

Our local library has opened up a digital media lab. One of the products in this lab is a 3D printer. The CFO and I took the one hour orientation course and can now book time to use the 3D printer. The printer was paid for by my taxes and a donation from the local family owned lumber mill. We just pay for the materials that we use.

For those who have ever used a lathe or carved stuff from wood or stone, designing a part usually consists of carving pieces off a block. Building a 3D part is the opposite. You design/model the part using Computer Assisted Design (CAD) software and then you use “slicing” software to slice the part into tiny layers, like a multi-layer cake. Think of building a stone house, one layer of stones at a time, leaving holes for the doors/windows etc.

The material is called filament, think of thin wire, about 2mm, and comes in rolls. The 3D printer feeds in the filament, melts it, and then layers the “liquid” onto a platform, following the commands of your slicing program. Depending on the type of printer, the filament can be plastic, wood, metal, etc.

There are many web sites with pre-designed models that you can download and modify. I am using thingiverse.com and grabcad.com

<https://www.youtube.com/watch?v=Vx0Z6LplaMU>

We will design new parts for the robots to extend/strengthen their capabilities.

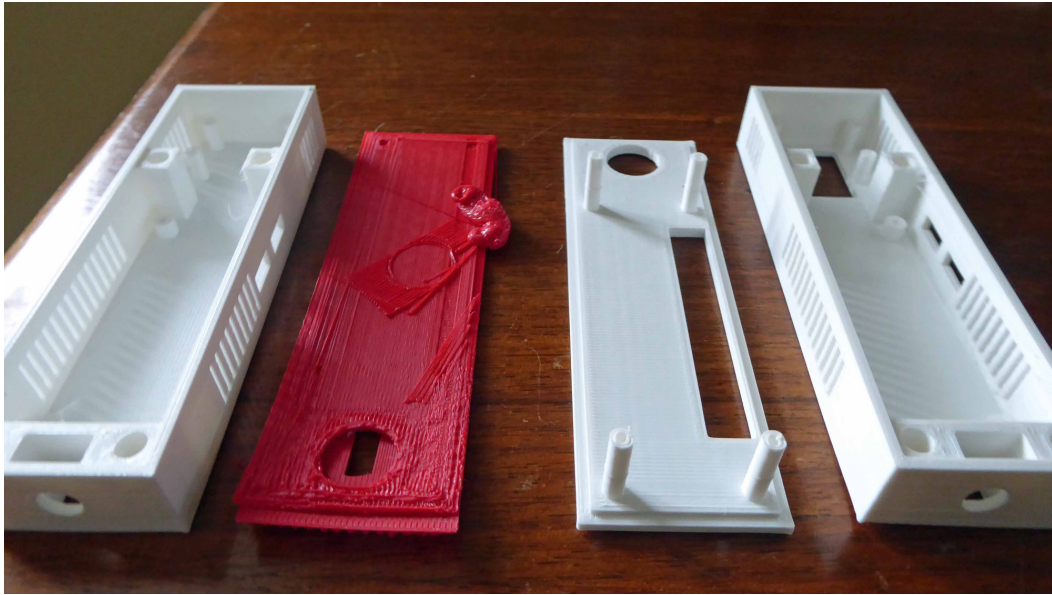
The first parts we designed were for the surveillance camera. We modified a design \* for a case and lid that could be mounted on a tripod. The case came out near perfect. The first part of the lid went well but then everything turned to chewing gum. Tried to print at different positions of the printer bed to no avail. Finally the tech and I went thru the process to re-calibrate the printer bed. Turning a series of bolts with an allen key until certain lights came on.

\* The original design came from thingiverse and was designed by Oern from Russia. I made my mods and then 3D printed it, two hours of printing.. I then noticed that the hole for the camera did not match my camera. Long story short: his camera came from China and the cable has the camera pointing forward. My camera is from the same people who make the Raspberry PI and the cable has the camera pointing to the back, unless you fold the cable 180 degrees. China drives on the right and the UK drives on the left. More mods and printing.

Note: the standard colours for Raspberry products are red and white, just like someones beautiful flag.

Since you print from the bottom up, one has to consider how to position the part. Example, you want to print a table. You cannot print it table top up “n” as the filament would fall, as it has nothing to support it. Therefore you flip the table over and print the table top “u” and then the legs.

Look at the your two palms. On one, the thumb is on the left and on the right on the other. This is called mirroring. If you print upside down, and want a design on the left.. you must place the design on the right.

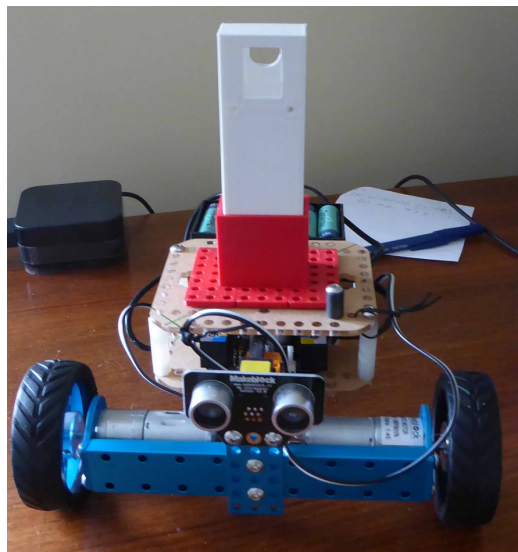


From left to right we have:

- original case
- original cover/top before re-calibration
- cover/top with slot for add-on peripherals
- case with hole for camera

At the bottom of the Raspberry Pi (RPI) is a slot for the micro SD card which holds the operating system and programs. Since the case and cover/top were designed for a bolted down RPI, there was no easy way to remove the SD card. I then redesigned both pieces so that they were long enough so that I could remove the SD card with tweezers.

The second part was a holder for the camera that could be attached to Allie, the combo Raspberry/Arduino robot. Since the camera is attached to a Raspberry Pi zero, it doubles as the brain for the robot.



Now that I am back from my nearly three week break, demanded by my doctor, I can now start programming the upgraded Allie.