Omni Robot Platform

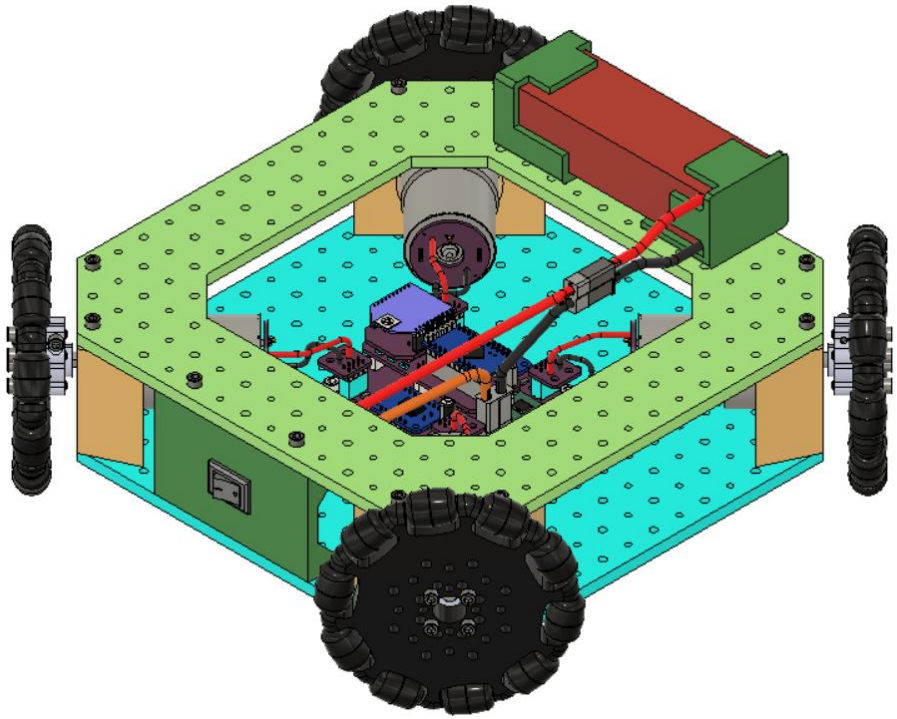
Richard Firth 1/25/18

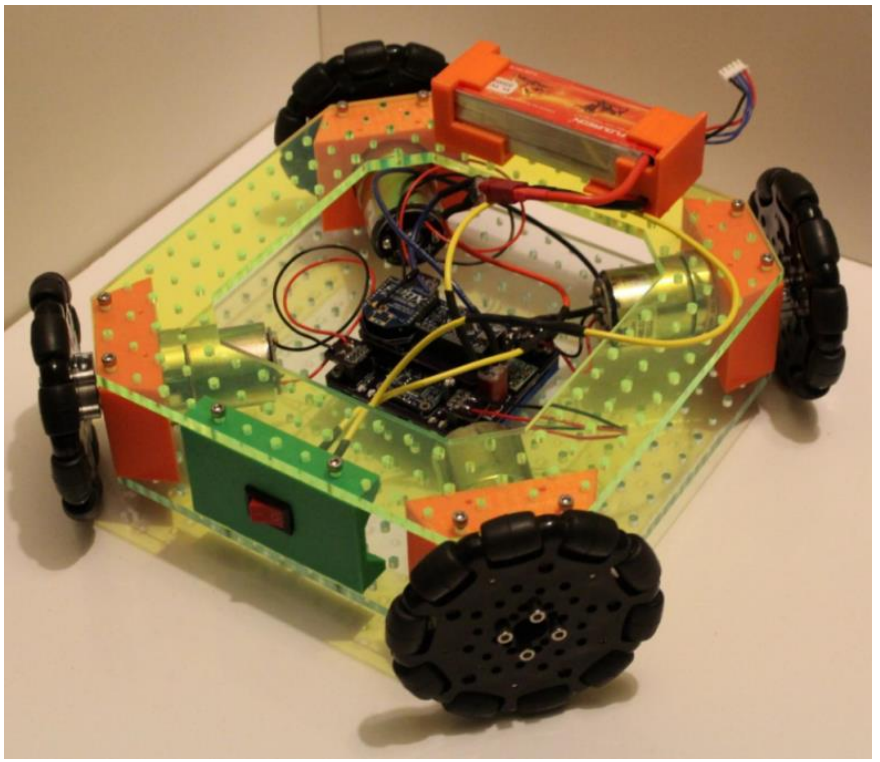
I saw these cool omnidirectional robots, so I decided to make one of my own (The ones for sale were out of stock). I figured I may as well document it and release it for others to make.

This isn't a robot since it is controlled by a remote, but it should be easy enough to add sensors.

Everything is released like an open source thing. So people may do whatever they want with these.

Contact me at richardfirthucsb@gmail.com if you decide to make one of these. I'd be interested to know what people do with it.





Goal / Contents

- Provide high level instructions on how to construct the robot platform
- List the parts used in constructing the robot platform
- Go over the design/engineering of the thing, so that people can understand how it was designed & constructed

Resources:

Github: https://github.com/richardFirth/OmniRobotPlatformSKIRB_RevA
CAD Files: https://grabcad.com/library/omni-robot-platform-skirb_reva-1

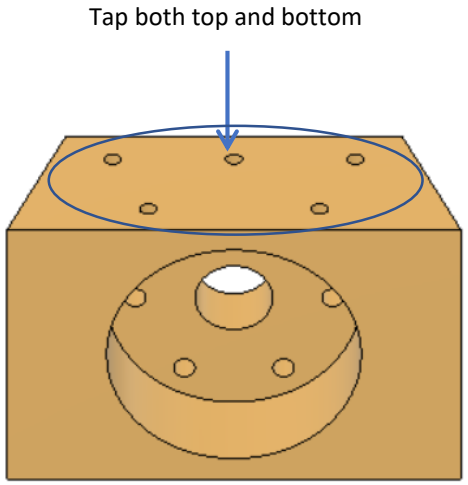
Prerequisites:

- Electronics/soldering
- Arduino Programming
- Knowledge of Xbees
- 3D printing
- ~$450 + equipment

Price estimate: ~$200

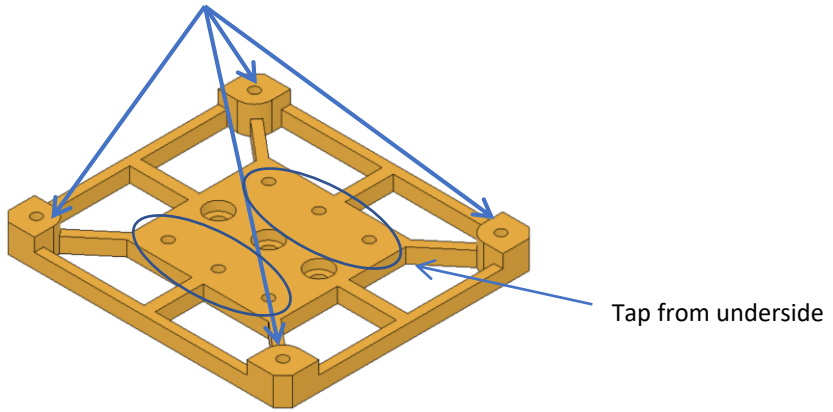
- Each wheel assy ~$30 ($120 for wheels)
- LiPO battery $16
- Misc screws, wire ect $20
- 3D printed parts, laser cut parts $30

3D Printed Parts Index

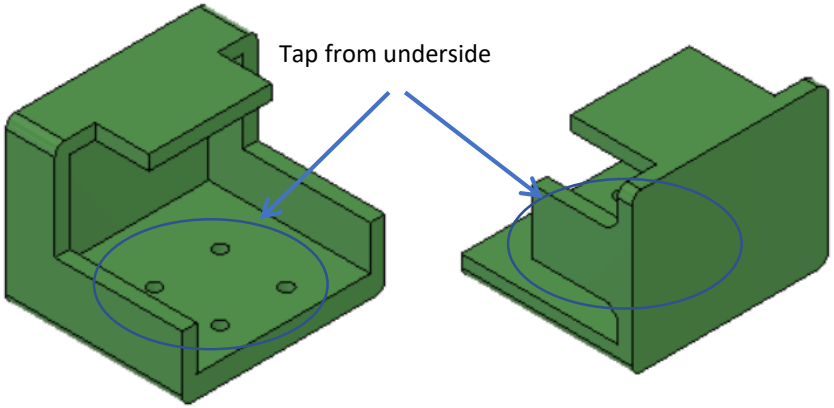


MotorHolderD (X4)

Tap

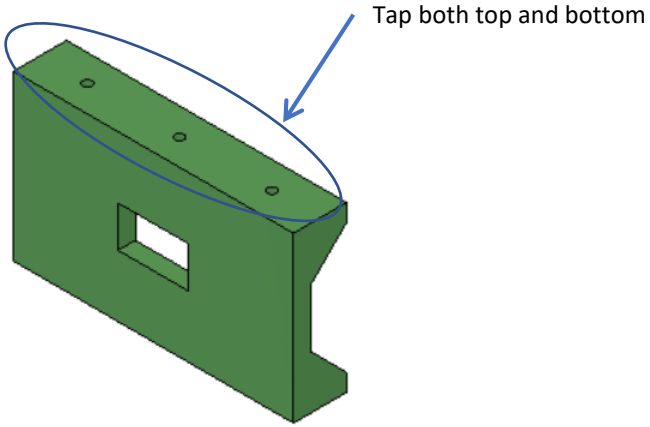


Standoff_Omni



BatteryHolderA_2

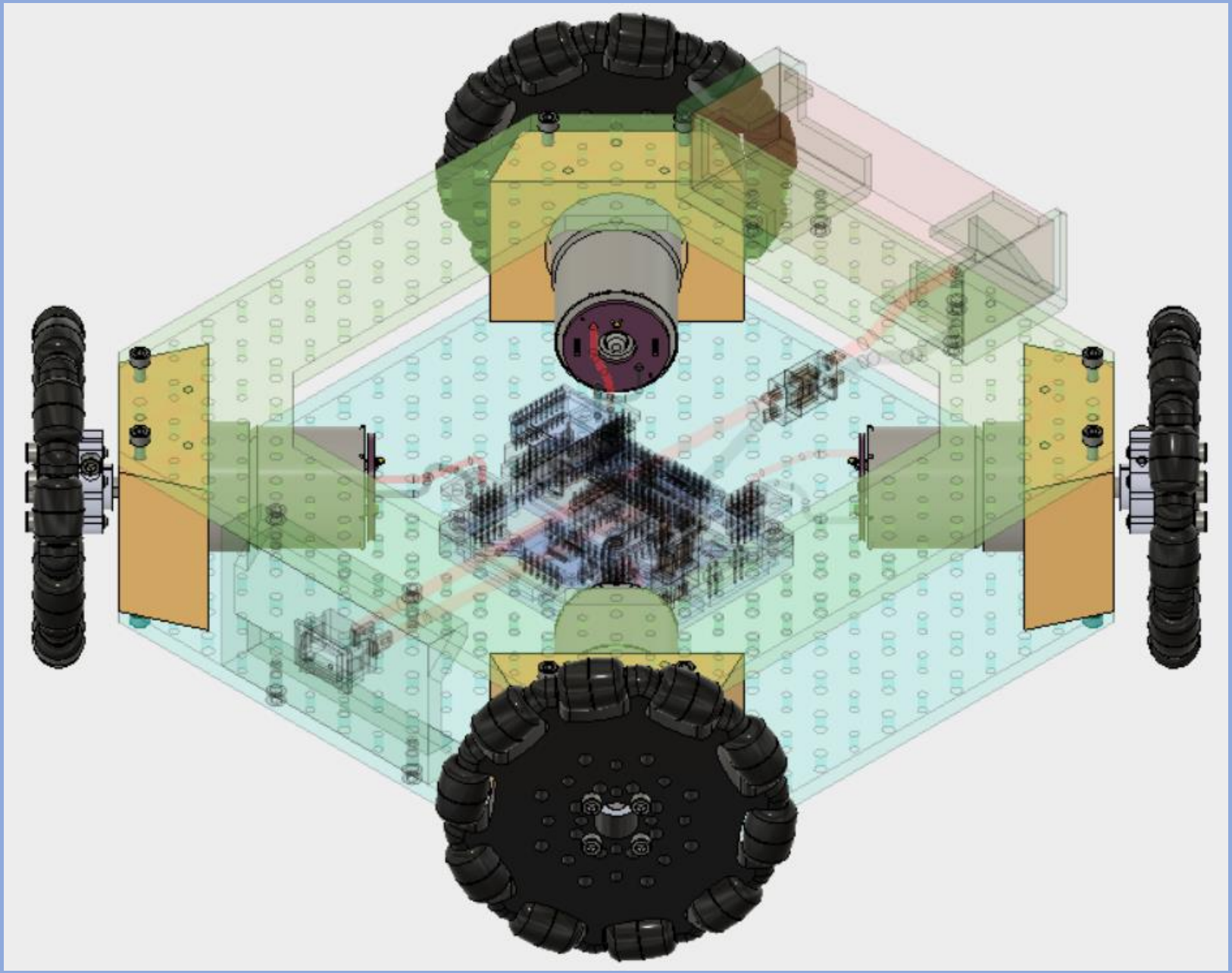
BatteryHolderB_2



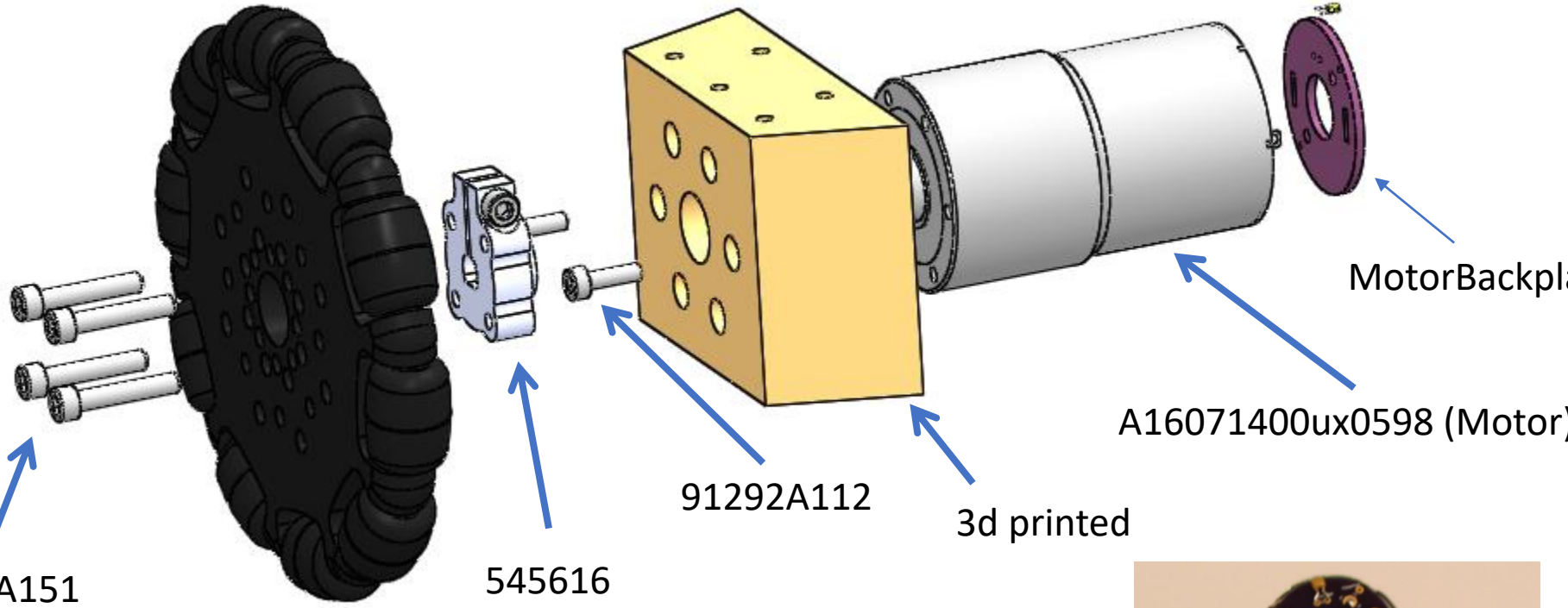
SwitchHolder

- Holes match the spacing for attaching stuff bought on servocity.com
- Thread holes using a 6-32 tap
  - https://www.mcmaster.com/#2548a12/=1a34129
  - https://www.mcmaster.com/#27175a114/=1a340o6

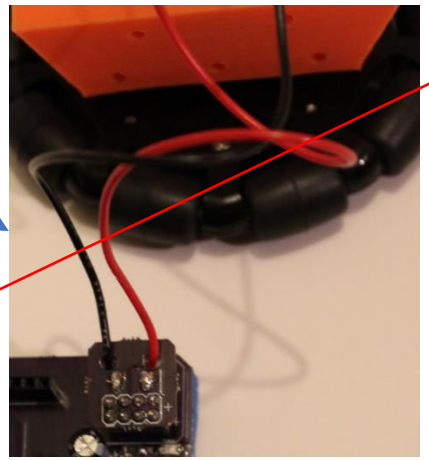
Wheels

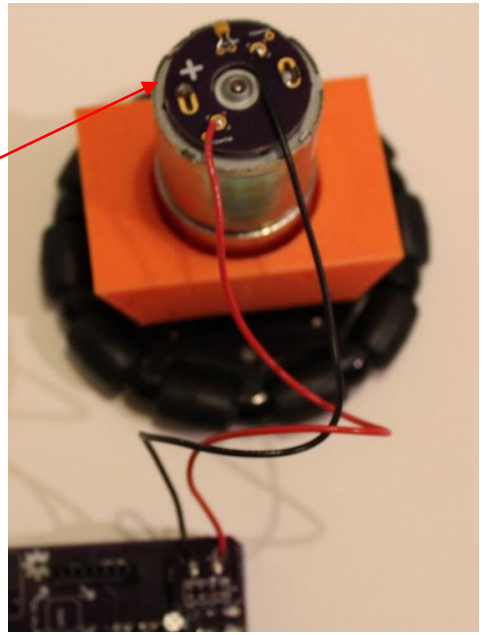


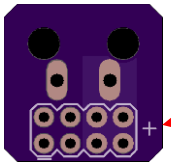
Wheel Assembly (4 needed)



Motor attached to main board via clips

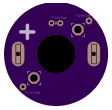
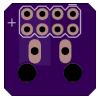






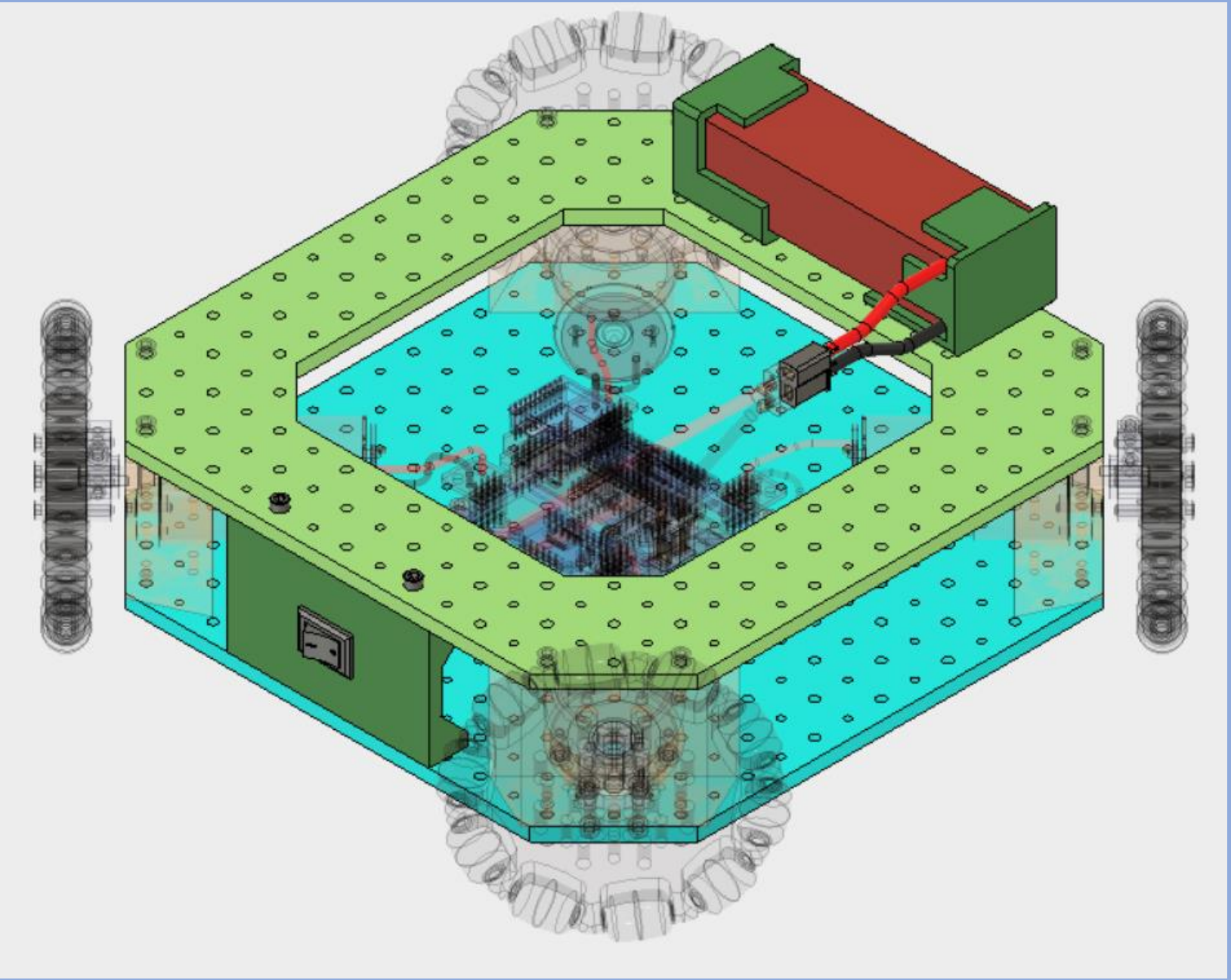
Make sure the + of the motor aligns with the + on the board

Bill of materials – Wheel Assemblies (Need 4)

Part #	Description	Pic	Source
ZGA37RG31 (Gearbox) a16071400ux0598 (Uxcell P/N)	12V 100 RPM DC Motor		https://www.amazon.com/gp/product/B01KTZXZ1G/
545616	Face Tapped Clamping Hubs, 0.770" Pattern (6mm)		https://www.servocity.com/770-clamping-hubs#348=98 SERVOCITY
595671	4" Omni Wheel		https://www.servocity.com/4-omni-wheel SERVOCITY
0.1 uF Ceramic Capacitor	0.1 uF Ceramic Capacitor		https://www.amazon.com/gp/product/B01N3L8IE1
MotorBackplate	MotorBackplate		https://oshpark.com/shared_projects/eEKy6Eoc
MotorClip	MotorClip		https://oshpark.com/shared_projects/modA4HzY
Wire	Wire		https://www.amazon.com/gp/product/B01180QKJ0/

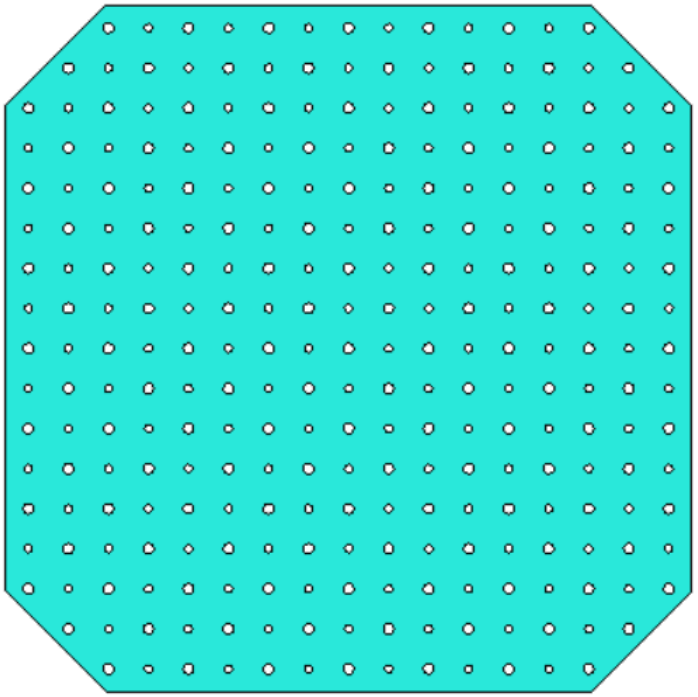
Part #	Part	Pic	Source
92196A151	18-8 Stainless Steel Socket Head Screw 6-32 Thread Size, 3/4" Long		https://www.mcmaster.com/#92196A151/ McMASTER-CARR
92196A146	18-8 Stainless Steel Socket Head Screw, 6-32 Thread Size, 3/8" Long		https://www.mcmaster.com/#92196A146/
91292A112	8-8 Stainless Steel Socket Head Screw M3 x 0.5 mm Thread, 8 mm Long		https://www.mcmaster.com/#91292A112/ McMASTER-CARR

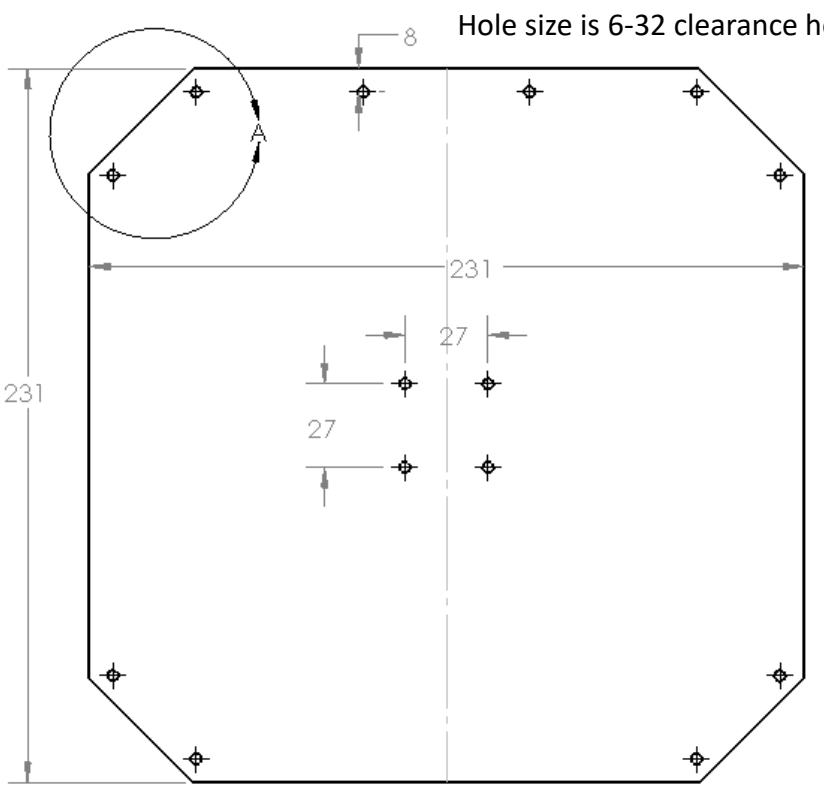
Body

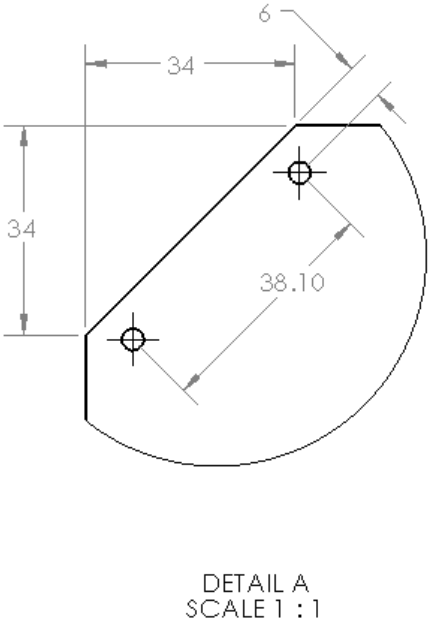


Laser Cut / Flat Parts

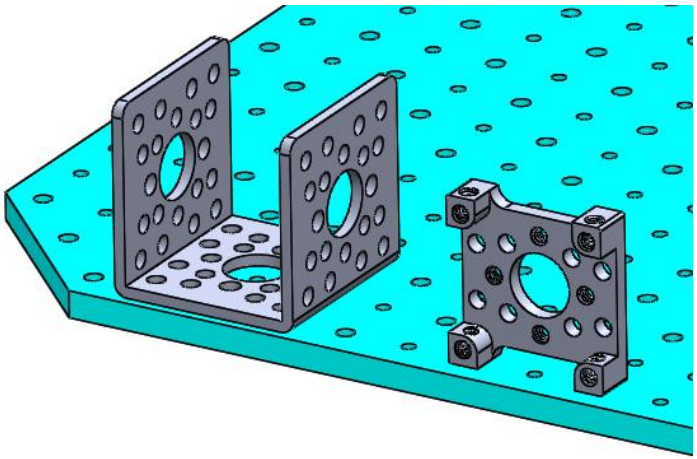
If you don't have access to a laser cutter. You can order from ponoko or use a Saw/Drill on plywood. Not all holes are used.







(if not using a laser cutter, these are the critical holes)

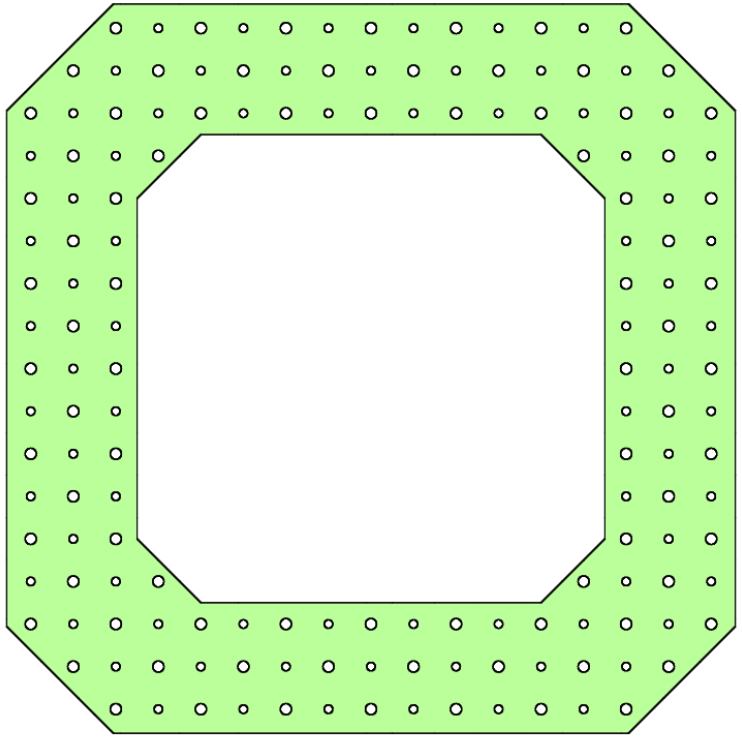


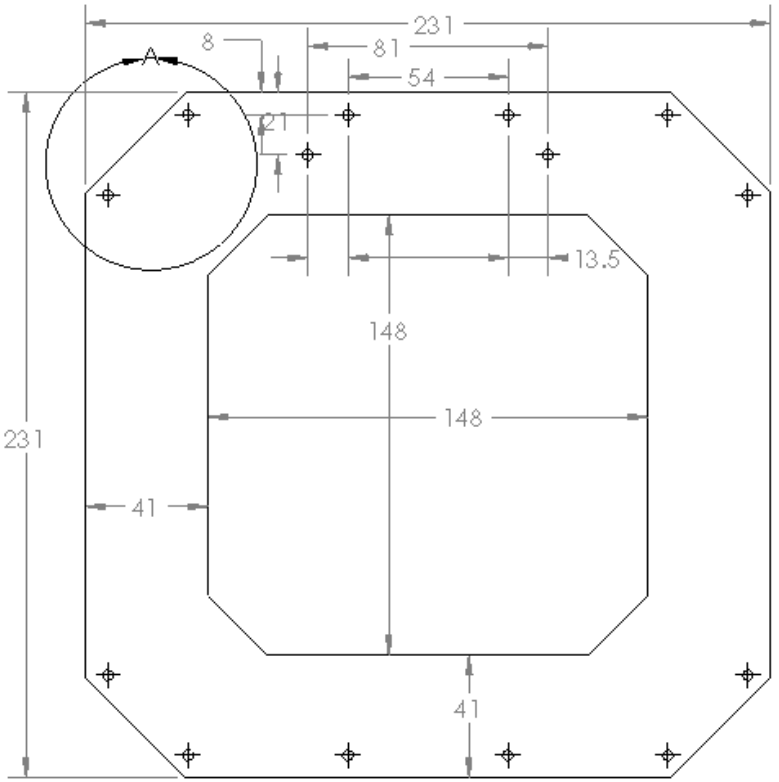
- Holes match the spacing for attaching stuff bought on servocity.com
- Narrower holes can be 6-32 threaded using tap.

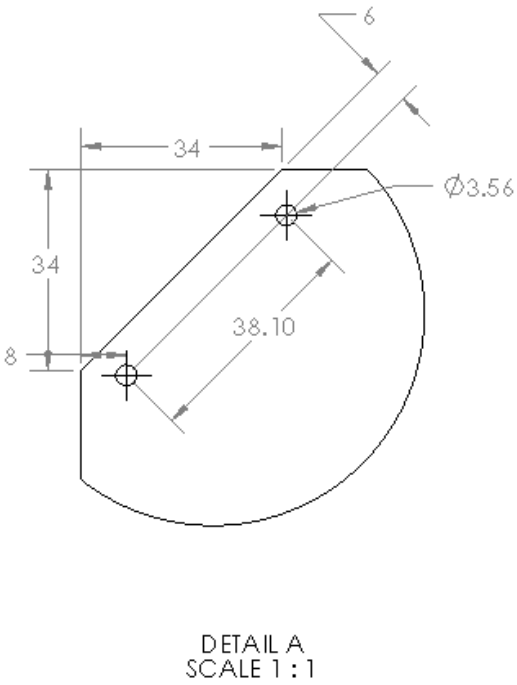
Dimensions in MM

Laser Cut / Flat Parts

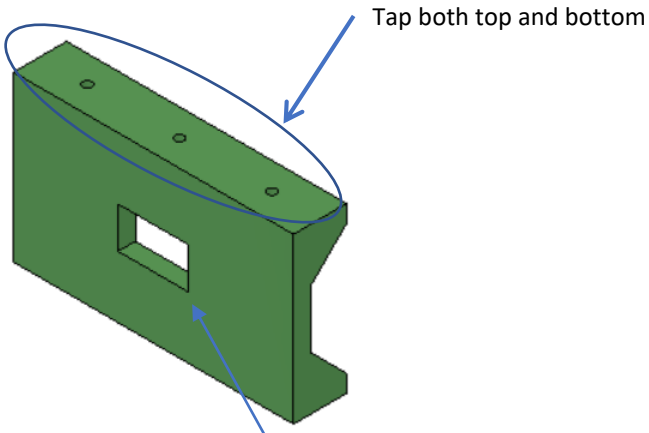
If you don’t have access to a laser cutter. You can order from ponoko or use a Saw/Drill on plywood. Extra holes are to support future stuff you might add.





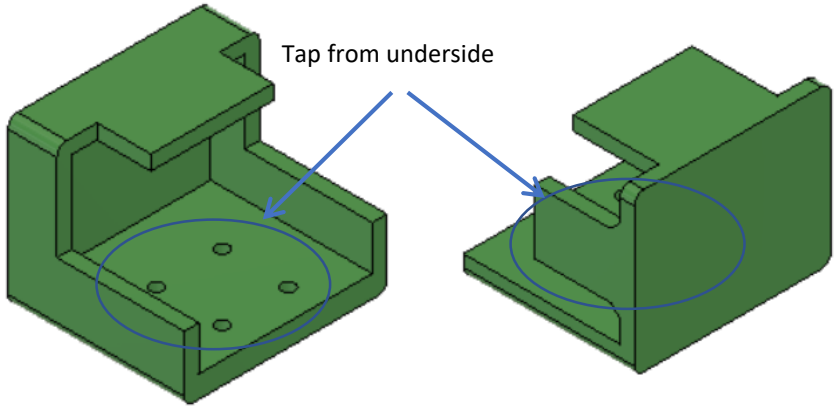


Standoff_Omni



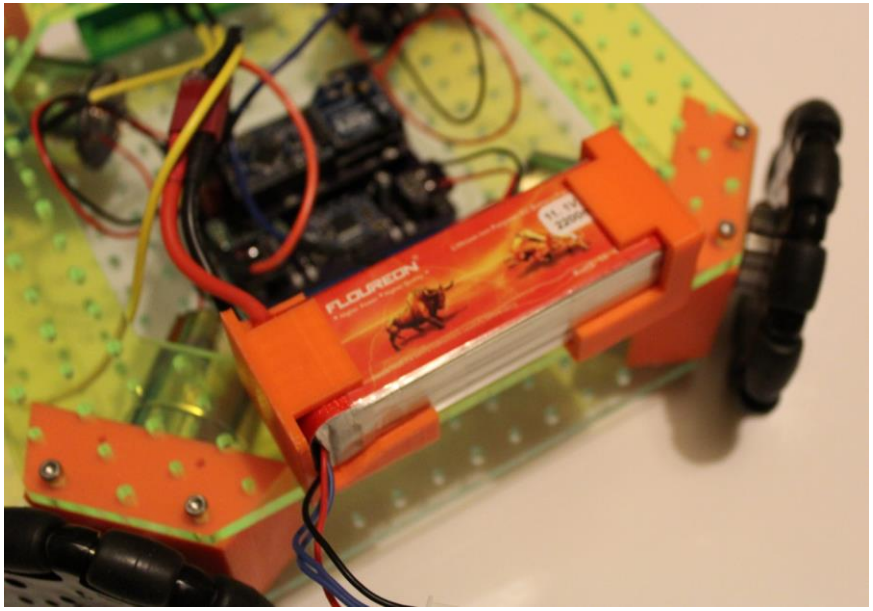
SwitchHolder

Snap in



BatteryHolderA_2

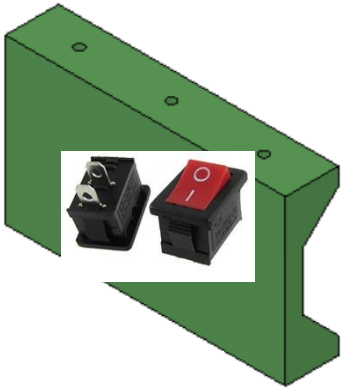
https://www.amazon.com/gp/product/B009751Y3Q/

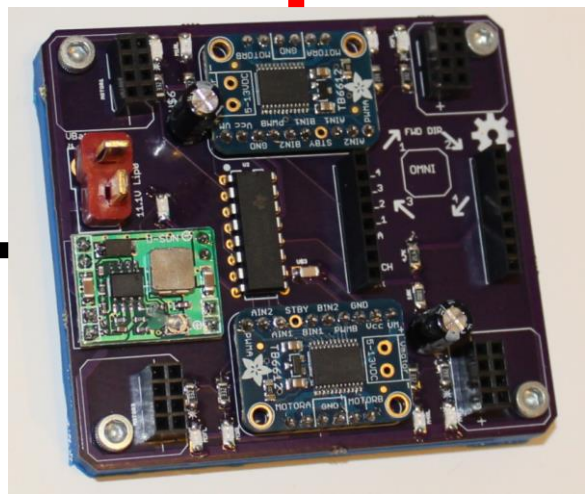


https://www.amazon.com/gp/product/B00PQKQ0BM

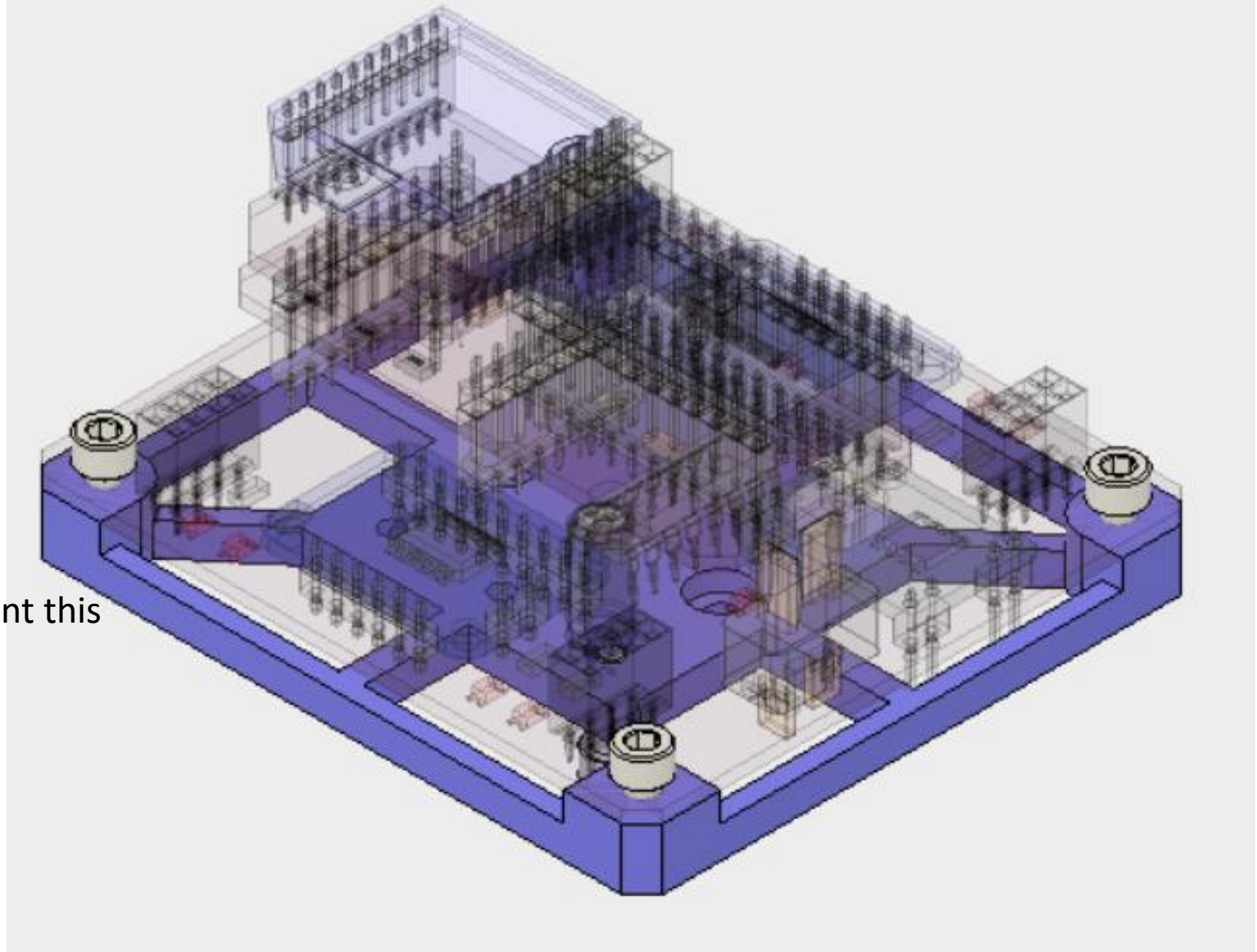
Wiring


FLOUREON
11.1V 25C
2200mAh




FWD DIR
OMNI
CH
AIN2 STBY BIN2 GND
AIN1 BIN1 PWM Vcc Vm
MOTORA
MOTORB

Circuit board Holder



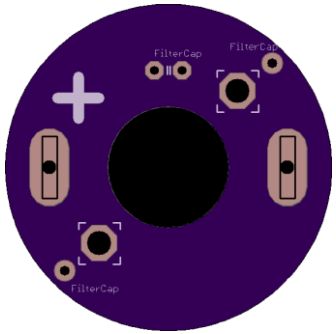
3d Print this

Printed Circuit Boards

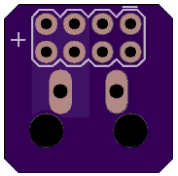
MotorClip -> https://oshpark.com/shared_projects/modA4HzY (need 4)
MotorBackplate -> https://oshpark.com/shared_projects/eEKy6Eoc (need 4, optional part)

Not to Scale!

MotorBackplate

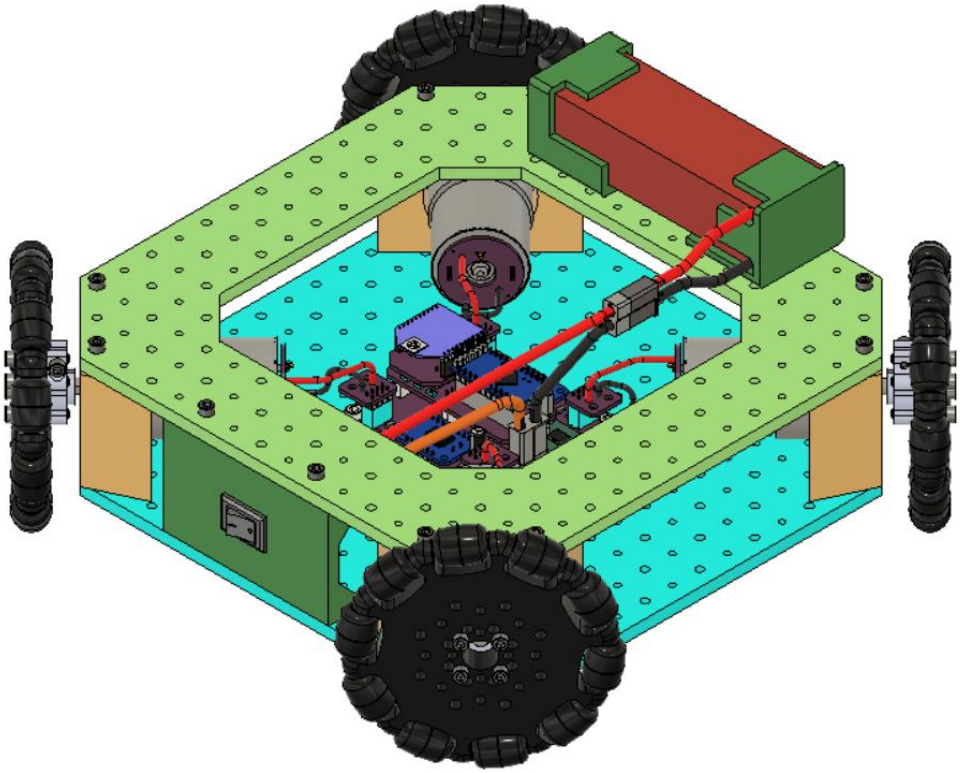


MotorClip



Design Notes - Mechanical

- For the frame and wheels, the materials were chosen based on the fact I have access to a laser cutter and 3D printer and am familiar with them
- Wheels, hubs, screw sizes ect were chosen to match stuff off ServoCity, because I have a bunch of their stuff already, and the hole pattern lets me attach actobotics stuff to the robot
- The motor was the first guess, and worked so I didn't try others. Of the choices available 100 RPM seemed a good place to start. (https://www.amazon.com/gp/product/B01KTZXZ1G/) and they don't use a lot of current (around 0.5 amp when resisted according to an ad hoc test – I used a benchtop power supply and grabbed the wheel physically and resisted it while looking at the current)
- The battery was the second of a two pack bought for another project, but works well here.
- I didn't really think about cost as a thing since this is a one off for learning purposes



Forward sense of each motor should cause clockwise rotation of robot (VCC to + of motor, GND to -)