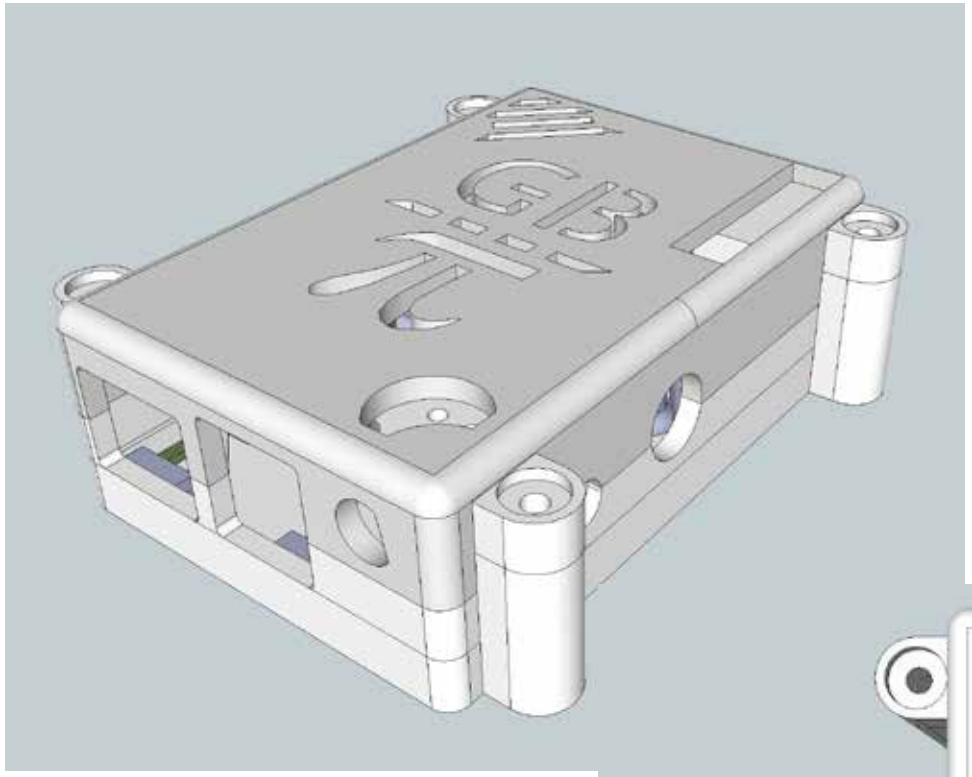
Greg Buckland

/ Portfolio /

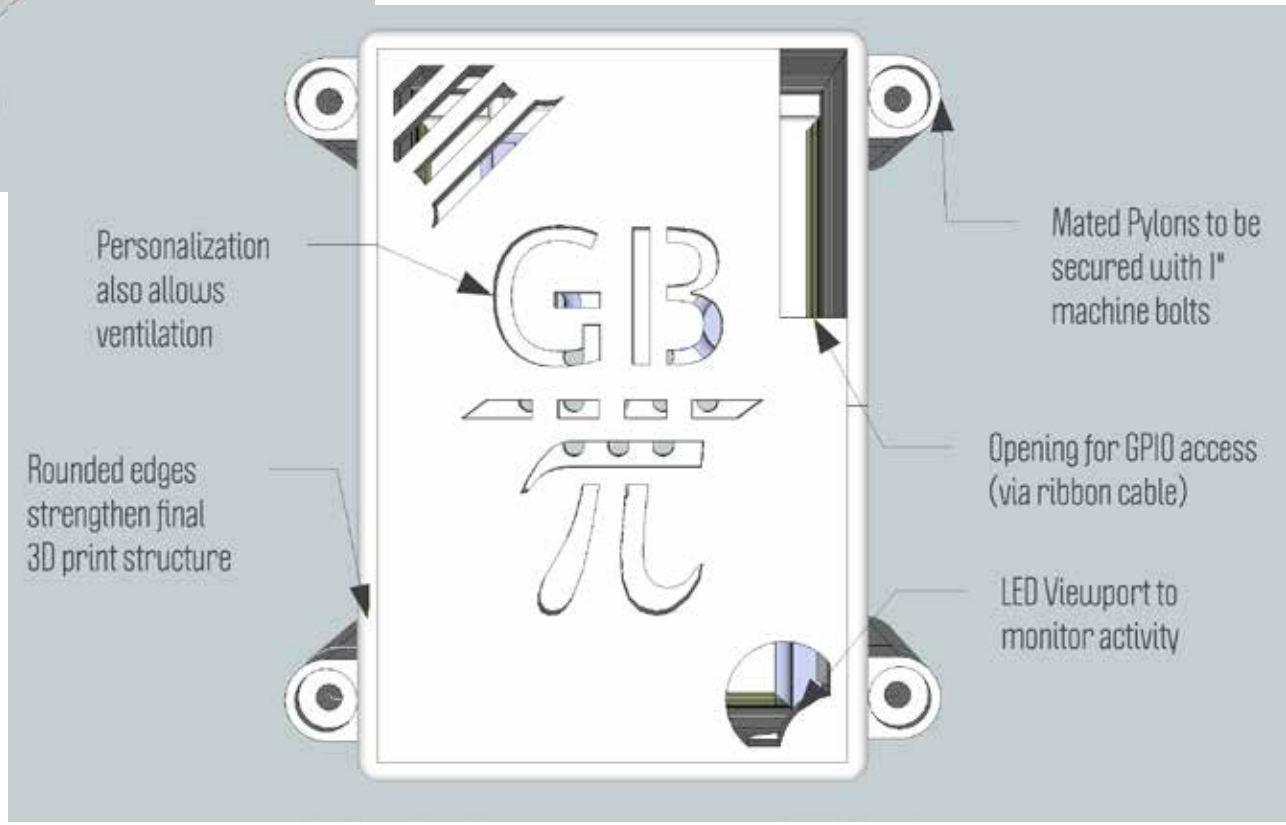
Dedicated Project Visit

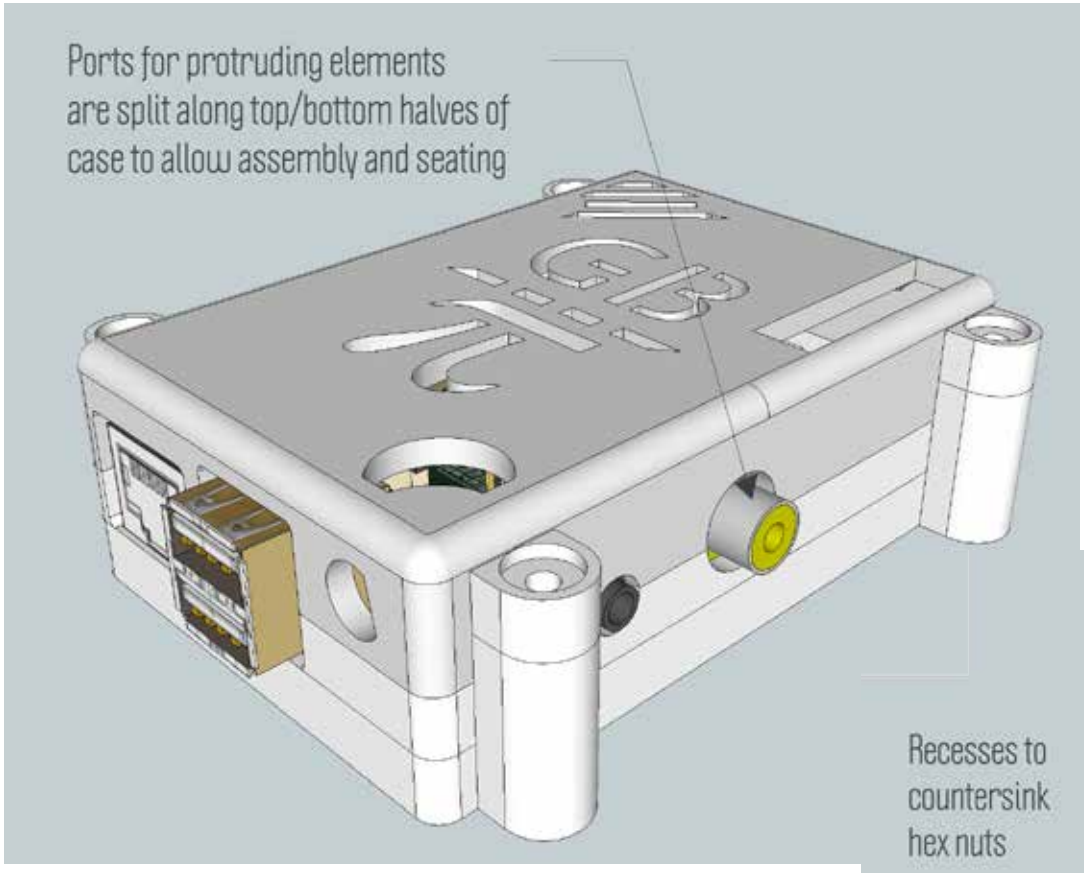
Open Source Ecology / Factor-e Farm

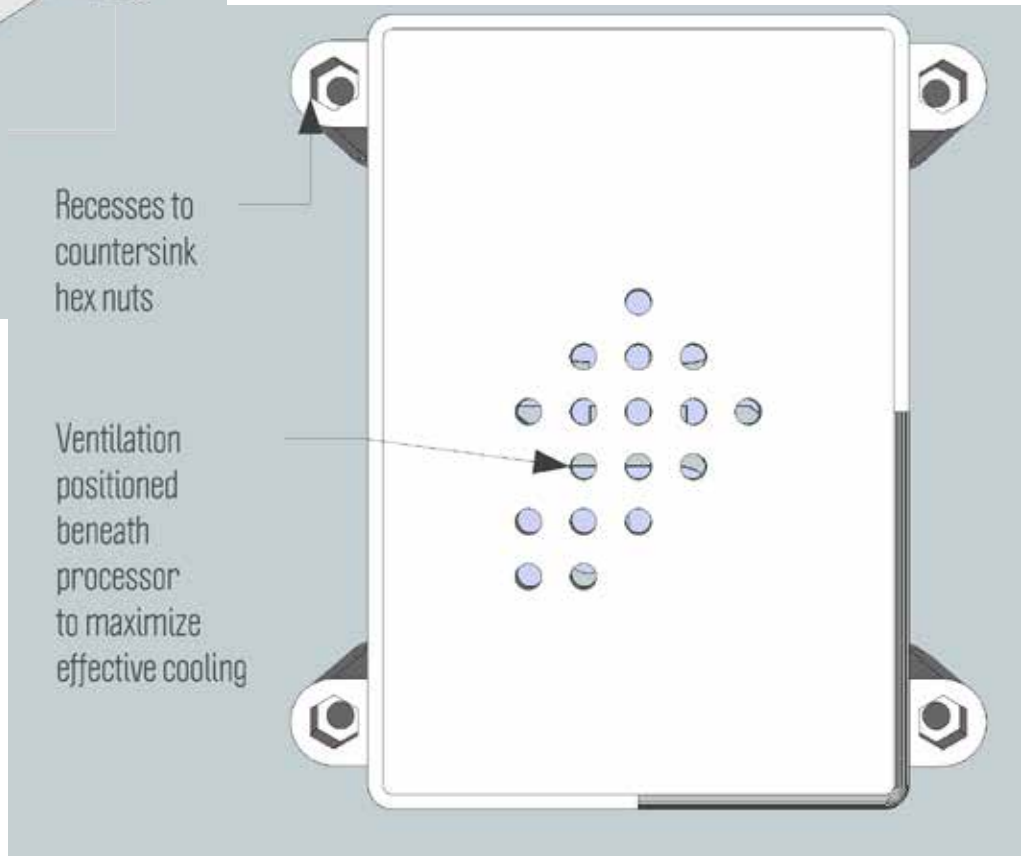


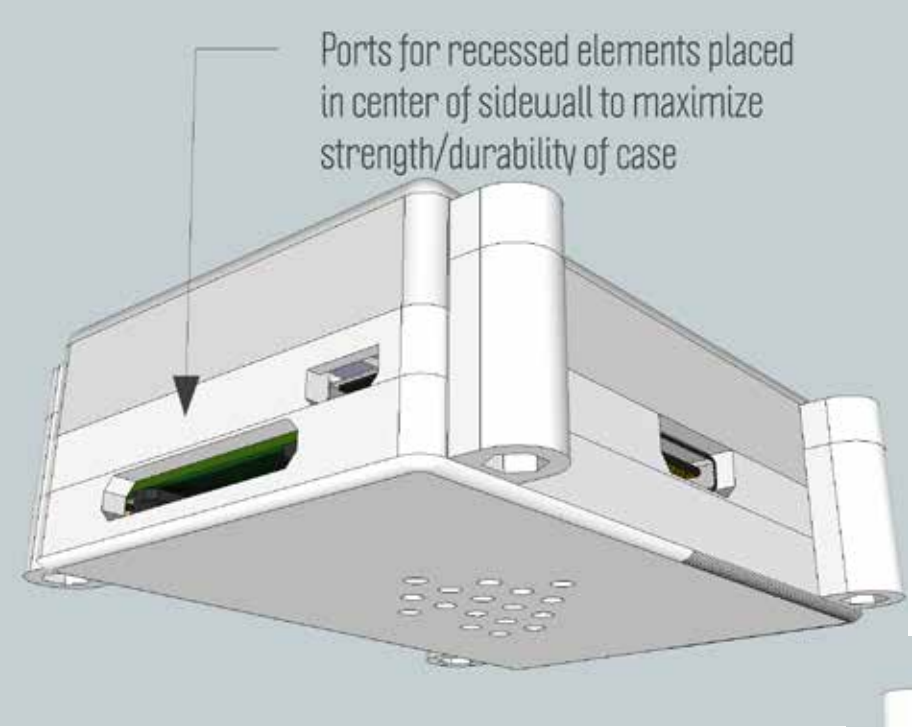
/ Raspberry Pi Case for 3D Printing /

Custom case designed from scratch for the Raspberry Pi, a credit-card sized "system on a chip". Case designed for functionality, strength, and stability when printed in extruded ABS plastic on Stratasys uPrint SE printer.



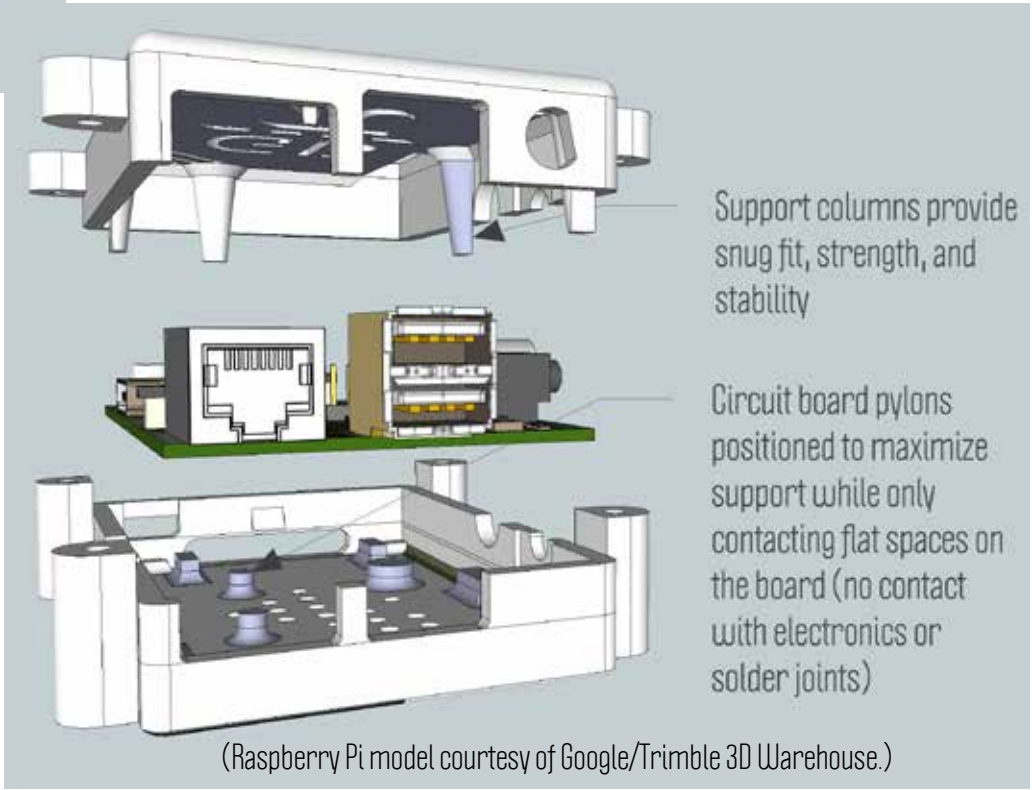

Ports for protruding elements
are split along top/bottom halves of
case to allow assembly and seating


Recesses to
countersink
hex nuts
Ventilation
positioned
beneath
processor
to maximize
effective cooling

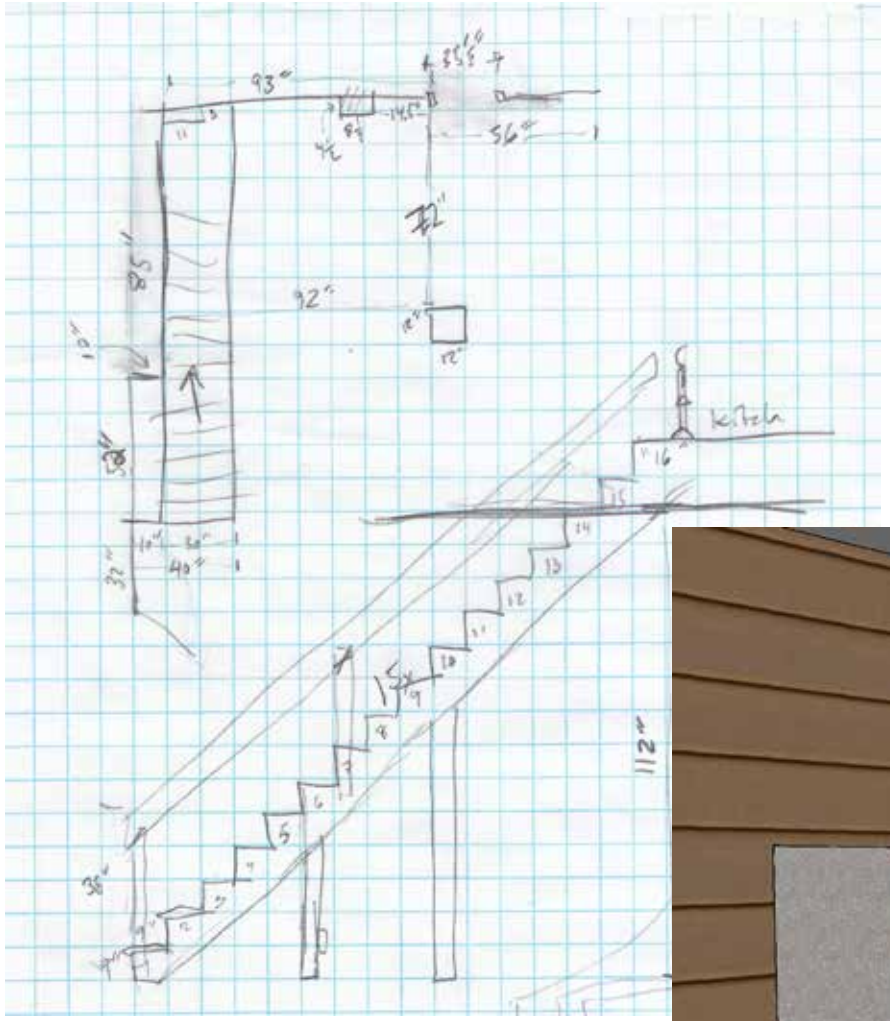


/ A snug fit /

The inner "support columns" and the outer columnar "pylons" slide together for a snug and stable fit in the x-y plane, without the need for snap-tight tabs. The case is secured with 1-inch panhead machine screws and hex nuts which are recessed and countersunk into the pylons at both ends.



(Raspberry Pi model courtesy of Google/Trimble 3D Warehouse.)



/ Visualization of Basement Laundry Option /

3D sketch of possible renovation to install laundry machines under existing basement stair. Visualization allowed residents to decide not to proceed with installation due to insufficient space.

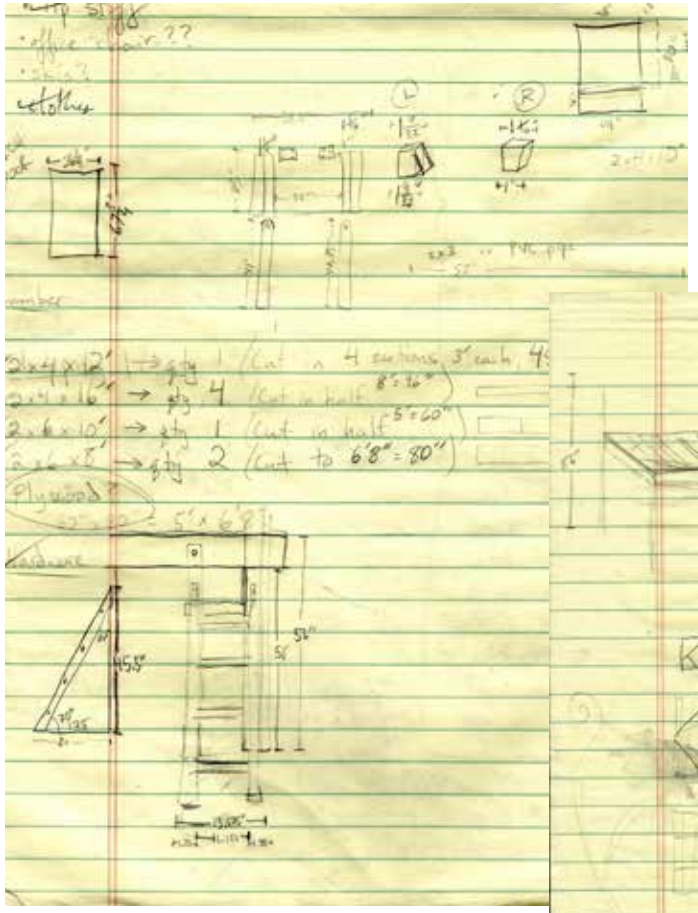
(iMac, mattress, pillows, bed courtesy of Google/Trimble 3D Warehouse)

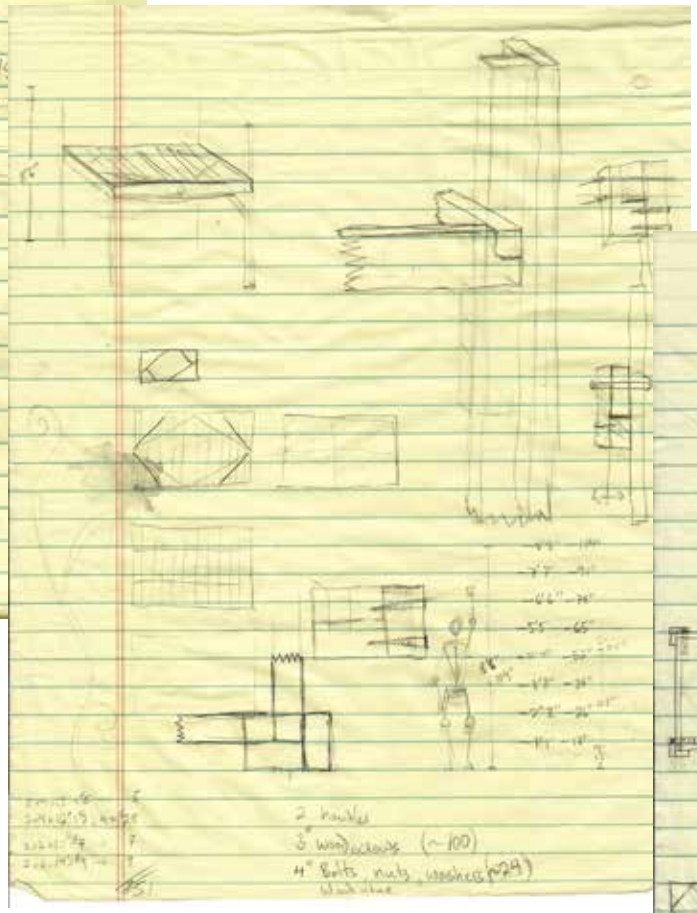
/ Visual Planning with Sketchup /

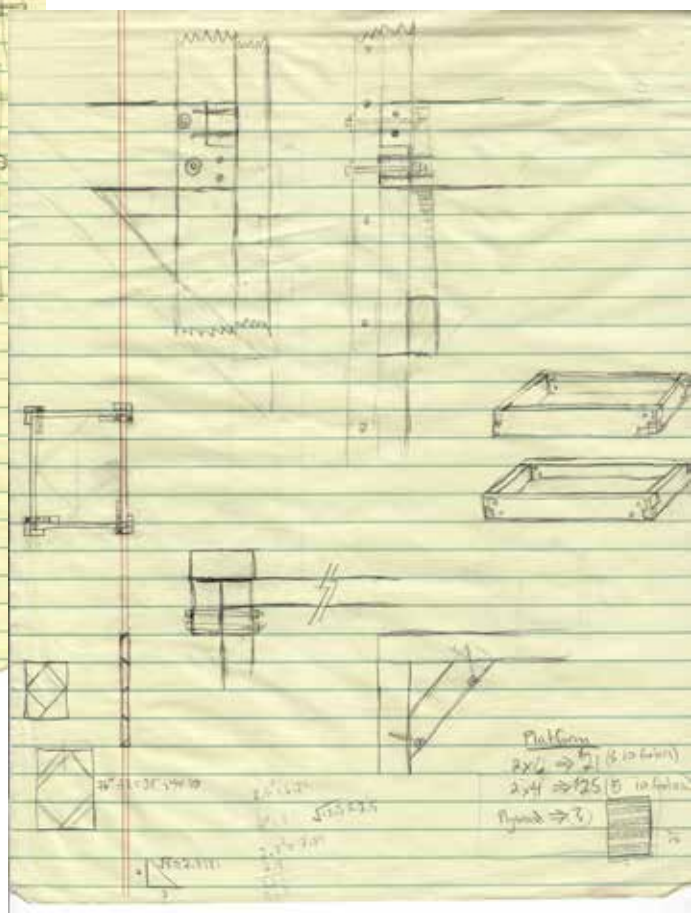
To learn 3D modeling with Sketchup, I measured and modeled an existing bedroom and filled it with furniture to plan for space use and furniture arrangement.

/ Full-Sized Loft Bed /

Two roommates each wanted a full-sized bed, but there was not enough floor space. Design called for a full-sized, free-standing loft. At the time, I had relatively little carpentry experience, so I sketched the designs by hand thoroughly before starting construction.







/ Loft Bed - Final Product /

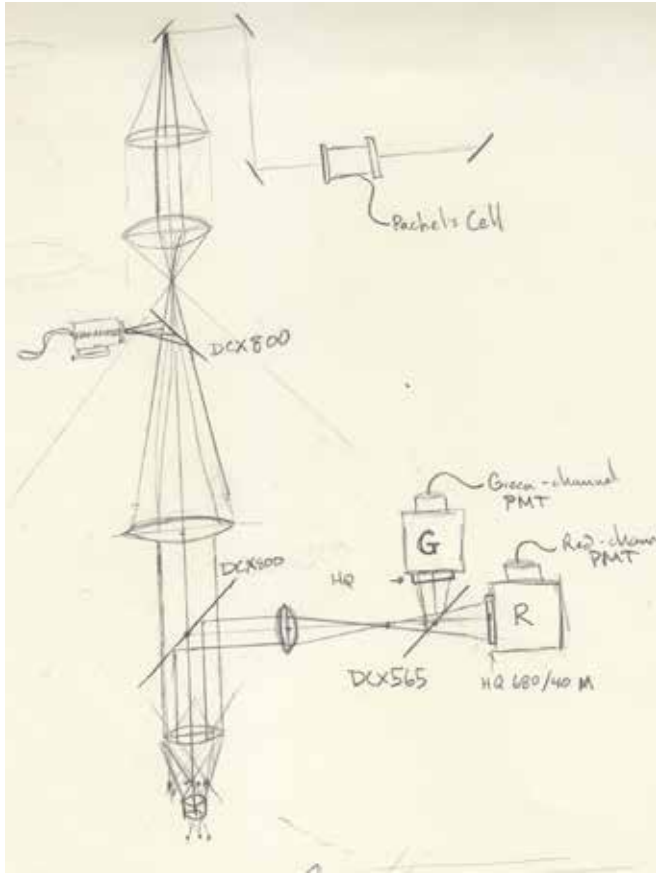
The bed could fit a queen-sized mattress and comfortably sleep two on the top level, with a full-sized mattress and two more sleepers underneath. Loft used for nearly a year, and then passed to the next occupants of the room, who used it for another 2 years after that.

One design challenge was to maximize the space below the loft while making it sturdy enough to be safe. The 2x4 support spans under the middle of the platform lie flat to give an extra few inches of headroom.

Another challenge was to maximize stability and minimize squeakiness. The trusses stemming from each leg reinforced the structure. Bolting the corner leg to the fixed door frame eliminated movement almost entirely.

/ A Clever Little Ladder /

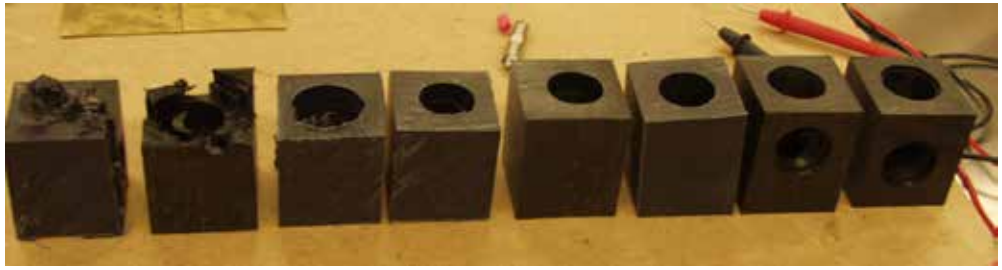
Another challenge was to increase ease of access to the loft. My solution was to create a ladder/stairs with materials on hand. I commandeered an old bunkbed ladder and built simple steps out of it. The back-ends of the steps double as shelves for the lower level occupant.

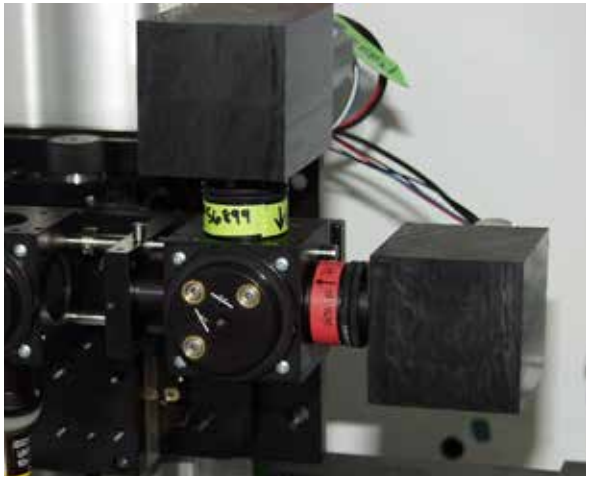


/ 2-Photon Microscope /

While completing my undergraduate thesis research, I assisted in the construction of a 2-Photon scanning microscope. I made the sketch on the left to help me understand how the optics would work. On the right is the assembled microscope.

I taught myself to use the lab's milling machine (over several iterations!) to create light-proof, tight-sealing hard plastic boxes for the photo-multiplier tubes, which collect the flourescent light scattered back from the specimen.





/ DCPAD /

It was necessary to design and build a device which could control the gain on the two photo-detection channels (red & green) and display the command voltage being sent to each one. I built this box, adapted from designs of Johann Bollman, a Post-Doc in the lab, and named it the Dual Control Potentiometer and Display (DCPAD) .

/ Thesis Technical Figures /

Included here is Figure 1. from my undergraduate thesis, including an original schematic of the zebrafish larva. The figure is intended to give an overview of the neurophysiology and orient the reader to the physical location of my experiments.

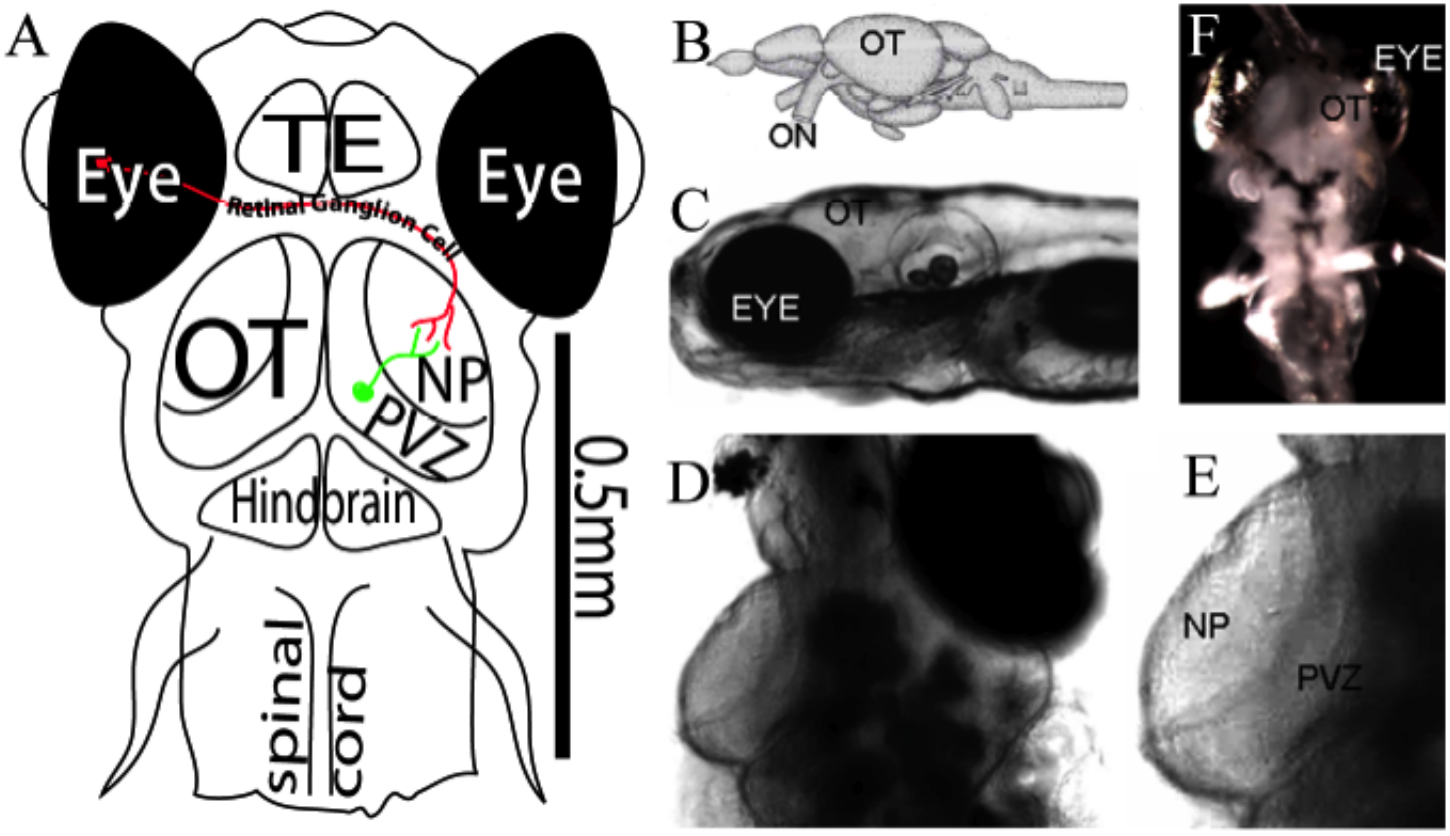


Figure 1. The zebrafish visual system. A: Schematic ventral view of the larval zebrafish visual system; note the contralateral projection of the retinal ganglia (Abbreviations: TE=Telencephalon, OT=Optic Tectum, NP=Neuropil, PVZ=Periventricular Zone) **B:** Schematic sagittal view of the adult zebrafish central nervous system (adapted from Wulliman et al, 1996). **C:** Comparable sagittal view of zebrafish larva; note optical transparency and absence of hard skull. **D:** Ventral view of larva with left eye removed and optic tectum exposed. **E:** Close view of tectum from 'D' with NP and PVZ labeled. Experimental prep showing...

Thank you for your consideration.

"We want them removed" (2006)

Sincerely,

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