co/4k3eoEo>

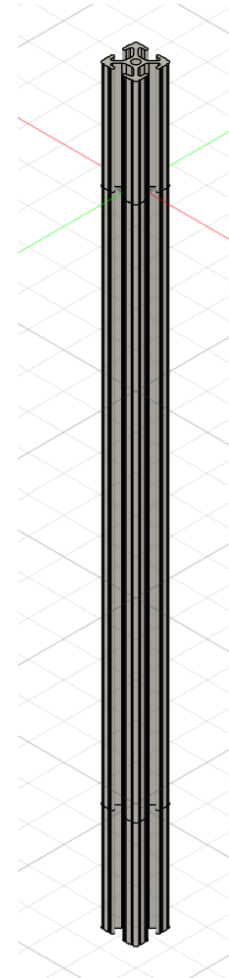


Fig 28.1. The 3D view of PT-00028.

PT-00029

Name: Corner Brackets

Amount: 20

Description: 1" wide corner brackets used to help join two pieces of 80/20 together.



Fig 29.1. The 3D view of PT-00029.

PT-00030

Name: 6 in 80/20

Amount: 2

Description: These 6" 80/20 pieces are attached to the back of the robot to allow an external user to easily move and control the robot. <https://a360.co/4jV5cSy>

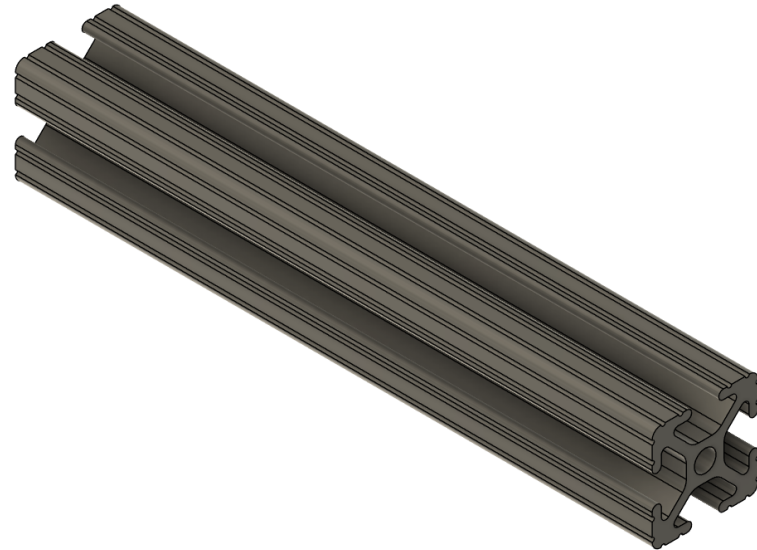


Fig 30.1. The 3D view of PT-00030.

PT-00031

Name: Table Front

Amount: 1

Description: The front of the armrest. Used to connect the armrest's design to the chair itself. <https://a360.co/4mtuOaY>

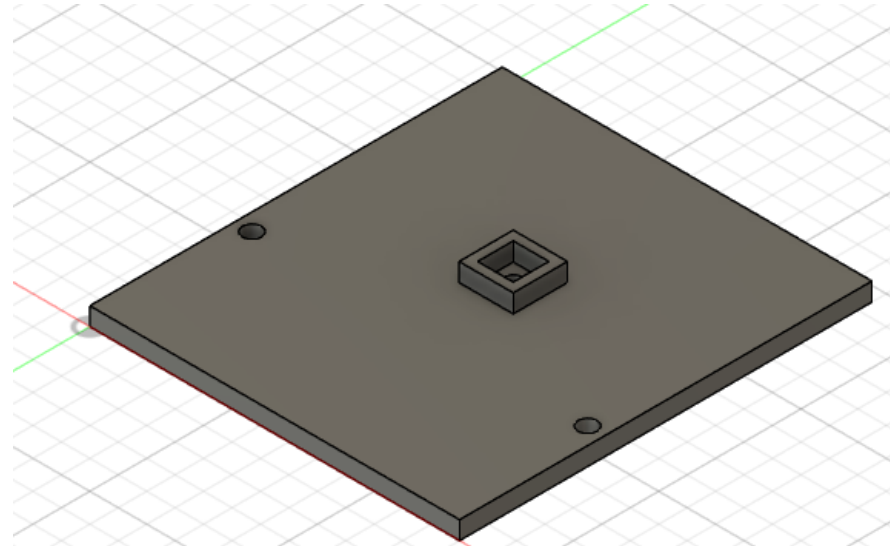


Figure 31.1: The 3D view of PT-00031

PT-00032

Name: Table Connector

Amount: 2

Description: Designed to hold the PT-00031 and PT-00033 together using screws. <https://a360.co/3F2rKlk>

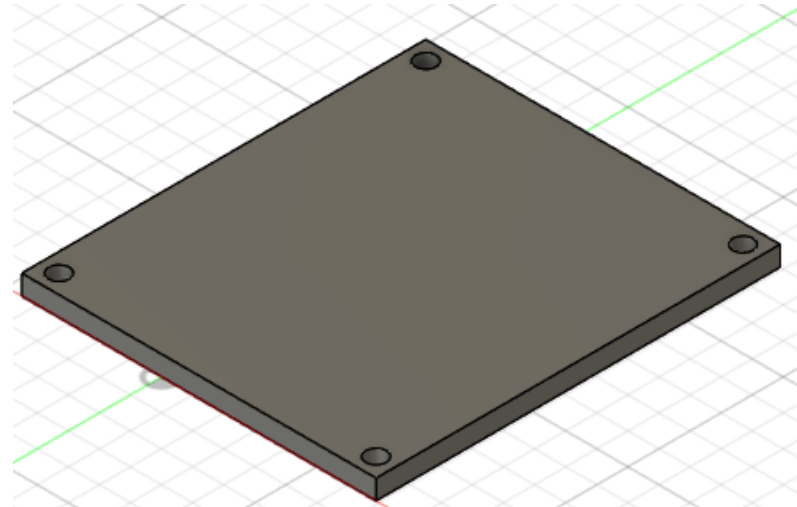


Figure 32.1: The 3D View of PT-00032

PT-00033

Name: Table End

Amount: 1

Description: The end of the armrest. Holds the joystick, ultrasonic sensor, switches, biometric sensor, and PCB Holder. <https://a360.co/4jehCDL>

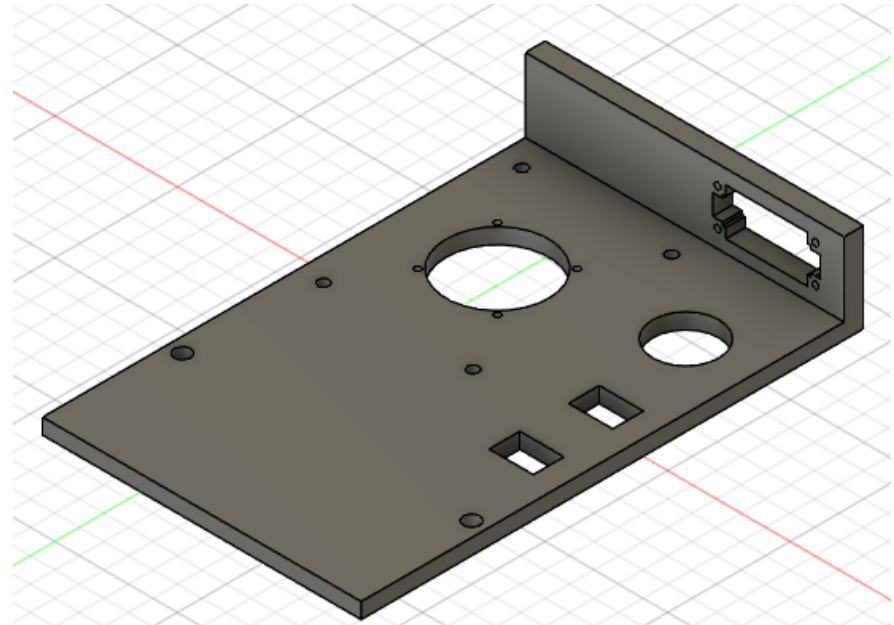


Figure 33.1: The 3D View of PT-00033

PT-00034

Name: PCB Holder

Amount: 1

Description: A box to hold the PCB for the joystick. Connects to the end of the table. <https://a360.co/4kut3Zi>

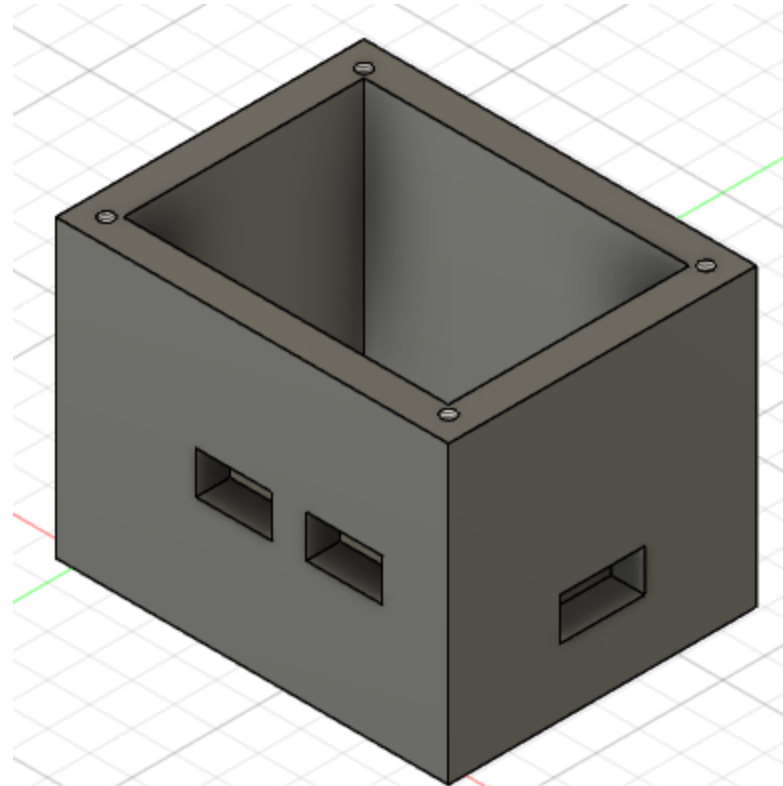


Figure 34.1: The 3D View of PT-00034

PT-00035

Name: Screen Waveshare 13.3-inch HDMI LCD (H) Touchscreen

Amount: 1

Description: A touchscreen that the user will use to control the wheelchair mode and monitor the status of the robot.

<https://a360.co/4jcrrCn>



Fig 35.1. The 3D view of PT-00035.

PT-00036

Name: Creative Pebble V2 Speakers

Amount: 1

Description: A warning noise sounds when the wheelchair is in operation. [Creative Pebble V2 – Minimalistic 2.0 USB Powered Desktop Speakers with USB-C Connectivity - Creative Labs \(United States\)](#)



Fig 36.1. The 3D view of PT-00036.

PT-00037

Name: Livox Mid-360 lidar Minimal Detection Range Original for Self-Driving Robots (with Connector)

Amount: 1

Description: One of the sensors used for 3D mapping for obstacle detection. <https://a360.co/3H0uWyp>



Fig 37.1. A 2D image of the front of PT-00037.

PT-00038

Name: Joystick Adafruit 3102

Amount: 1

Description: Used to control the wheelchair movement when manually controlled. <https://a360.co/434DEUR>



Fig 38.1. The 3D view of PT-00038.

PT-00039

Name: Raspberry Pi SC0915

Amount: 5

Description: PT-00039 is used for communicating between devices on the robot including data input from the sensors and the desired rotational speed of the wheels. [SC0915 EDA | CAD 3D Model Download | Digikey](#)

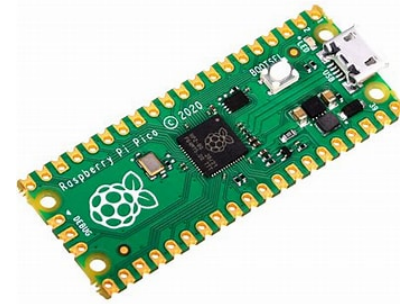


Fig 39.1. The 3D view of PT-00039.

PT-00040

Name: PIR Sensor 170uA Pearl Wide Angle Len

Amount: 4

Description: PIR sensors are used for obstacle detection. [EKMC1605113 Panasonic Industrial Devices | Mouser](#)



Fig 40.1. The 3D view of PT-00040.

PT-00041

Name: Ultrasonic Sensor DFRobot SEN0307

Amount: 6

Description: Ultrasonic sensors are used for obstacle detection.
[SEN0307 DFRobot | Mouser](https://www.dfrobot.com/product-1111-1.html)

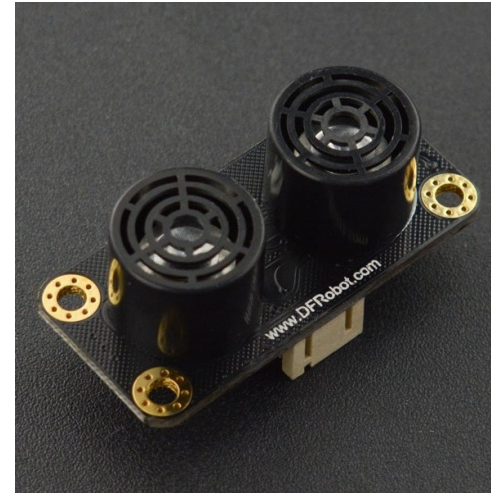


Fig 41.1. The 3D view of PT-00041.

PT-00042

Name: Left Motor

Amount: 1

Description: PT-00042 is a left hand output shaft 21 gear ratio motor used for the robot. <https://a360.co/4jeVOrZ>



Fig. 42.1. Side view of PT-00042.

PT-00043

Name: Right Motor

Amount: 1

Description: PT-00043 is a right hand output shaft 21 gear ratio motor used for the robot. <https://a360.co/4jeVOrZ>



Fig. 43.1. Side view of PT-00043.

PT-00044

Name: 24V 60Ah LiFePO4 Battery

Amount: 1

Description: PT-00044 is a LiFePO4 battery used for the robot. It is a rechargeable 24V lithium battery. <https://a360.co/4kpshMZ>



Fig. 44.1. Front view of PT-00044.

PT-00045

Name: Motor Controllers

Amount: 2

Description: PT-00045 is a BLDC speed control drive used for motor control. There are two motor controllers, one for each side, and they work in conjunction with the motors.

<https://a360.co/43oHPtw>



Fig. 45.1. Front view of PT-00045.

PT-00046

Name: Charger

Amount: 1

Description: Charger to charge the battery.

<https://a360.co/4mlpDJU>



Fig. 46.1. 3D view of PT-00046.

PT-00047

Name: Arctic P14 Fans

Amount: 4

Description: Fans to keep electronics cool.
<https://a360.co/4mplW6a>

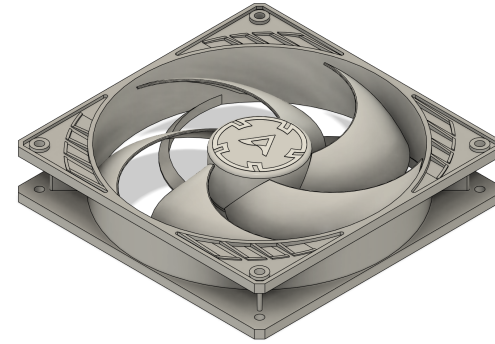


Fig 47.1. The 3D view of PT-00047.

PT-00048

Name: Door Screws

Amount: 2

Description: Screw to hold the door to the door hinge and allow it to open. <https://a360.co/3SJusza>

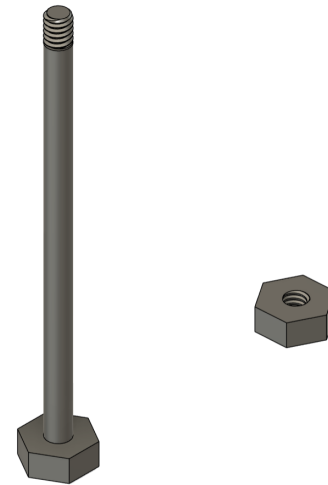


Fig 48.1. The 3D view of PT-00048.

PT-00049

Name: Door Hinge

Amount: 2

Description: Holds the door and allows it to open to access electronics. Attaches directly to 80/20. <https://a360.co/4jZD3d1>

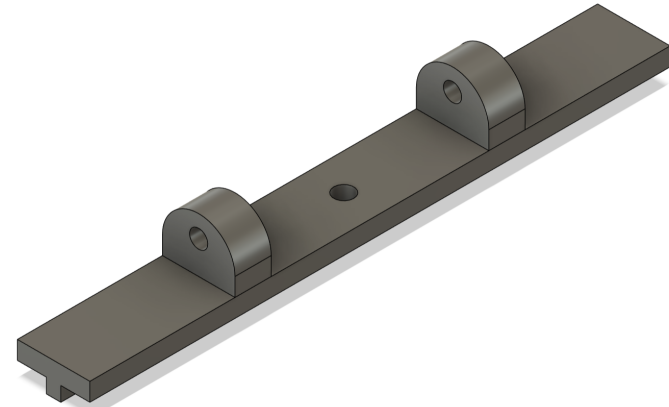


Fig 49.1. The 3D view of PT-00049.

PT-00050

Name: Ultrasonic Sensor Covers

Amount: 1

Description: Covers the Ultrasonic Sensor on the front of the Robot. <https://a360.co/437fN6Y>

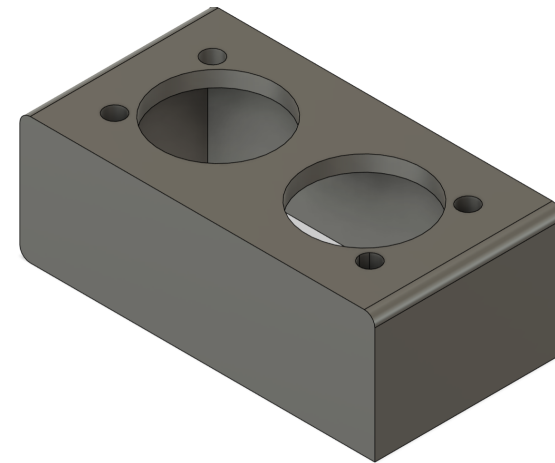


Fig 50.1. The 3D view of PT-00050.

PT-00051

Name: Jetson Nano

Amount: 1

Description: Central Computer to send information and calculations. <https://a360.co/4jbuZET>

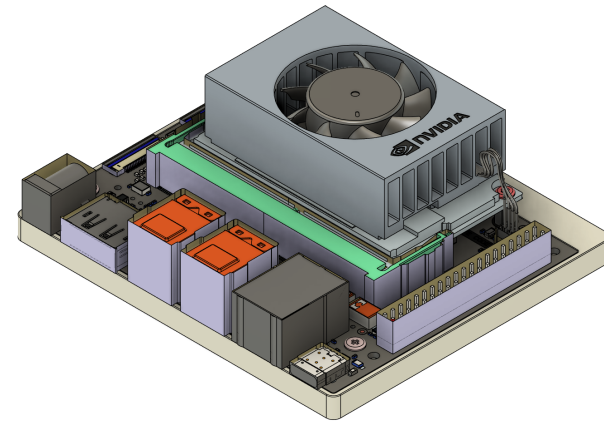


Fig 51.1. The 3D view of PT-00051.

PT-00052

Name: JoystickPCB

Amount: 1

Description: PCB circuit for the joystick. <https://a360.co/4j9yawE>

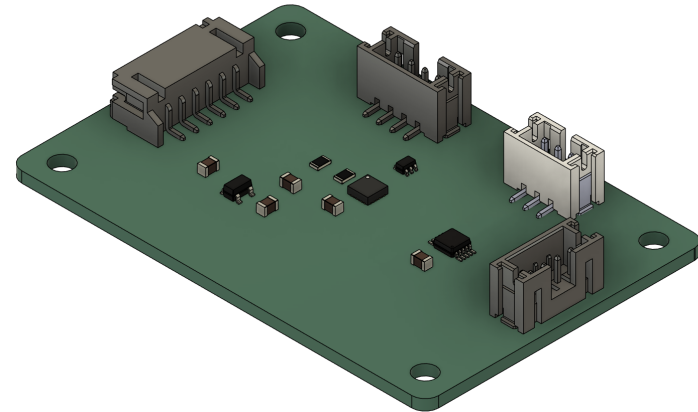


Fig 52.1. The 3D view of PT-00052.

PT-00053

Name: Motor Signal PCB

Amount: 1

Description: PCB circuit to convert signals back and forth between the pico and the controllers. <https://a360.co/3SKvRp8>

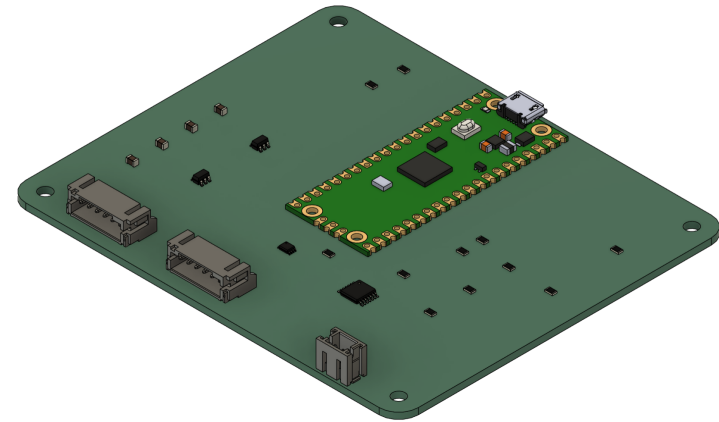


Fig 53.1. The 3D view of PT-00053.

PT-00054

Name: PIR Ultrasonic PCB

Amount: 5

Description: PCB circuit for connecting the ultrasonic and PIR sensors for the robot detection. <https://a360.co/3Sc6X1t>

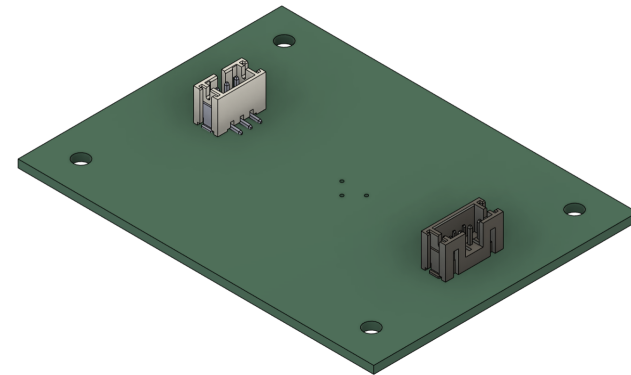


Fig 54.1. The 3D view of PT-00054.

PT-00055

Name: Power Distribution Board

Amount: 1

Description: PCB circuit for the power distribution throughout the electronics of the robot. <https://a360.co/3YTJkP4>

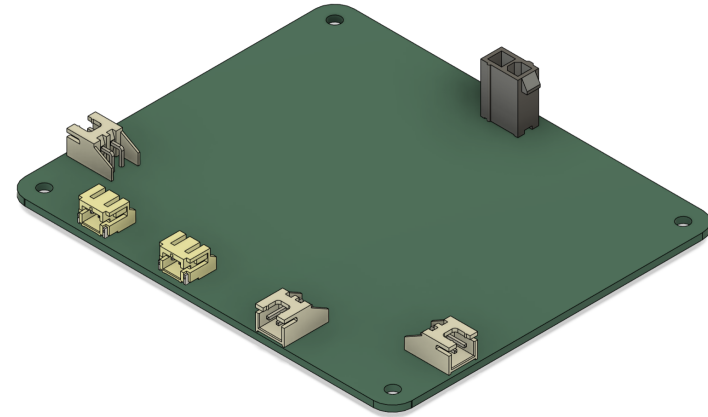


Fig 55.1. The 3D view of PT-00055.

PT-00056

Name: Sensor Microcontroller

Amount: 1

Description: PCB circuit for receiving data from the sensors throughout the robot. <https://a360.co/3YS9KRi>

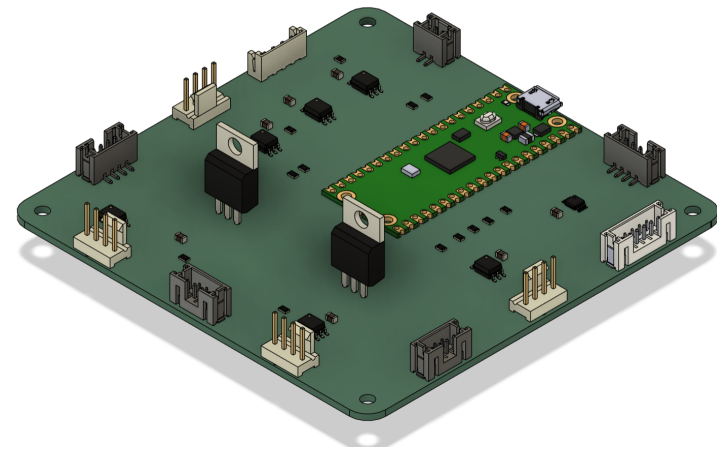


Fig 56.1. The 3D view of PT-00056.

PT-00057

Name: Castor Tire

Amount: 2

Description: The plastic tires in the front of the wheelchair that swivel. <https://a360.co/4mjVKKh>

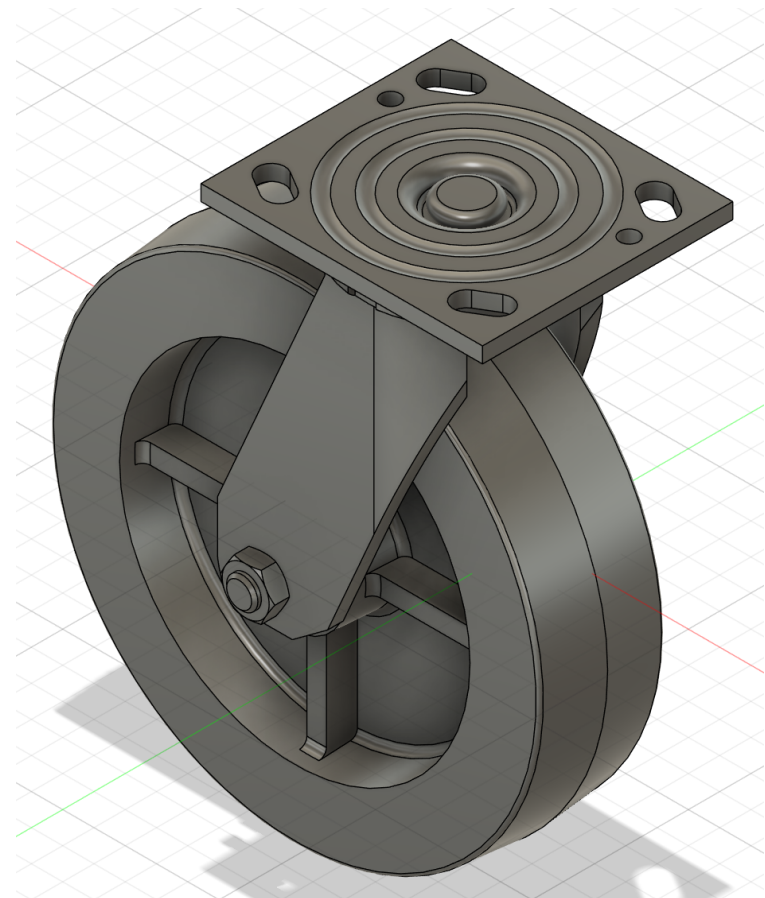


Fig 56.1. The 3D view of PT-00057.

PT-00058

Name: Drive Wheel

Amount: 2

Description: The back rubber wheels that are attached to the motors. <https://a360.co/4ju2rH3>

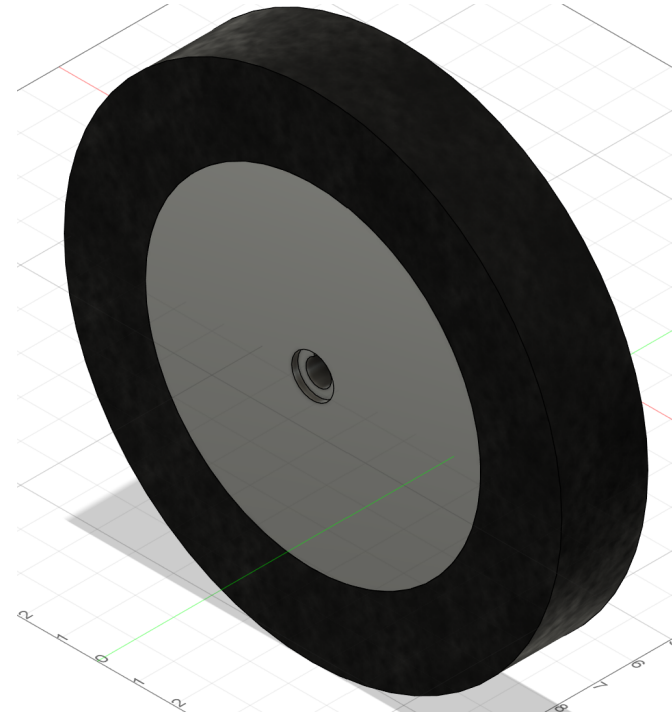


Fig 56.1. The 3D view of PT-00058.