

902004 - Planktivore

Week 51

1. Denis Klimov
 - a. We have parts started coming together for the Fluume assembly integration. Couple of important pieces are still being made: Aquarium assembly (by Gary Plastics Place) and Mounting Plate (need functional water jet for this one). We can, however, start on the assembly with what we have, assemble lifters, access integrity, replace casters, add crossbarace and modify assembly as needed while waiting for parts.
2. Thom Maughan
 - a. Year end budget.
 - b. Review of setup parts in machine shop with Denis and Paul
 - c. Work on camera controller hardware design

Week 50

1. Thom Maughan
 - a. Working with James Mc on test of buck-boost converter efficiency and providing design overview doc.
 - b. Parts and docs kit for Indtec. Sent quote request.
 - c. Working on Camera Controller design
 - d. Year end project admin and budget

Week 49

1. Thom Maughan
 - a. Working on Cam control board. Getting quotes for pcb assembly.
 - b. Working with Denis on Fluum

Week 48

1. Thom Maughan
 - a. Reviewing Fluum updates from Denis
 - b. Reviewing Jon's housing design
 - c. Budget and project organizing
 - d. Parts ordering and kitting for board build at Indtec.

Week 47

1. Thom Maughan
 - a. Working on components of Camera control. Boost v1.1 board build and test. Puzzling thru optimizing impulse response / loop compensation across the input voltage range (4.5v to 50v) in LTpowerCAD. Board works great and is ready for Indtec assembly.
 - b. Working on update for LED strobe design - aiming for 3x light output to support shorter pulses for higher speed LRAUV.

Week 46

1. Denis Klimov
 - a. We have a conceptual design of key components for Aquavore / Fluume adaptation: (1) Aquarium designed to transit water flow from round water pipe to rectangular optical section, allowing access to

the flow structure from the water free surface; (2) Wide version of Aquavore Base supporting the aquarium; (3) Lifting assembly holding the Aquavore Base and Aquarium, allowing vertical adjustment under load.

- b. Currently, finalizing parts, detailing drawings, and placing orders

Week 44

1. Duane Edgington
 - a. Report to Planktivore team on interest in the work raised by fellow plankton folks at the MIW2022 workshop.
2. Thom Maughan
 - a. Jon held design review for Planktivore Rev 2 housing. Gave feedback and approval to move forward with fab.
 - b. Weights for internal components. Also sent a prelim camera controller solid model to Jon.
 - c. In progress on camera controller update for Rev 2 housing. Buck-boost converter daughter card, boost v1.0, pcb was stuffed and with a couple of blue wires was functioning. Tested at 6v to 48v input, with 12v 4amp output. Updated the design to fix the probs, added additional copper, sent out for fab. Moving forward with the rest of the camera controller design.

Week 42

1. Thom Maughan
 - a. Board bullets and Project slides for board meeting. Created mosaics
 - b. Attended Lucendi holographic microscope demo.

Week 41

1. Jon Erickson
 - a. Working on interior optics parts prints. There are still questions about machining the flashlights.
2. Thom Maughan
 - a. Jon is in progress on the Rev2 housing design.
 - b. Ordered cable for battery housing, working to get Paragon deployment setup ready
3. Paul Roberts
 - a. Ingest of ROIs into RIMS database

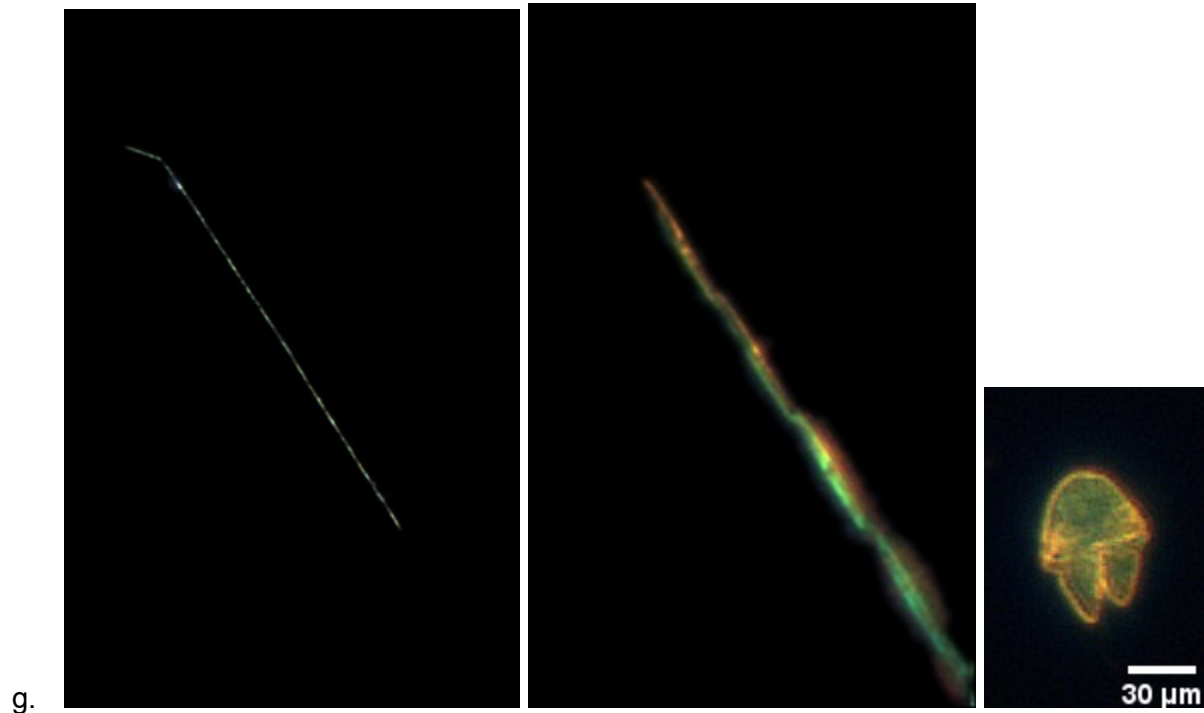
Week 40

1. Thom Maughan
 - a. No word yet on Planktivore lab space. Working spray battery storage problem. Ed Pelzer, Jose Rosal helping. Tin shed, high pressure test room,

Week 39

1. Jon Erickson
 - a. Flow SIM results for the "flashlights" produced good results. Starting the drafting for all the parts, (19 parts).
2. Brent Jones
 - a. Deployed Spray+Planktivore 2x. Determined Spray is not actually flying. Analysis on flight data and scheming for the future
3. Thom Maughan
 - a. Boards and stencil have arrived for boost converter, boost.
 - b. Camera controller design update in progress

- c. Prep and deployment of Spray 34 + Planktivore on Thurs 9/22. Pressure test and dive to 70m for 20min. Yoyo to 200m was scrubbed. Thanks to Jared and Emily for the Paragon support and Brent on shore commanding and analyzing Spray data.
- d. Prep and deployment of Spray 34 + Planktivore on Mon 9/26. Pressure test and flight test yoyo to 200m. Thanks to Jared, Joe Warren for Paragon support and Brent on shore.
- e. Brent analyzed flight data and found we are a profiling float instead of a glider. Syntactic foam shape is coarse and needs refinement to lower the drag.
- f. Plankton images were great and Paul's web tool makes access easy.. Many thanks to Colleen for verifying that we are seeing pseudo-nitzschia chains in both the high magnification and low mag microscopes! Looks like Akashiwo in the high mag.



Week 38

1. Thom Maughan
 - a. Design review for rev 2 Planktivore housing with Jon E, Paul R and Brent J.
 - b. Prep and test Planktivore and Spray 34 for deployment. Brett made quick work of reconfiguring the Spray for Planktivore after I located a connector. Also, many thanks to Brett Hobson helping recover the Spray drop weight off the bottom of the test tank.
 - c. Worked on Camera Controller pcb design / layout during the PGE battery fire on Tues.
 - d. Met with Yui regarding Spray and the Planktivore test plan.

Week 37

1. Jon Erickson
 - a. Spent most of the last two weeks in design and drafting for the pressure case and "flashlights".
 - b. Will do a preliminary design review on Fri. to eliminate some of the design options.
2. Denis Klimov
 - a. We are looking at building a mobile setup for Aquawore.
3. Thom Maughan
 - a. Working deployment plan and coordinating vehicle access with Yui. Window of opportunity to get out on Spray 34 before first of Oct.
 - b. Working with Brent J. on best course wrt battery replacement.
 - c. Roman finished Spray blocks with an inaugural use of new water jet. Mobile cart based Planktivore lab...

- d. Also, worked Castroville fast access with Greg / Norm - big help.

Week 34

1. Thom Maughan
 - a. Prep Planktivore for deployment
 - b. Camera controller updates for power reduction, wakestr board bringup, boost converter review package.

Week 33

1. Thom Maughan
 - a. Noot battery housing pressure test prep and test by Aaron S - passed
 - b. Spray + Planktivore prep for flight test deployment. Lack of lab space is hampering progress.
 - c. Working on updated camera controller design to reduce power. In progress on board bringup for wakestr v1.1.

Week 32

1. Thom Maughan
 - a. Camera control board update. Finished 'Wakestr' design, layout and review with Paul M. Created assembly package and kit of parts. In progress on high efficiency buck-boost converter with support for battery backup to allow linux shutdown in case of power loss.

Week 31

1. Thom Maughan
 - a. Wakestr, smart power supply for power reduction.

Week 30

1. Thom Maughan
 - a. Migrated board sleep power supply design from a personal project for use on Camera Controller. Designed, made review slides, layed out pcb for Wakestr, RTC + Vreg + Sleep and Wake signals.

Week 28

1. Duane Edgington
 - a. Proposal work

Week 27

1. Thom Maughan
 - a. 2023 Phase 1 proposal (overhead)
 - b. Camera Controller, Strobe Driver and Strobe hardware updates.

Week 25

1. Denis Klimov
 - a. Organizing parts and fastener, and updating assembly jig with 100% fill bases
2. Thom Maughan
 - a. Draft of phase 1 proposal
 - b. Researching lower power hardware options capable of openCV + nvme + global shutter imager.

Week 24

1. Thom Maughan
 - a. Assembled Noot with temporary bracket for mounting to Planktivore. Tested in the harbor for 10 minutes and again in the test tank. Planktivore 'imaging at depth' feature was tested, works great.

Week 22

1. Thom Maughan
 - a. Planktivore has been removed from Spray.
 - b. Working on assembly and test of Noot housings.
 - c. Brackets for mounting Planktivore to Noot.
 - d. Replace failed (due to bad cable) harddrive in DeepRip. Paul ran an eyris processing job that pegged all 128 threads on 64 cpus. Processor temp was getting close to 70 C, fans remained quiet.

Week 21

1. Duane Edgington
 - a. Project team meeting. Paul R. will be loading Planktivore images into RIMS this week.
2. Thom Maughan
 - a. Test and prep for Monday deployment of Planktivore on Spray with dive to 150m over the canyon. Canceled due to Covid exposure.
 - b. Handing Spray over to the Carbon Lab. Removed Planktivore and transferred to table cart to enable Chris or Brent to do the battery swap and reconfig in B109
 - c. Assembly and test of Noot battery housing. Working alternate deployment plans to test pressure gated sampling and collect more plankton data.
 - d. Paul setup ZFS to pool nvme drives on DeepRip. We debugged the sata drives and found power supply cables that were not compatible (corsair vs evga). One of the four drives was bad. RAID controller on the motherboard setup was problematic however ZFS handled pooling the drives wonderfully.

Week 20

1. Brent Jones
 - a. Analyzing data from initial field test. Spray performed 1 dive to 40m
 - i. Power draw on main batteries presents an issue
 - ii. Flight characteristics hard to analyze due to shallow dive. Need to do a deeper dive
 - iii. Overall HUGE SUCCESS
2. Thom Maughan
 - a. Post cruise engineering data. Investigated Spray primary lithium battery behavior under load. Canceled Monday's deployment on Sunday.
 - b. Working on a cruise plan / checklist doc. Trying to get Planktivore out one more time before handing the vehicle to the Carbon Lab.
 - c. Attended Embedded Vision conference in Santa Clara. Talked to various vendors about low(er) power solutions for Dual 12MPixel, 12Bit, image pipelines with OpenCV support. Amberella was recommended by Leopard Imaging. AI at the Edge was the theme of the show.
 - d. Exploring Xilinx and Lattice FPGA product offerings

Week 19

1. Brent Jones
 - a. Installed planktivore on spray and successfully ballasted in test tank
 - b. Deployed Spray+Planktivore offshore and successfully completed 1 dive to 40 m

- c. Digesting engineering data from first real dive
- 2. Thom Maughan
 - a. Roman M has done a great job fabricating the Planktivore+Spray service cart spec'd by Brent
 - b. Tank testing the Spray comm's roll, turtle roll
 - c. Plankton imaging and lighting adjustments in a bucket of seawater from the shore.
 - d. Pre-deployment testing and checklist for both Spray
 - e. Deployment on Wednesday, 40m depth envelope resulted in 54m max depth due to overshoot. We aborted the 2nd yoyo as we ended up with too little depth margin to the bottom and the wind was starting. Thanks to the Plantivore team for the great effort pulling it together. The plankton images are wonderful.
 - f. We are working towards a Monday May 16th mission with greater depth and longer range along the C1 to M1 line.

Week 18

- 1. Brent Jones
 - a. Ballasting spray 34 with planktivore attached
- 2. Denis Klimov
 - a. We have upcoming deployment approaching quickly. Of a recent development, designed a vacuum viewport extractor which greatly simplified removal of viewports, to the point that now insertion is a bigger effort.
 - b. Also, worked on various issues of mounting and clearances on a strobe assembly, as well as cables and routing
 - c. Also, designed an assembly jig allowing handling Planktivore housings during assembly
- 3. Thom Maughan
 - a. Worked with Paul and Denis on housing assembly.
 - b. Worked with Paul to resolve software issues on camera controller and setup of nomachine for remote access to XavierNX - learning opportunity.
 - c. Ballast and trim Planktivore
 - d. Mounted Planktivore on Spray with revised foam. Comms roll maneuver was successful, almost too good. Brent J says good to go.
 - e. Working plans for engineering test at sea next week.

Week 17

- 1. Thom Maughan
 - a. Working to be deployment ready on 5 May and in the water on Spray 10 May, drafted punch list
 - b. Worked with Paul R to finish camera control board bringup, invert trigger signal.
 - c. Base configuration of 3x Xavier NX + 2TB Samsung 970 with the latest Jetpack 4.61,
 - d. Benchtop 'soak' test of two cameras, camera controller and xavier nx over the weekend. No problems, but no ROI's either as the cameras are pointed at nothing.
 - e. Porting i2c driver for Keller PA7LD pressure sensor from whaleshark tag.
 - f. Worked with Denis to provide design requirements and test his acrylic lens extractor - works great! We are now enabled to move forward with cameras in housings.
 - g. Worked with Jon to get o-ring analysis on reduced (2.738) diameter acrylic.
 - h. Worked with Aaron on pressure test plan using the Noot housing filled with RO water with compensation. Test started 25 Apr, 10 cycles to 750 psi, with an hour hold time at 750 on one cycle. Passed test for 500m.
 - i. 2nd camera controller board is stuffed with low profile (expensive!) machine pin headers, in progress on benchtop integration test.
 - j. In progress on Xavier NX, camera control mounting in compute node. Wiring diagram, in progress on housing wiring with help from Denis.

- k. Worked with Aaron on revised syntactic design to address buoyancy / trim challenges. So far so good with Aaron's water jet approach. Reviewed foam calcs with Paul and found I made an error but we can trim the length to compensate.

Week 15

1. Duane Edgington
 - a. Project meeting
2. Denis Klimov
 - a. We had to do couple of adjustments on the strobe assembly design, due to issues of tolerances stack. Latest testing indicated they fit satisfactory now, but better fit would require drastic redesign/ reprint of 2 parts. This temporary modification of parts on the mill would have to do for upcoming deployment
3. Thom Maughan
 - a. Buoyancy test on Monday in the Test Tank followed by Buoyancy test of Planktivore on Spray.
 - b. Working thru measurements and fitment of optical chassis in titanium housing.
 - c. Met with Yui on Spray schedule, met with team on date for Spray deployment. We are aiming for at sea testing on Spray by May 10. Lots to do.

Week 14

1. Brent Jones
 - a. Meetings and discussions centering on mounting contraption to Spray

Week 13

1. Duane Edgington
 - a. Team meeting March 28. Waiting for images to test Shore-side data system. Should be pretty soon now!
2. Thom Maughan
 - a. Weekly meeting
 - b. Assembly and test of 0.5x and 4x microscope 'pipes' with Aquavore. Working with Paul R and Denis on tuning lighting and alignment.
 - c. Overlapping Denis schedule has worked well, he has completed test setup and strobe assembly to perfection. EE-Techs have built deployment set of strobe boards for the titanium housing.
 - d. Imaging of plankton on 30 Mar in Aquavore milestone.
 - e. Larry has completed Spray mount, syntactic foam, housing on 30 Mar, another milestone. Arranged Todd Walsh photoshoot.
 - f. Working with Larry to transition remaining tasks on Fluum to Aaron / Roman. Arranged with Norm to have Larry onsite next week to walk us through dis-assembly and assembly of the housing.
 - g. Received Spray batteries!

Week 12

1. Duane Edgington
 - a. Team meeting March 21. Eric O. and Paul R. have released a copy of RIMS shoreside software running on DeepRip for project use.
2. Thom Maughan
 - a. Weekly meeting...
 - b. We hit a milestone. Using camera GPIO as trigger, fired the strobe and imaged with revised optical path (prism, camera and telecentric lens) in Aquavore. Wahoo.
 - c. Working with Denis on best way to wire things up for testing and moving the 2 camera / microscope assemblies between Aquavore and Fluum. Denis' test setup design is great, well thought out.
 - d. Housing went out on the Flyer cruise for pressure test, have not heard results yet.

- e. Working on Noot battery pack assembly.
 - f. Syntactic foam design is complete and Larry is in progress on the fab. He has designed the Spray mount and is expecting to finish by retirement. Congrats to him on 25 years (as of Mar 17). Very much appreciate his work ethic.
 - g. Paul has revised the optical path, working thru the finer points of a custom prism mount. He's finished the mods for the retaining pins on the strobe ball array.
3. Paul Roberts
- a. Working on revision 2 of the steering optics

Week 11

- 1. Duane Edgington
 - a. Team meeting March 14. Eric Orenstein has RIMS image database system and RIMS viewer (web front end front) installed and up and running on DeepRip.
- 2. Brent Jones
 - a. Met with Larry and reviewed first article housing
- 3. Denis Klimov
 - a. The hardware for mounting strobe boards is ordered, this week we are attempting to assemble the board stack and do the test fit on the frame assembly

Week 10

- 1. Duane Edgington
 - a. Team meeting March 7.
- 2. Thom Maughan
 - a. LED Strobe assembly and test
 - b. Setup and test in the Rock Lab
 - c. Camera and lens assembled on Paul's frame. Working thru assembly process to add Strobe.
 - d. Paul found an optical path length problem, working on a solution
 - e. Larry has completed the titanium housing fab. Pressure test will be on an ROV dive to 1200m Mar 17. Larry is working on Spray Mounting bracket and foam.
 - f. Denis' Aquavore is assembled and Paul ran first image test.

Week 9

- 1. Duane Edgington
 - a. Team meeting Feb 28.
 - b. Preparing for further work on RIMS shoreside software with Paul R. and Eric O.
- 2. Brent Jones
 - a. Meetings
- 3. Denis Klimov
 - a. Core of the lab test setup (Aquavore) is ready, next - doing some improvements and setting up the experiment.
- 4. Thom Maughan
 - a. LED Strobe assembly in progress. We'll have lighting and cameras ready for test when the strobe is finished.
 - b. Energy board update is in progress.

Week 8

- 1. Duane Edgington
 - a. Working session with Paul R. and Eric O. on plantivore shore-side software, installed on DeepRip. The software is shared with EyeRIS LRAUV project. Next steps are to get updates checked-in, front end

debugged, and then rebuild and document (developer doc and user doc). Long-term, look to build as docker containers...

2. Thom Maughan
 - a. Rock Lab is in use for rock cutting next week. Fluum moved into hallway and covered. Denis is looking into an alternative space.
 - b. Strobe boards with revised optical spacing are due in Friday, parts kit, assembly request in place.
 - c. Larry is making wonderful progress on the Titanium housings. Spray mounting bracket, compute chassis, fluum imaging section are in the todo list of this good worker as his impending retirement looms.
 - d. Denis has finished assembly of Aquavore imaging aquarium. Testing can commence when lab space is resolved.

Week 7

1. Duane Edgington
 - a. Team meeting Feb 14.
 - b. Shoreside software discussion with Paul R. and Eric O. Feb 15.
 - c. Reviewing Django, nginx, Unicorn, and Planktivore repository on MBARI bitbucket in preparation for sprint Weds Feb 23 on preparing and documenting shoreside web server for Planktivore images.
2. Jon Erickson
 - a. Final assembly of the remote battery cases.
3. Brent Jones
 - a. Meetings
4. Denis Klimov
 - a. Material for Aquavore tank/ aquarium is ordered and picked up from Professional Plastics, assembly is done by Gary's Plastic Place in Santa Cruz since gluing acrylic with good quality requires skill and very specific techniques.
 - b. Also, order for rails/ fasteners from McMaster is received

Week 6

1. Duane Edgington
 - a. Reported, in brief, to team on ZFS at weekly project meeting Feb 7.
 - b. Eric O., Paul R and Duane scheduling meeting to go over plantivore database tool (formerly used at SIO) to set up on DeepRip. Eric has established a bitbucket repository, and started build on DeepRip.
2. Jon Erickson
 - a. Pressure case end caps are out for Anodize.
3. Thom Maughan
 - a. Monday engineering meeting. Larry is finishing titanium work, beautiful stuff.
 - b. Updating LED strobe for proper optical spacing beneath lenses
 - c. Received updated strobe_energy board, kitting for assembly
 - d. Met with Larry/Paul to review optical chassis mounting
 - e. Pressure sensor wiring, dimension

Week 5

1. Duane Edgington
 - a. Team meeting Jan 31.
 - b. Looking at zfs file system and Ubuntu as requested by Project Manager
2. Jon Erickson
 - a. Endcaps out for anodize, pressure case tubes are done. Waiting on chassis parts.
3. Thom Maughan
 - a. Working on inventory of parts ordered, kitting, and expense report.

- b. Board bullets reviewed and submitted.
 - c. Strobe, strobe energy, strobe driver boards are functional. Improvements are planned and most interesting is Paul's new circuit idea for thermal protection.
 - d. Cam_ctrl board bringup with VS code PlatformIO.
 - e. Strobe board was found to need a revision to place the LEDS under the acrylic ball lens with correct optics
 - f. Hosted Monday engineering meeting, working to improve meeting format.
4. Paul Roberts
- a. Assembled internal chassis
 - b. Flow simulations

Week 4

- 1. Duane Edgington
 - a. Weekly status meeting Jan 24.
 - b. Plan to meet with Paul R. and Eric regarding updated SPCconvert software to use for viewing Planktivore images
 - c. Team discussed need for test images with appropriate filenames and metadata for software testing
- 2. Thom Maughan
 - a. Planktivore status update for Francisco, Henry, Paul and Steve H.
 - b. Started weekly Planktivore engineering meetings on Monday 1pm.
 - c. Testing Strobe, Strobe_Energy, Strobe_Driver boards.
 - d. Updated Strobe_Energy layout to move components off the bottom side to relieve tight fit. Out for fab.
 - e. Parts kit for build of cam_ctrl and assembly instructions delivered to James, board is assembled and ready for bringup.

Week 3

- 1. Duane Edgington
 - a. Status meeting planned for Jan 24
- 2. Jon Erickson
 - a. Remote Batt. pack parts in shop queue.
- 3. Paul Roberts
 - a. Internal chassis solid modeling and fit test
 - b. strobe optics solid modeling

Week 2

- 1. Duane Edgington
 - a. Project kick off meeting Jan 12.
 - b. Engineering meetings planned weekly starting Jan 24.
- 2. Jon Erickson
 - a. Remote Batt. Case parts in the shop - 4wks.
- 3. Denis Klimov
 - a. We are ramping up work on this, resuming lab testing, and starting outfitting a Flume set up in the Rock Lab
- 4. Thom Maughan
 - a. Found a copper pour problem on the Camera Controller pcb, fixed and sent out to Bay Area Circuits for fab on the 9th, boards due on the 13th.
 - b. Held project kickoff on Wednesday. Great discussion and appreciated Colleen Durkin's interest, thanks to Francisco for inviting her.
 - c. Parts are coming in from the Aliexpress order.

- d. Harddrive failed on Larry's mill, ordered a refurbished drive and channeled Zorba to do the fix. Got the floppy drive working, Win 95 mill software installed and parameters loaded in the 25+ year old Sony industrial PC.
 - e. Larry has the compute node housing machined and is starting on the microscope housings.
 - f. Meeting with Paul to discuss requirements for imaging section on Fluum, fast turn optics frame prototype options for Fluum. 3D printed housings are planned for Fluum and thanks to Paul we have a thermal management plan as well.
5. Paul Roberts
- a. Optical modeling of illumination system

Week 1

- 1. Duane Edgington
 - a. Kick off week of Jan 10
- 2. Jon Erickson
 - a. Remote Batt. Pack parts are ready for Fab.
- 3. Thom Maughan
 - a. Where there's smoke, there's ... Larry Bird has been 'on fire', machining titanium for the compute node housings. Joy.
 - b. Last minute review on the endcap and connector placement. Ethernet connector moved to improve the 'meat'.
 - c. First rev of Camera Control boards sent out for fab on the 26th arrived on Jan 4 and parts kit and manufacturing request for a build of 2 sent to EE Techs
 - d. Parts are arriving from China just in time for the Camera Control build.
 - e. Jon E provided the 100m nb battery housing design prints and we had a doorway review. A couple minor tweaks and it will be submitted to the shop for fab (qty 2). First class job by Jon.