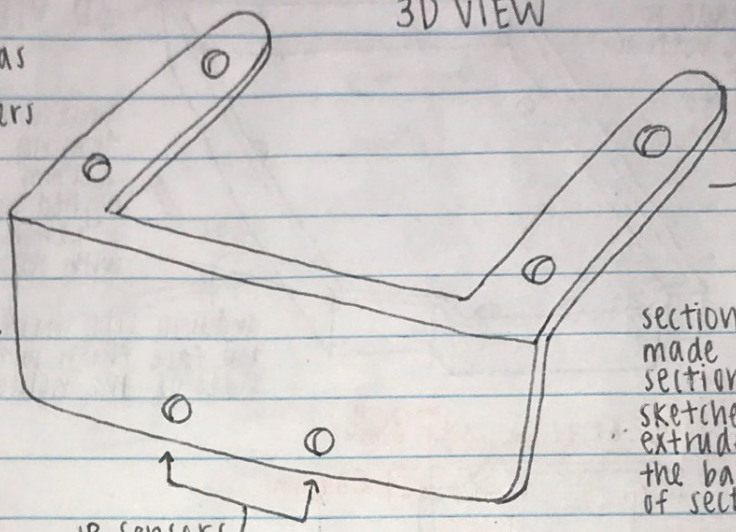
An-Ya Cheng
12/15/20
Final Project
Pages 35-44

Final Project

CAD Parts

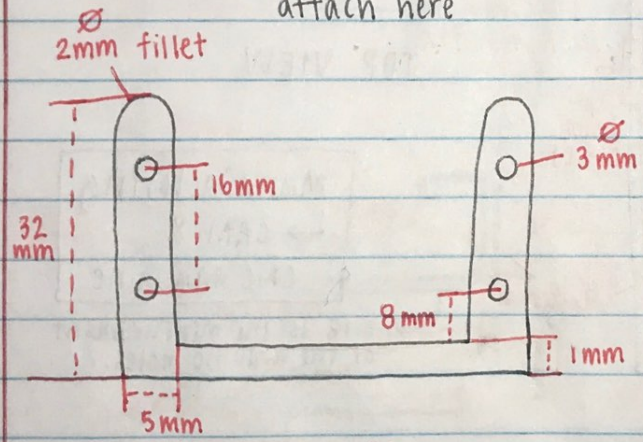
IR sensor Holder

3D VIEW

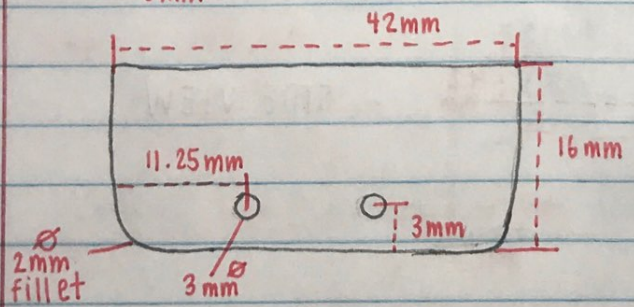


section a was made first, section b was sketched and extruded from the back side of section a.

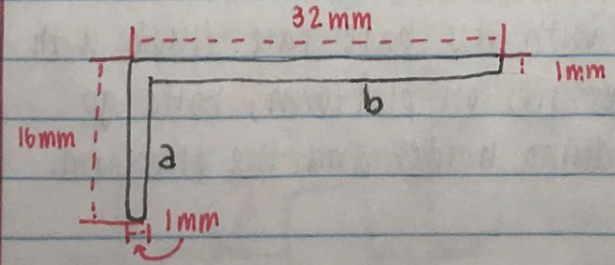
Manufactoring
↳ Cura & 3D printing



TOP VIEW
(b)



FRONT VIEW
(a)

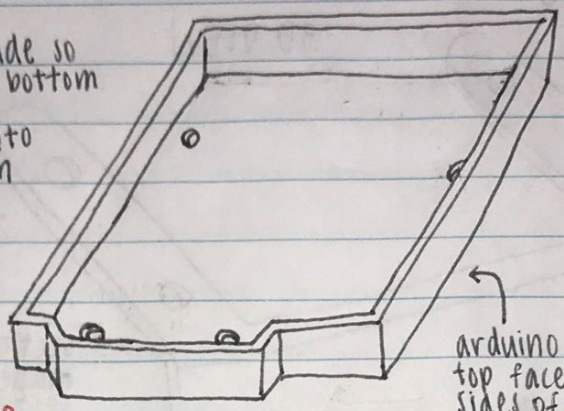


SIDE VIEW
(a & b)

Description:
section b attaches to the base body of the line bot. section a has 2 holes to attach 2 IR sensors, which are 5mm apart when bolted on.

Arduino Holder

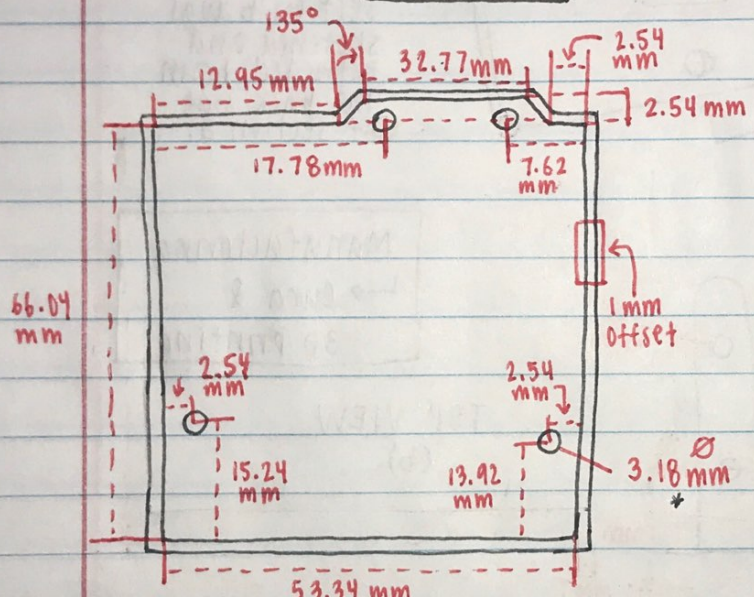
part was made so that arduino bottom pins are not compressed into base platform



3D VIEW

base was made by tracing the arduino a 1 mm offset was applied before extruding a 4.2mm cut was made with the arduino base

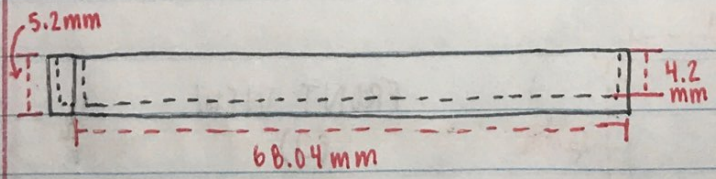
arduino sits inside with top face flush with the sides of the holder



TOP VIEW

Manufactoring
↳ CAM & CNC Machine

* 3.18 is the measurement of the arduino holes.



SIDE VIEW

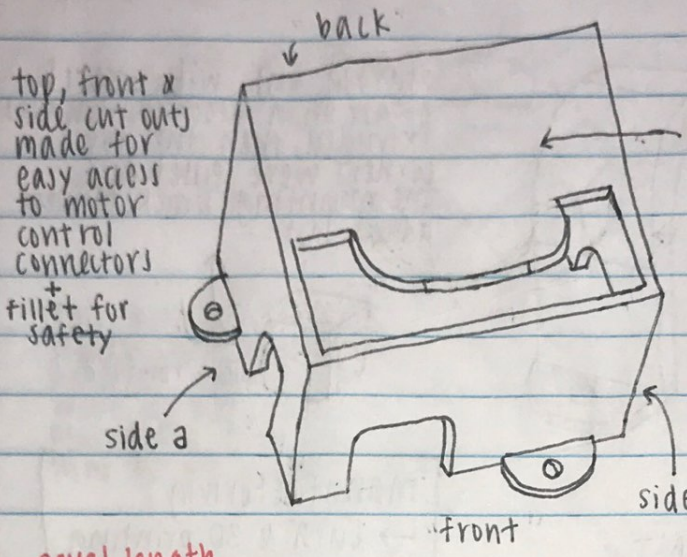
Description:

The arduino uno sits inside with it's base face flush with the sides of the holder. Holder sits on platform, bolts go through the arduino, the arduino holder and the platform.

Note:

one hole on the arduino is blocked by its header pins so it does not have a screw going through it.

Motor Enclosure (for motor driver)

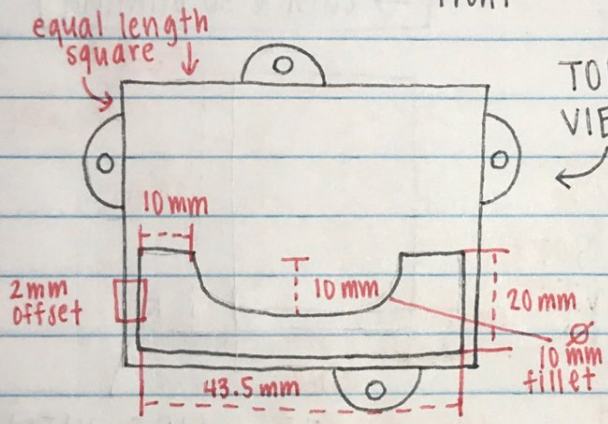


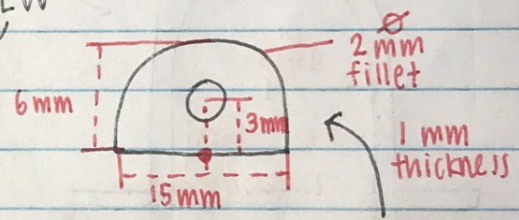
top, front & side cut outs made for easy access to motor control connectors + fillet for safety

3D VIEW

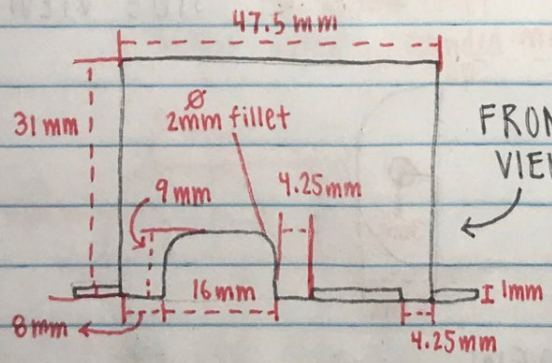
motor driver measurements with a 2 mm offset extruded and cut into box. Then cuts were made for access to ports and mounting pieces were made.

Manufactoring
↳ Cura & 3D Printing

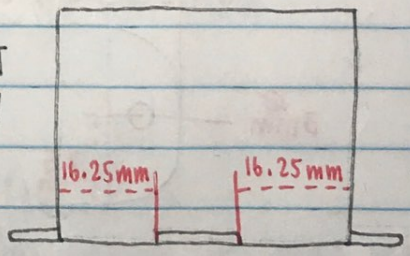




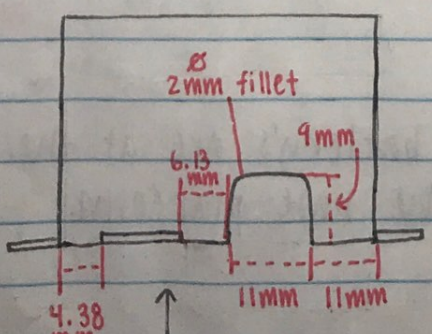
MOUNTING BRACKETS



FRONT VIEW



BACK VIEW



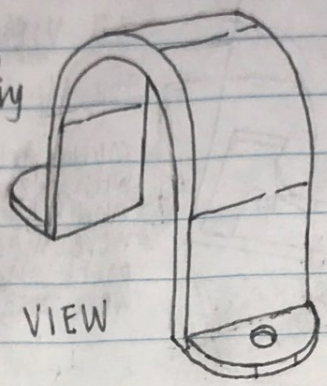
SIDE VIEW*

Description:
The motor driver sits inside the motor enclosure with all ports and pins accessable via cut outs. The motor holder sits on the base platform and is mounted after the motor driver.

*(side a & b have indentical measurements but are flipped)

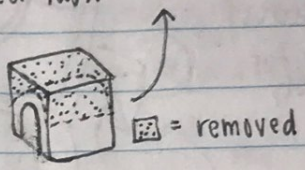
Battery Holder

the holder arc coincides with the arc of the battery ensuring a snug fit. The holder secures the battery to the base platform.

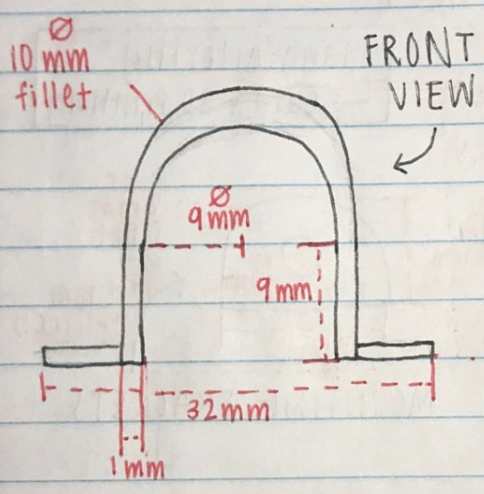


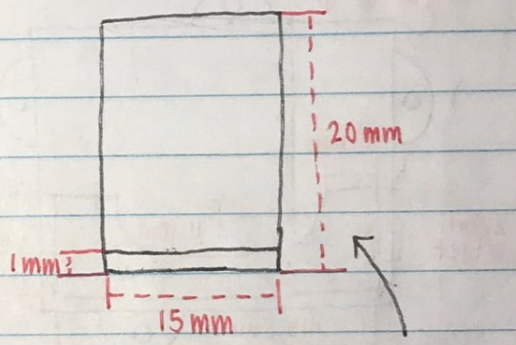
3D VIEW

started out with sketch of arc on a block which was extruded, then the top corners were fillet(ed?). The mounting brackets were added last.

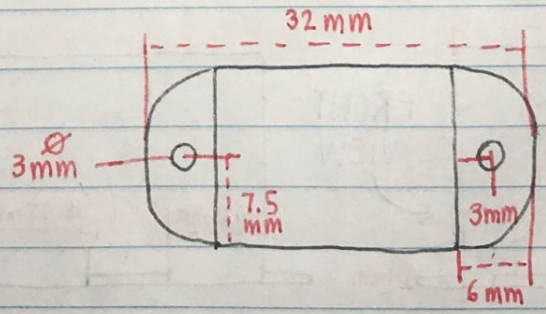


manufactoring
↳ Cura & 3D printing





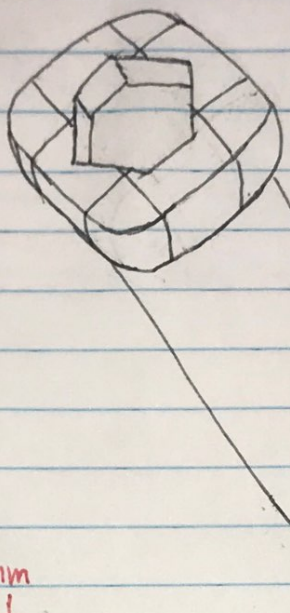
SIDE VIEW



TOP VIEW

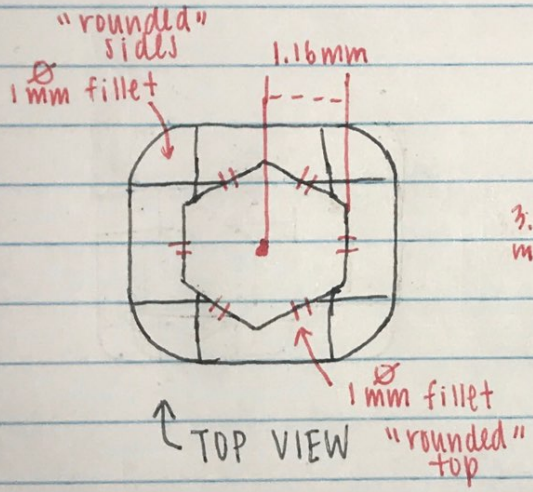
Description:
Battery holder is flush with the battery's arc at the top. The holder is fastened to the base platform.

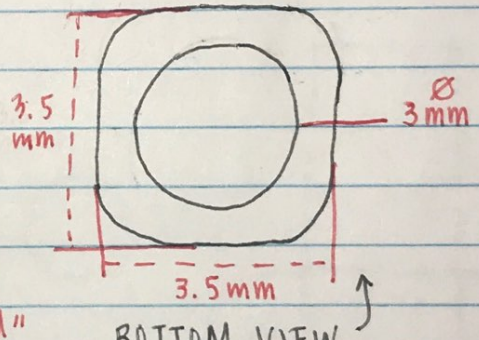
Custom Bolt

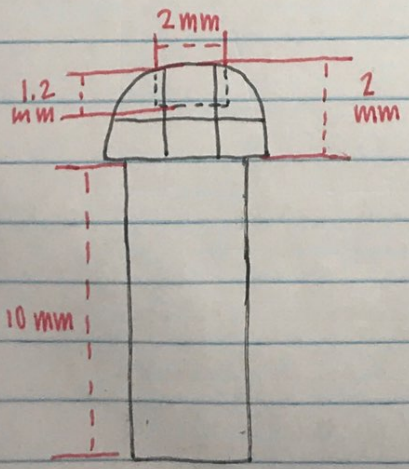


started out with the sketch of the base circle which was extruded to the length of the bolt. Then a square was sketched and extruded. A hexagon was drawn on top and then cut into the face. 2 fillets rounded the top & sides.

This bolt is a placeholder bolt because there were no bolts on Mcmaster Carr that fit my needs.







Description:
This custom bolt was made because the arduino uno has one port (fig 1) that is too close to the parts to fit a conventional screw. There were no bolts (that I could find) on Mcmaster Carr so I made this stand in bolt.

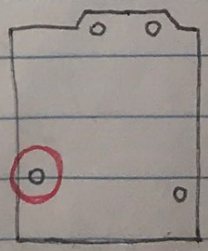
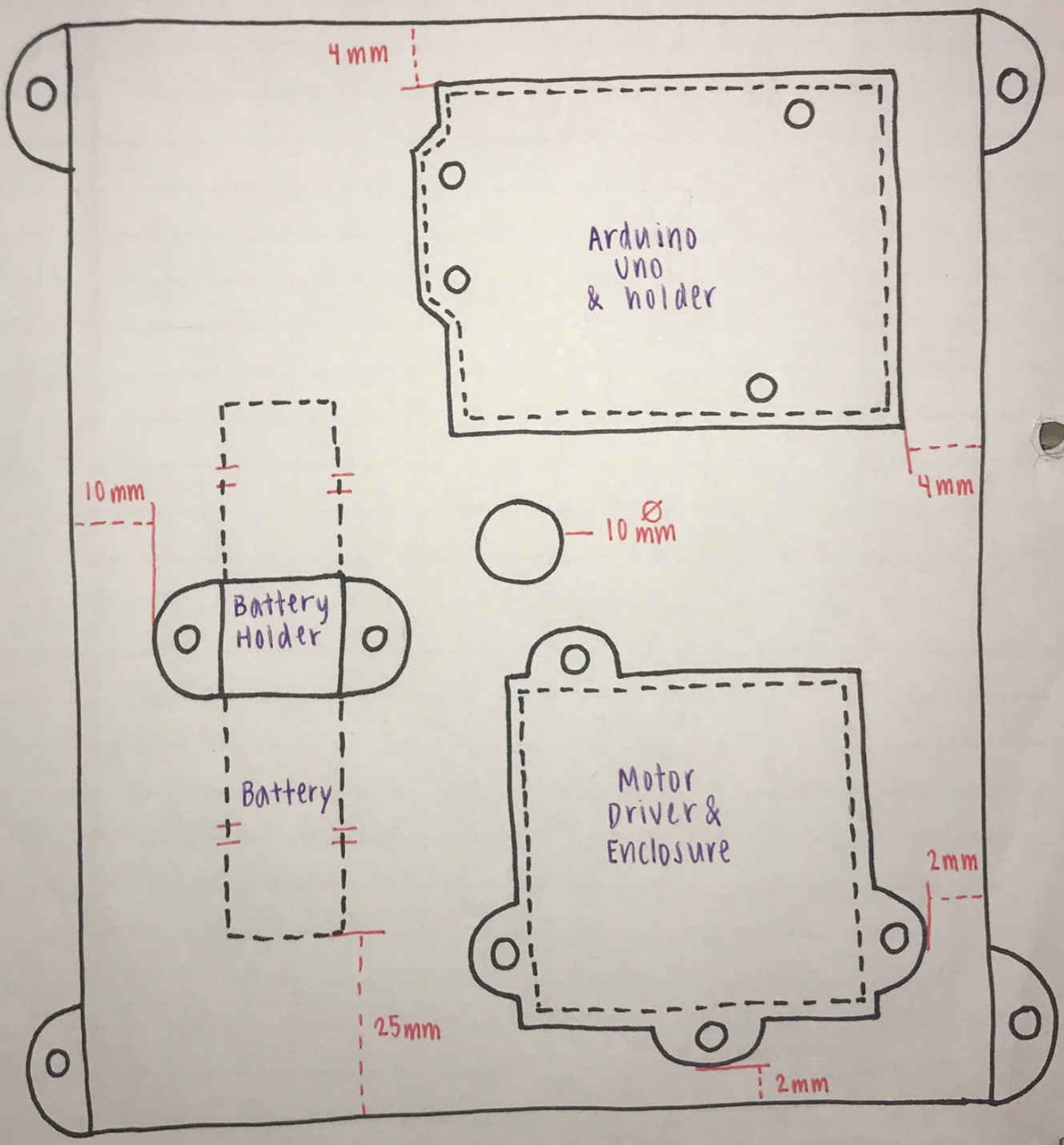


fig 1

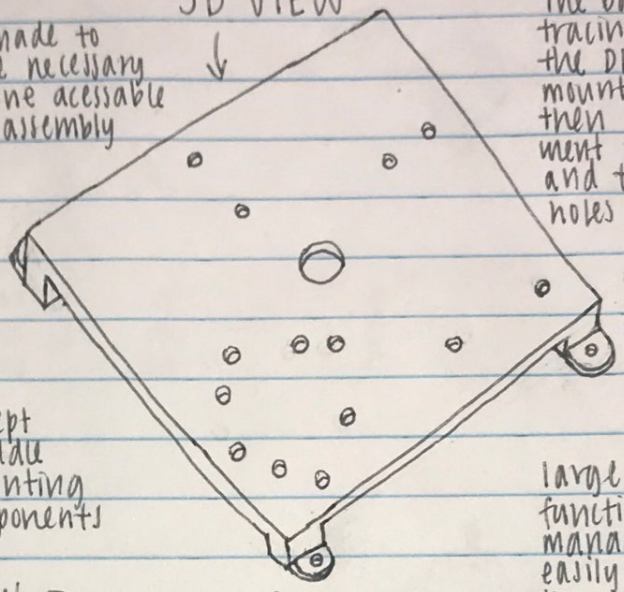
Part Placement on Base Platform



Base Platform

platform was made to hold all of the necessary components in one acessable area with easy assembly (minus IR sensors)

3D VIEW



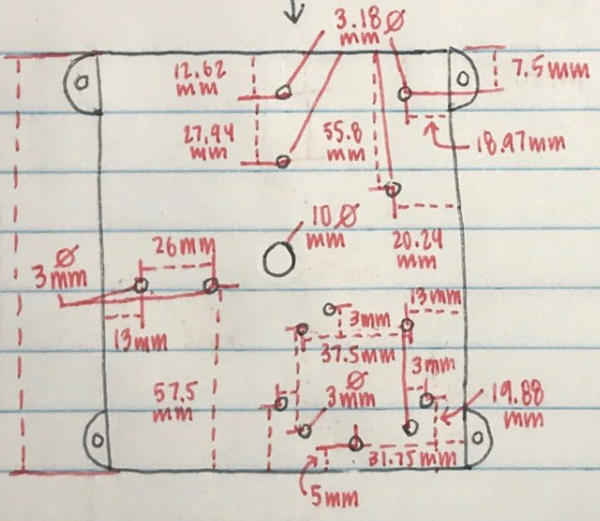
the base was made by tracing the base body of the DD Bot. The legs and mounting brackets were then added. Item placement was established and the corresponding holes were made.

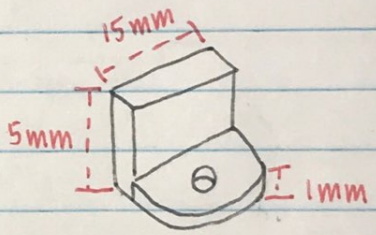
platform height is so that bolts and nuts do not have to go through DD Body.

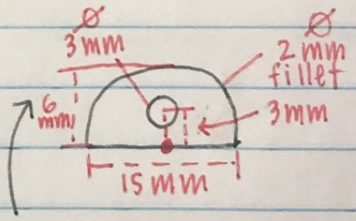
all the holes displayed except the large middle one are mounting holes for components

large middle hole functions as a wire management tool to easily hook everything up.

TOP VIEW



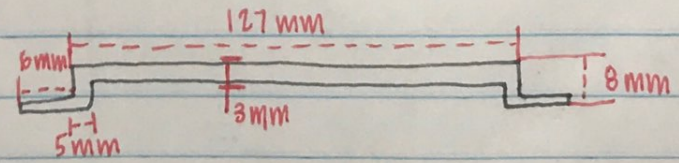




MOUNTING BRACKETS

manufactoring
↳ cura & 3D printing

note:
arduino mounting holes are 3.18 mm Ø
all other mounting holes are 3 mm Ø
All use the same sized hardware 3M.



SIDE VIEW

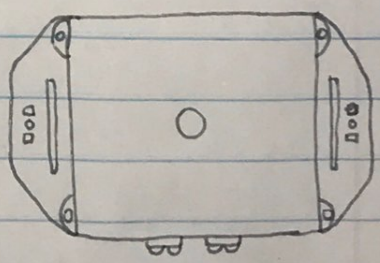
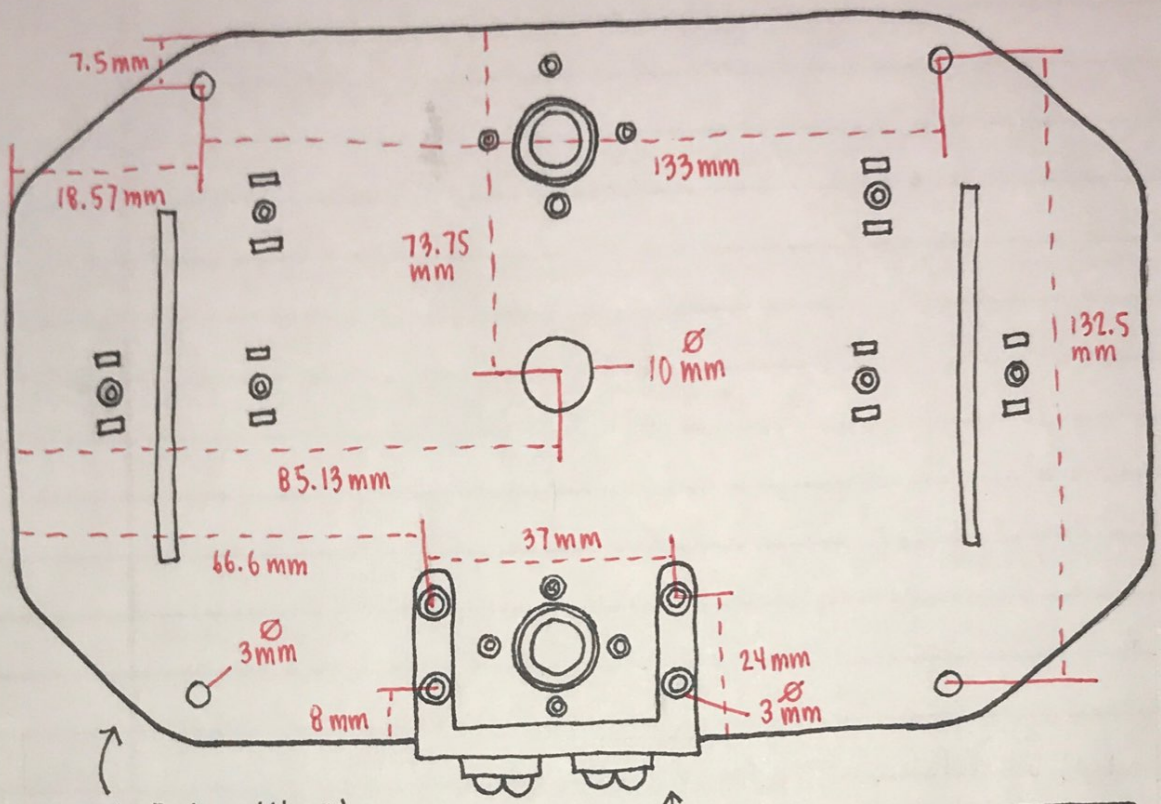


fig* 1.

*part mounting holes not shown for simplicity

Description:
This base platform holds the important pieces (arduino, motor driver, battery) and their enclosures/holders. It is mounted on top of the base body of the line following robot. The middle hole lines up with one on the robot's body for easy access to wiring. see fig 1.

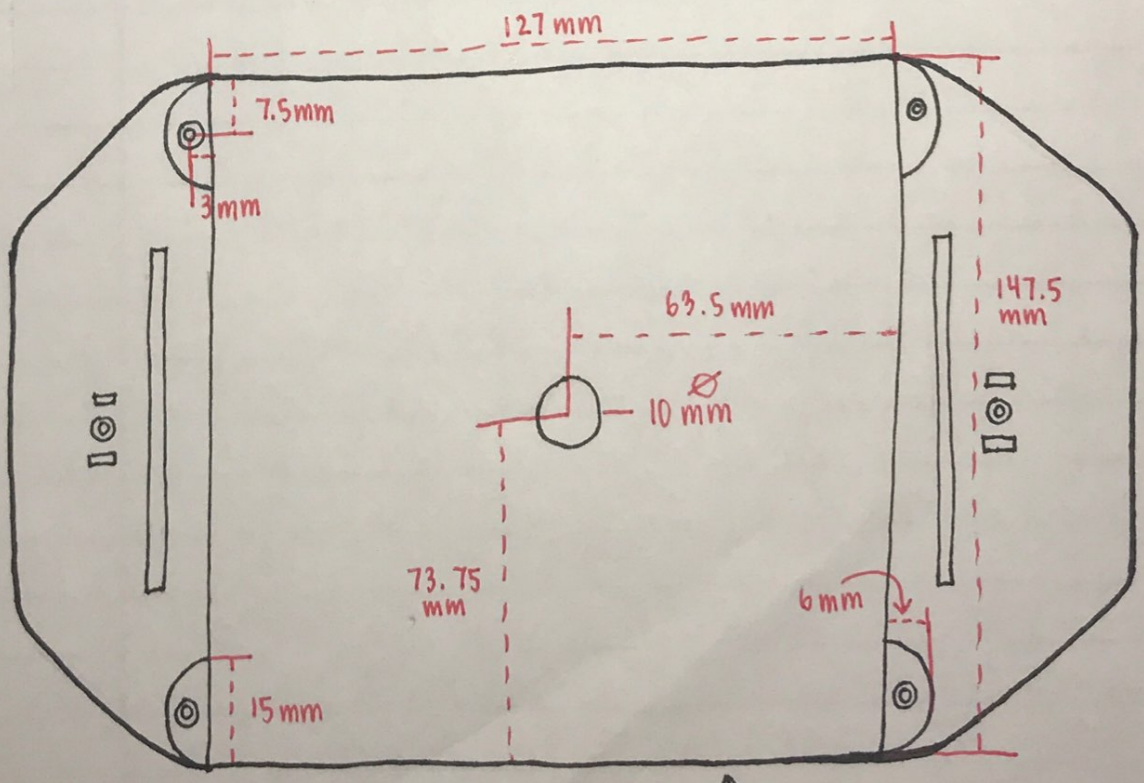
Part Placement on Bot Body



Bot Body without base platform

IR sensor Holder

◎ = bolt

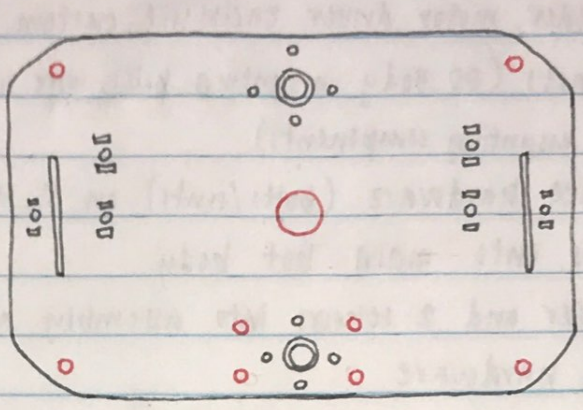


Base Platform*

* mounting holes and assembled parts not shown for simplicity

Modifications

Bot Body Base (OD Body)



In red = modifications

Description:
Holes were placed on the four corners corresponding to the base platform. Four holes were also made to mount the IR sensor holder. The large hole in the middle is for wire accessability and corresponds with the wire hole on the base platform. Measurements on page 42.

Hardware*

① 2M (2mm) bolt, 10mm length, 0.4 thread
2M (2mm) nut, 0.4 thread
↳ placed on Bot Body Base (non modified holes)

② 3M (3mm) bolt, 8mm length, 0.5 thread
3M (3mm) nut, 0.5 thread
↳ placed on Bot Body Base to hold IR sensor holder and on IR sensor holder to hold IR sensors
↳ placed on Bot Body Bot to hold base platform (using mounts)
↳ placed on all components (minus arduino) on the base platform. (motor driver, motor enclosure, battery holder)

③ 3M (3mm) bolt, 12 mm length, 0.5 thread
3M (3mm) nut, 0.5 thread
↳ placed on arduino & holder, goes from arduino face down through the base platform.

* all hardware is sorced from McMaster-Carr

Process

① CAD all neccesary parts (base platform, IR senior holder, battery holder, arduino holder, motor driver enclosure, custom bolt) *

② modify provided parts (DD Body: mounting holes, wire hole; Base platform: holes for mounting components).

③ find the appropriate hardware (bolts/nuts) on McMaster-Car

④ Assemble bolts/nuts onto main bot body

⑤ Add IR sensor holder and 2 sensors into assembly along with the corresponding hardware

⑥ in a separate assembly, assemble the base platform with battery, battery holder, arduino holder, motor driver and arduino, as well as the hardware (including custom bolt)

⑦ Then add motor driver enclosure and hardware

⑥ Add the second assembly (acheng31_platform_assembly) to the first assembly (line following bot) and add hardware

⑦ CAM the arduino holder (screenshot & gcode)

⑧ Cura & 3D print the base platform, IR senior holder, battery holder and motor enclosure. (screenshot & gcode)

* some parts like the base platform mounting holes, will be done at the end after placement of parts was finalized.