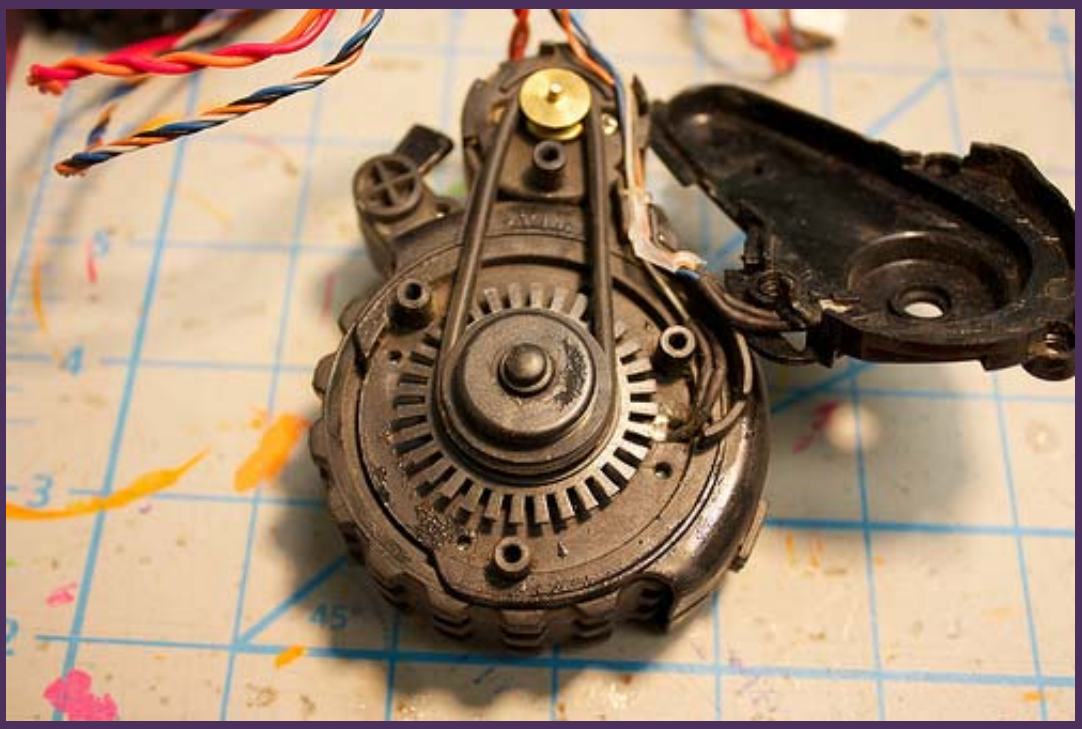
Inside Roomba Wheels & Creating Motor Mounts

Roomba wheels are pretty sweet wheels for any robot project. MakerDino (Hack A Week) was kind enough to send me two for my fire fighter robot project- Aguamenti!

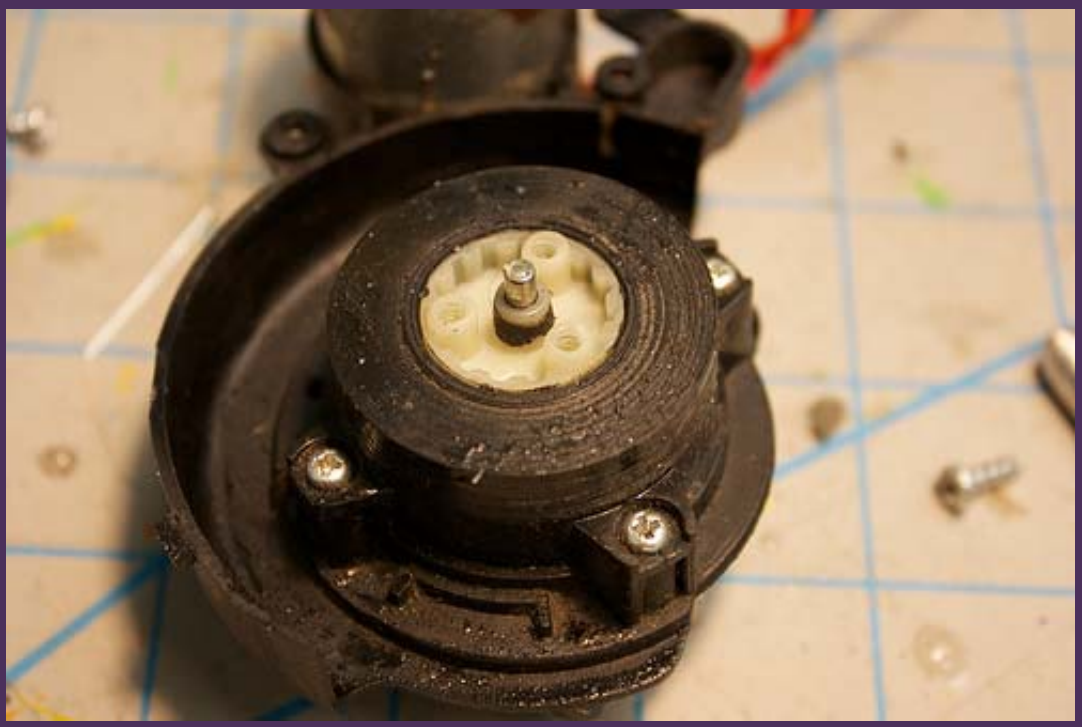
They have to be cleaned up, time to dive in. On this side is the belt that moves the encoder wheel and gearbox (which is on the other side). The encoder wheel is made

out of metal.

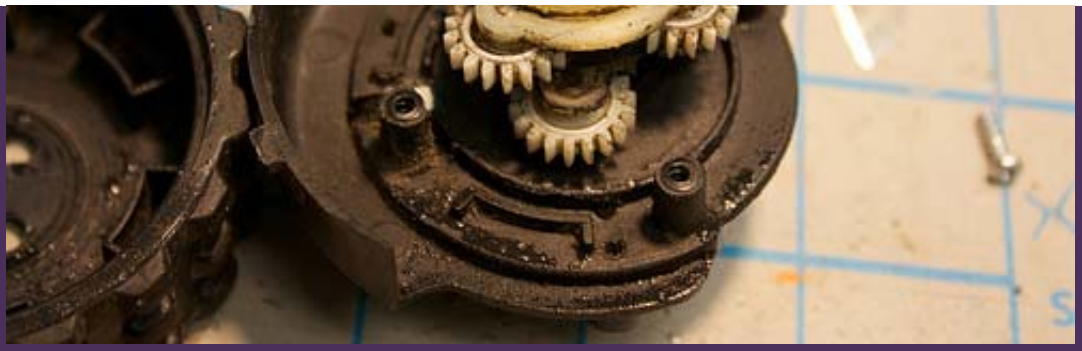


There are two light sensors to detect the encoder stripes:

After cleaning all this up and screwing it back together, it's time to flip to the other side. This is the part that is protecting the gearbox:

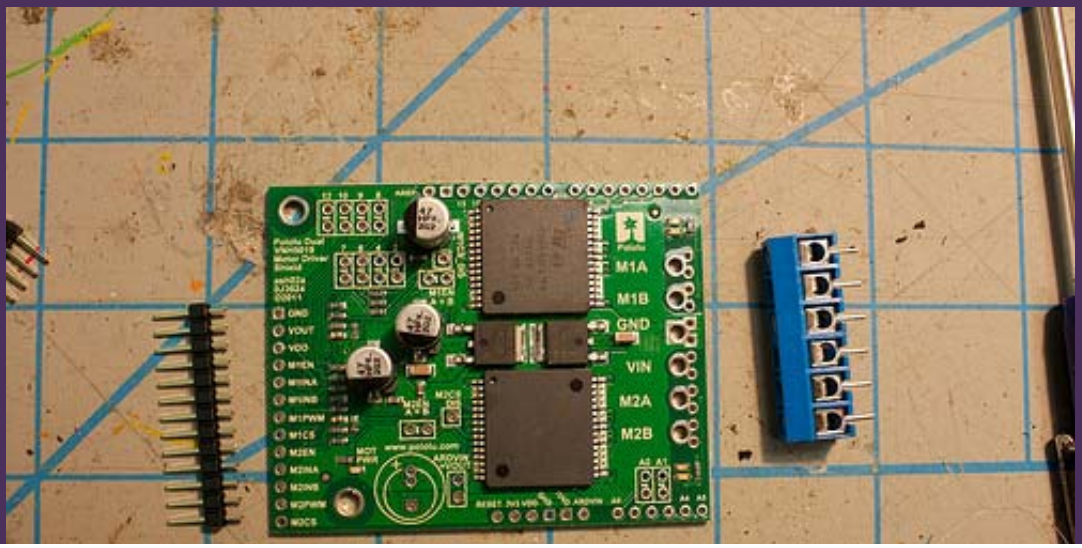


After taking it off- tada! Gearbox! This was pretty dirty before cleaning it.

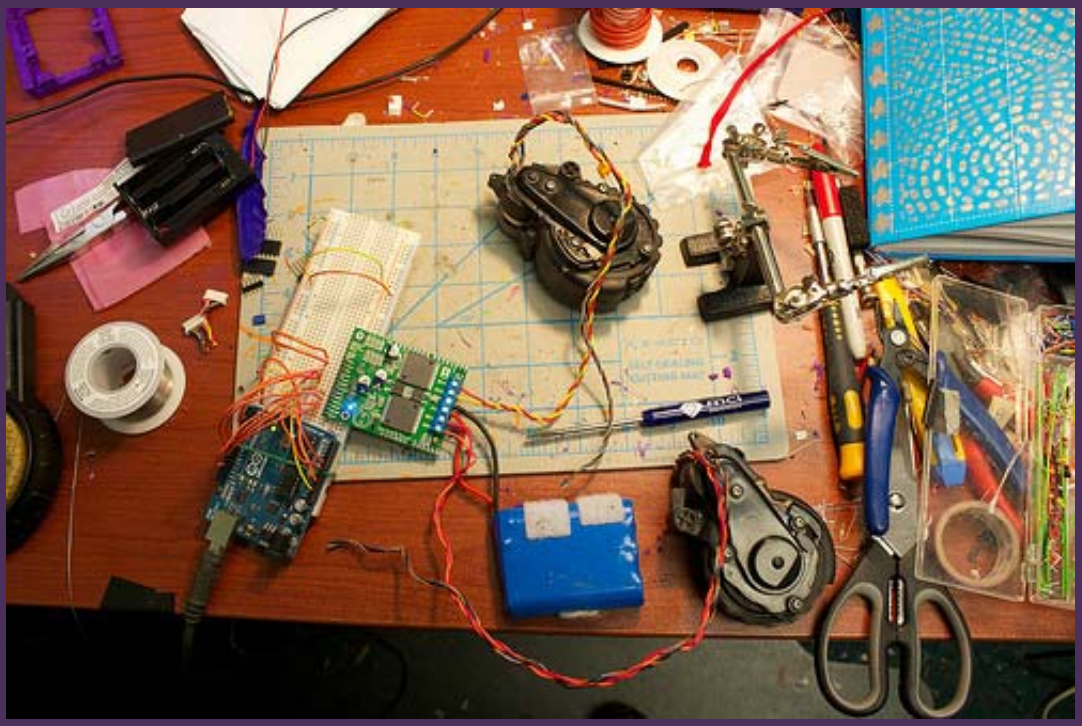


Did the same cleaning for both wheels. This should make them run better!

Here's what we're going to be driving them with! The Pololu Dual VNH5019. This motor controller is pretty sweet, it even has current feedback. Special thanks to Solarbotics!



Here's what the setup looks like. I wasn't sure about using it as a shield and the pin connections, so it is wired up with the breadboard for now. The battery is 11.1V (same one that MANOI uses).



It works GREAT! The motors spin and the wheels move. Sensing the current works as well. One of the wheels, however, had a tendency to slip when pressure was applied. I found an elastic roughly the same size and installed that instead of the black o-ring. It slipped a little less this way.

There is a little problem with the Roomba wheels. How on earth to mount them to a robot? Well, luckily with the 3D printer and some calipers, we can rapidly prototype! Here is test #1-4 (left to right). It started as a C, and once determining the dimensions, some boundary extrudes were added on top.

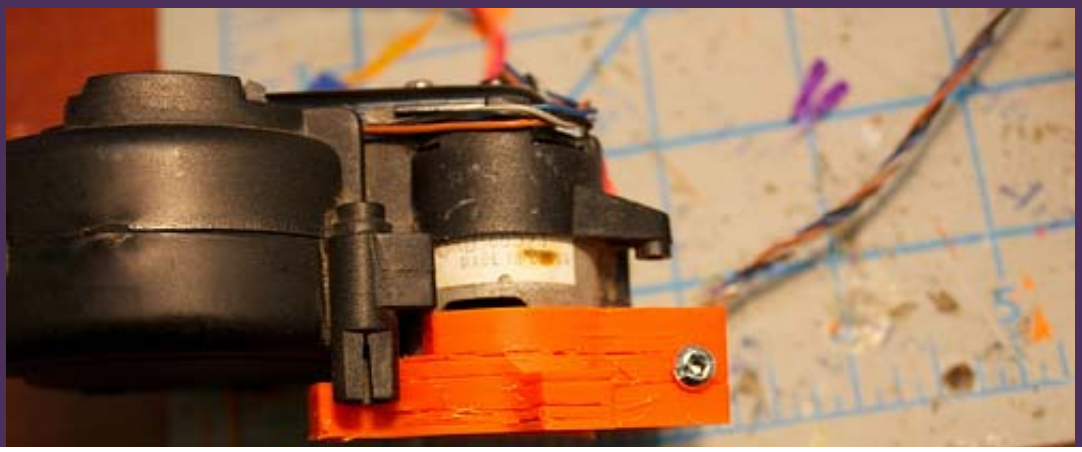
Here is test #5-8 (left to right). #8 ended up being the final version, but had to be reprinted with a smaller number of shells. In test #6, the 'circle' part in the middle now has an empty boundary around it. Without it, the piece cannot flex together and clamp onto the motor. The 'clip' areas were greatly thickened in test #7. This is important because these pieces will need to be quite strong!

Now, one would imagine that printing the final version would be quite simple. For some reason, this was definitely not the case, and the prints kept failing one after the other! 6 fails in total! Arrgh!

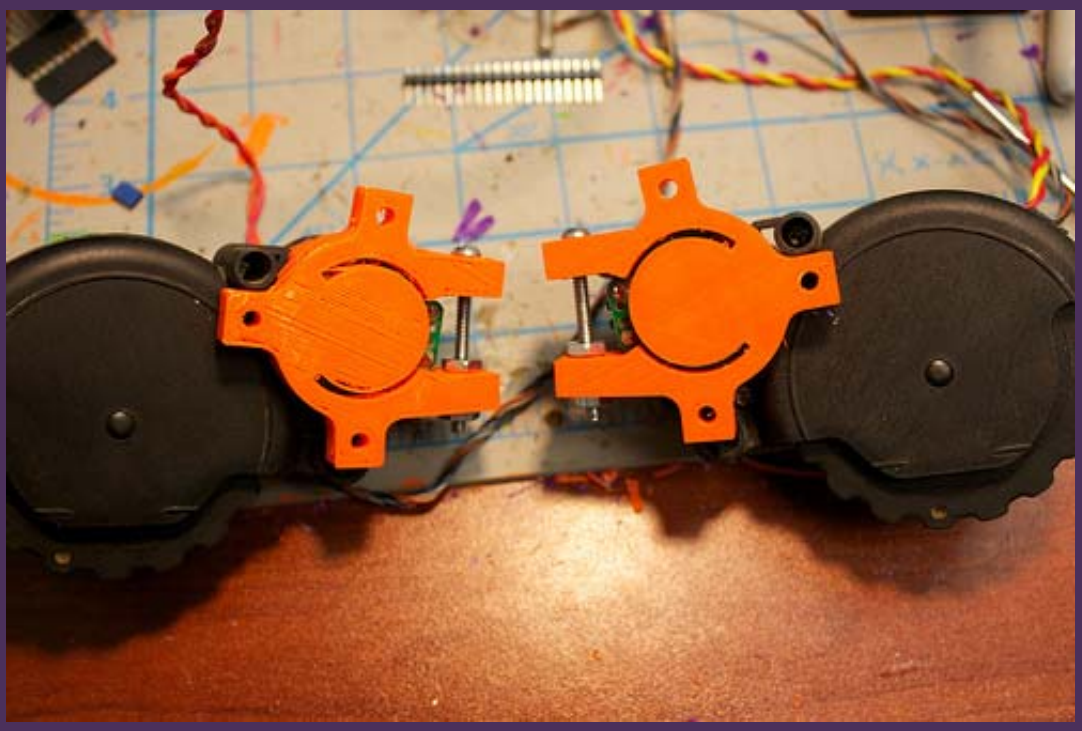
This one is my favourite fail.

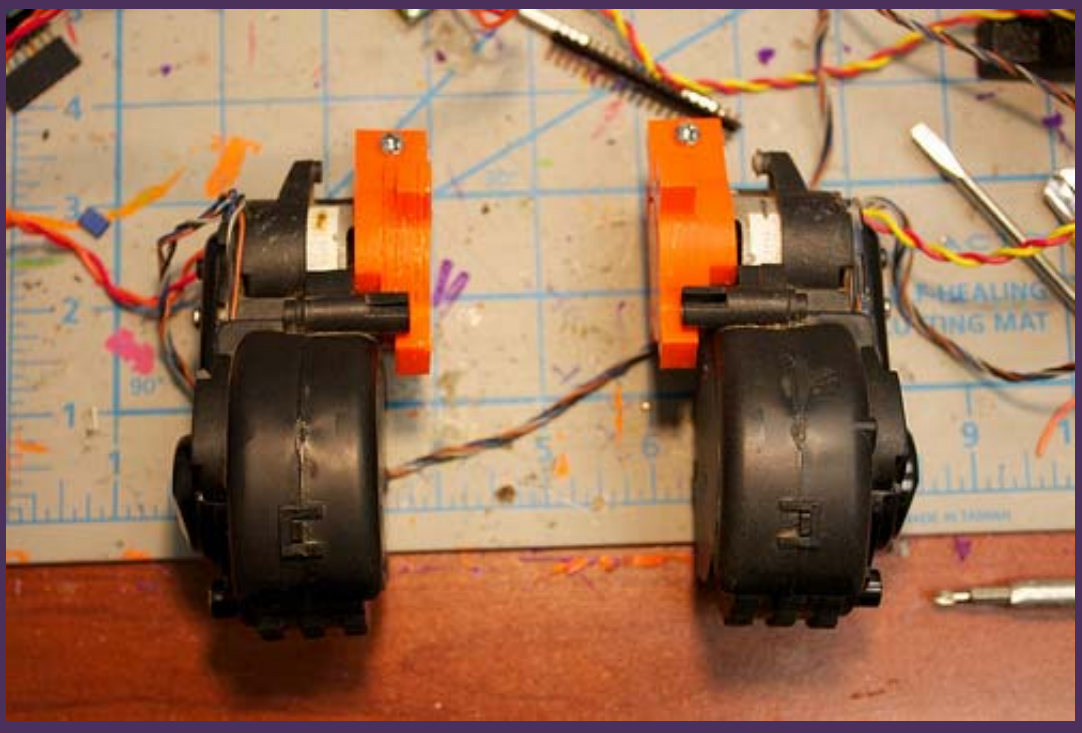
ANYWAY, finally it finished. Here they are attached to the motors, with a 1.5 inch 6-32 screw holding it all together!

Though, here is something peculiar. The two motor mounts are exactly the same, except mirror images of each other. The mirrored one printed fabulously the first try. This one seems to keep not having some of the layers get printed. It is slightly worrisome, as the layers could break apart and cause a tremendous robot breakdown.

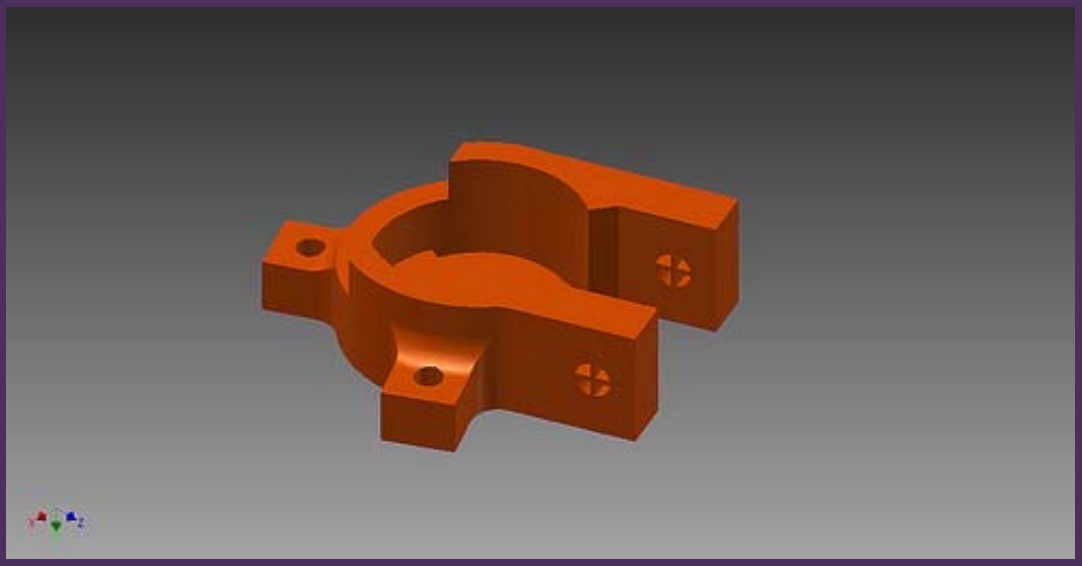


Notice the difference? Quite weird.

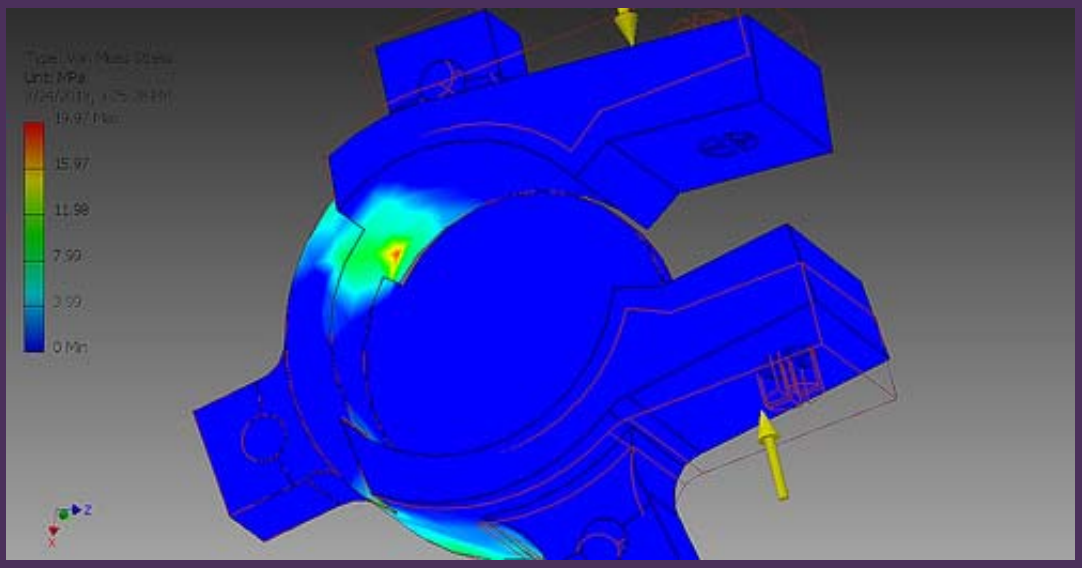




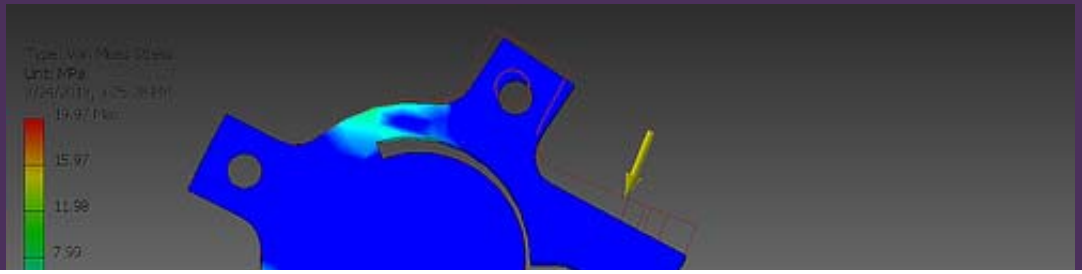
The motor mount was modeled in Autodesk Inventor. Here's what it looks like:

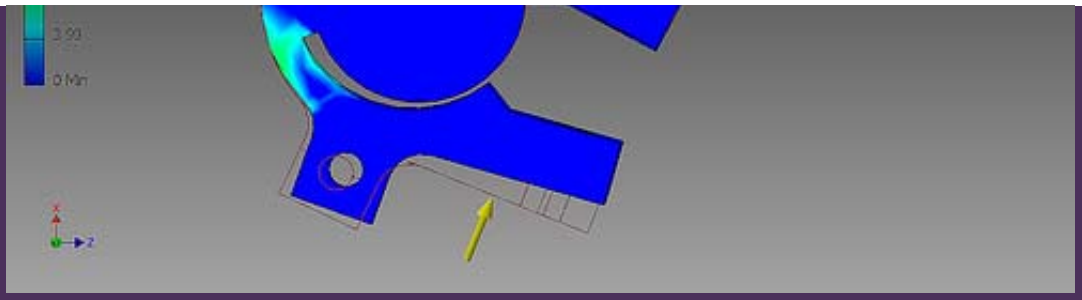


Stress simulations are fun. This is a simple one with two 10N forces on the clips, and the model is fixed at the 'circle' part. You can see where the point of failure will probably be, as indicated in red.



The clips actually don't move this far when attaching to the motor, and hopefully the motor will also provide some sort of support at the stress points.





It was fun to be able to make something that wasn't created before, so that these great wheels can be used. Though, I didn't expect to take so much time on a minuscule task. I guess there is still lots to learn about 3D printing.

Up next, I have to create the shell of the robot. The two roomba wheels will be the only drive wheels, meaning two other wheels will probably be 3D printed as well. RoboBrrd will definitely be able to sit in/on the robot!

Tags: 3d, autodesk, clamp, fail, inventor, motor, mount, print, roomba, stress, wheels
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BY ERIN, THE ROBOTGRRL / IN CATEGORY 3D, PROJECTS, ROBOT

TAGS 3D AUTODESK CLAMP FAIL INVENTOR MOTOR MOUNT PRINT ROOMBA STRESS WHEELS

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