

# Irene Hu Sorted By Project

## 901101 - Seafloor Mapping

- Discussions with Erik on how to proceed. Started looking at circuit diagrams for existing MAPR (Week 5)
- Reviewed schematics and materials for ORP sensor to start mapping out requirements and boards (Week 16)
- Discussion w/ Dave and Dorado crew about requirements and where sensor would live (Week 16)
- Began schematic for ORP main board (Week 16)
- Working draft of main ORP board completed (Week 17)
- Updated ORP board for new choice of microprocessor. Using uP directly instead of a module requires more attention (Week 18)
- Packaged materials for design review and wrote a readme (Week 18)
- Ordered turbidity sensor (Week 18)
- Procured command set manual for RBR turbidity sensor (Week 19)
- Adding a power switch to circuit (Week 19)
- Design review for ORP board and subsequent modifications to board (Week 20)
- Continue updating ORP board schematic following suggestions from design review (Week 21)
- Finished ORP board rA, ready for layout (Week 22)
- Look over commands for RBR turbidity sensor (Week 22)
- First draft of code for ORP board including ADC code adapted from MOSOS and translated to C++ (Week 23)
- Review of first layout of ORP board (Week 24)
- ORP board sent out for prototyping. Made a cable for turbidity sensor (Week 25)
- Made some cables for RBR turbidity sensor and communicated with instrument (Week 26)
- A few minor tasks like getting the solid model of the board. Meeting with Sharon next week. (Week 30)

## 901217 - Chemical Sensors

- Updated sampfast code for ISUS fast sampling to match a better format for MSC3; incorporated into main code (Week 4)
- A bit of exploration re: lighting sources for wastewater ISUS (Week 16)
- Looked into some LEDs for wastewater ISUS (Week 17)
- Minor scare on “malfunctioning” float ISUS was resolved as water droplet reflections (Week 21)
- Looked into some LEDs for wastewater ISUS (Week 26)
- Wastewater ISUS opening meeting (Week 28)

- Evaluated some LED and lens options for wastewater ISUS prototyping (Week 28)
- Picked parts for an LED excitation system for wastewater ISUS (Week 29)
- Ordered parts for LED excitation system for Wastewater ISUS. (Week 30)

## 901805 - Coastal Biogeochemical Sensing Program

- Revised version of floating anode electrode holder to move it more towards center of flowcell. Started on a little lid. (Week 2)
- After various iterations of flowcell and electrode holder for alkalinity floating anode experiment, finally tested it... massive leakage, needs further redesign (Week 3)
- Some project coordination for mini ISUS (Week 3)
- Alkalinity: Massive redesign of floating anode flowcell, lid, and mounts. To be made out of clear acrylic. 3D printed a mockup, needs some more modifications (Week 4)
- Alkalinity: (Week 5)
  - Finished design for flowcell and other parts for floating anode setup, printed some mockups. Made drawings and sent to MEtechs to make out of acrylic (Week 5)
  - Made some solutions, wire harnesses, and other setup to test the alkalinity DSL in lab (Week 5)
- Various tests to try to understand substrate leakage in DSL (Week 5)
- Tests to understand substrate leakage in DSL continue (Week 6)
- Alkalinity: (Week 6)
  - Assemble a low-pressure alkalinity unit with Luke, currently setting up for lab tests (Week 6)
- ISUS: (Week 6)
  - Discuss new lamp with Gene, mock fit in Solidworks. Arrange a call with Excelitas for more info (Week 6)
  - OSM poster, had to learn all about calibration protocol (Week 6)
- Alkalinity: (Week 7)
  - Set up lab tests with new TApH unit. Weird results. Updated connectors, still weird results. There seems to be some high resistance related to the anode that goes away after current is applied for some time but comes back after awhile, accompanied by strange pH results (Week 7)
- ISUS: (Week 7)
  - OSM poster (Week 7)
- Alkalinity: (Week 8)
  - Continue tests on TApH unit. Results confusing, still unclear what is going on (Week 8)
  - Floating anode flowcell was completed by Yamir, started setting up experiment. Micrometer mount needs some modifications, new version printed. (Week 8)
- ISUS: (Week 8)
  - OSM poster - finished and printed (Week 8)
- Alkalinity (Week 10)

- Starting again on floating anode measurements (Week 10)
- Alkalinity: (Week 11)
  - Floating anode titrations, not as good as expected but did finally get double inflection point curves (required too-high current and distance didn't seem to make much difference, some weird behavior) (Week 11)
  - Behavior from TApHl anode seems to resemble NC. Probed anode on two alkalinity isfet chips and can't get connection to pad. Resistance to itself varies, the one used in solution seems to have grown a layer. Will talk to Lionix. (Week 11)
- Mini ISUS: (Week 12)
  - Inventory sleuthing (Week 12)
  - Troubleshooting some random comms issues. On Saleae, the mini ISUS behavior looks fine. (Week 12)
  - Luke observed some freakout in mini ISUS 002 spectra that went away. Plotted data and brainstorming ideas. (Week 12)
- Alkalinity: (Week 12)
  - Designed and printed, then worked with Roman to fab, small jigs to hold ISFET chips and probe via fuzz buttons (won't scratch like probe tips). Anode still seems disconnected from its pad. Measured diode drop between S/D and substrate, and leakage resistance in other direction (Week 12)
  - Looking at fab files from Lionix via CleWin6, the anode pad seems to be missing a contact hole (Week 12)
  - Modifications to floating anode setup, forgoing the lid (and pumping) in favor of better alignment between anode and isfet. Printed new electrode holder. (Week 12)
- Alkalinity (Week 13)
  - Various tests with floating anode. Generated rough graph of titration time vs distance or current, data is messy. System seems to be titrating itself after titration ends. Experiments with better flushing or reversing current (firmware change). Latest results point to flushing as the main issue (Week 13)
  - Weird precipitate shows up on anode, investigating (Week 13)
  - Probed TA-alk Lionix chips using fuzz button jig. Inconsistent and confusing results. Compiled data into a ppt so Yui can email Lionix. (Week 13)
- Alkalinity: (Week 14)
  - Ran several more experiments to look into apparent "self titration" of system where it continues to titrate after current stops. Seems to continue for around 15 minutes (Week 14)
  - Trying to investigate the weird precipitate on anode, no results (Week 14)
  - Next flowcell with better spacing control outsourced to Joe, wrote design requirements document (Week 14)
  - Yui has emailed Lionix about the chips; ongoing conversation (Week 14)

- Alkalinity (Week 15)
  - Continued long tests on self-titrating behavior. Latest hypothesis is a large cloud of acid that lingers in the area (Week 15)
  - Picking out and probing some more chips to send back to Lionix (Week 15)
- Alkalinity (Week 16)
  - Measured a couple more chips and sent package to Lionix with explanatory email (Week 16)
- Alkalinity (Week 17)
  - Ordered some electrode polish (Week 17)
- Mini ISUS (Week 18)
  - Looking into some serial comms errors that seem specific to mini ISUS (intermittent junk characters upon wakeup). Seems to be a timing thing, playing with crystal capacitance. Some cables also seem to cause issues, may need a pulldown. (Week 18)
- Mini ISUS (Week 19)
  - Troubleshooting for serial comms errors. Missing bits seems solved by choice of RS232-USB convertor, although also seems sensitive to various factors (eg going through bulkhead/cable) and Saleae trace looks fine (Week 19)
  - Cross talk on Rx/Tx happens on longer cable, Rx is already pulled to GND by receiver. As per Thom, can be improved by twisting each signal with GND. (Week 19)
- Troubleshooting some lioncaps from Indtec. ADC is upside down. (Week 19)
- Alkalinity (Week 20)
  - Brent is now designing the flow cell for floating anode (taking over from Joe). Handed over materials. (Week 20)
- Alkalinity (Week 23)
  - Tried polishing electrode and rerunning titration. No noticeable improvement. (Week 23)
  - Finally received a response from LionIX and they have recreated the problem with alkalinity chips (Week 23)
- Made a small board to test turning off Nanofet's bias battery on command. Board is laid out, waiting for parts to finalize layout (Week 25)
- Looked into alternative isfet manufacturers (Week 25)
- Measured some signals and looked into code to help Thom's contractor with Nanofet rC new NAND flash issues (Week 25)
- Measured signals and found a code bug for Thom's contractor, NAND flash now communicates (Week 26)
- Finished Nanofet bias battery power toggling board in KiCAD and sent off for fab and assembly (Week 26)
- Some discussions and sent some emails about deploying eddy covariance next year (Week 26)
- Nanofet (Week 27)

- Finished assembling tester circuit for turning off bias battery. Initial tests with Yokogawa showed some unexpected extra transient current draw, traced to sagging voltage on latch's data input pin as GPIO power is cut or left floating. Added pulldowns and has some implications for code. (Week 27)
  - Tester circuit is currently undergoing long term power consumption tests but so far seems promising (Week 27)
- Alkalinity (Week 27)
  - Alkalinity chip from Lionix with measured lower anode resistance built into TApHI 002 sensor by Luke. Made connectors and set up for alkalinity titration. Spent a day troubleshooting non-working pH and anode, it started working at some point during tests and best hypothesis is a bubble (Week 27)
  - Initial titrations of TApHI 002 show some working behavior but titrations don't seem to fully hit two inflection points or are inconsistent. Currently experimenting. (Week 27)
  - Updated code to be able to toggle between Vrse and Vrsi (Week 27)
- Alkalinity (Week 28)
  - After experimenting with built-up TApHI 002, was able to get some repeatable titrations with two inflection points. Need to use higher current (~50 uA) and flushing with a pump in the big tub seems to work better than stirring in a beaker. (Week 28)
  - Alk setup suddenly stopped working; current was railed and stuck on. Behavior matches open circuit anode, and visual inspection shows that the Pt anode deposited on isfet seems to be coming off (similar to observed before). Circuit latching is a separate issue not previously observed before, and after some troubleshooting and help from Claude, the best hypothesis is that railing the op amp inputs from the open circuit load has damaged the op amp. New part selected and ordered. (Week 28)
- Nanofet (Week 28)
  - Continuing power draw tests for bias battery disabling circuit (Week 28)
- Alkalinity (Week 29)
  - After many discussions with Claude about Pt delamination, the observed delamination seems to have to do with too-high voltage at the anode (as well as other "bad behavior" like reversing current, possibly coupled with some fab choices like encapsulation window being larger than anode). Some of the observed voltage is from electrolysis of water, but tens of kilohms of observed resistance (which causes the high voltages) remains unaccounted for. (Week 29)
  - After running various tests on a new chip (eg R/X with AC excitation using LCR meter) to determine source of resistance, no issues can be found- the new chip is showing better behavior than any other previously observed. Hypothesis is that previous chips might have been damaged

early on by overvoltage, coupled with some fab inconsistencies. (Week 29)

- Currently exploring circuit solutions to limiting anode overvoltage. Previous circuit fix on the Howland pump op amp seems to be working. (Week 29)
- Nanofet (Week 29)
  - Completed current measurements on a tester circuit for disabling bias battery power. The extra current consumption is  $<1 \text{ uA}$  and there is no impact on voltage. (Week 29)
- Alkalinity (Week 30)
  - Chip that exhibited excellent behavior suddenly went bad and looked open circuit. After various tests and taking it apart (done by Luke), it seems the anode to pad connection has been broken. (Week 30)
- Nanofet (Week 30)
  - Started incorporating the tester circuit into nanofet rD (Week 30)

## 901902 - Unoccupied Aerial Vehicles for Science, Operations and Outreach

- Sat in on a meeting (Week 21)
- Helped Tom with a flight (Week 28)

## 901904 - Deep-Sea Coral-Sponge Community Observatory

- Image correction for reflectance images, assembled RGB versions (Week 2)
- Revised motor interface board for two motors + minor fixes. New version ordered (Week 3)
- Motor interface board received; attempted to hook up and found some issue with connectors, fixed (Week 6)
- Looked at chassis wiring with Paul for new longer housing. Did some unwiring and some planning (Week 8)
- Drafted and printed new parts to hold fan and motor controllers (Week 8)
- Parts for chassis modification for longer house: iterations on fan holder and motor driver mounts (Week 11)
- Planned out spacing for chassis rewiring, ordered and printed some parts (Week 13)
- Chassis wiring for longer housing is finally finished, need to test (Week 14)
- Weekly meeting; checks on Harlequin for testing (Week 15)
- Test with Ventana went well (Week 16)
- Working on actuators. Fixed a bug causing comms delay, trying to implement new feature to goto position. This requires a series of commands and a two-point calibration that will be difficult to automate with the GUI. Need to discuss (Week 16)
- Modified electronics in backlight to improve LED performance. Reassembled chassis with great effort. (Week 16)

- Revisited motor controller manual and did a bunch of tests and calculations to figure out how it works. Two point calibration reduced to single point calibration and implemented into GUI (Week 17)
- Slightly reworked structure of motor controller driver in GUI to clean things up, implemented position polling while motor is moving (Week 17)
- Made an alternate version of GUI code with previous motor control structure, as using potentiometer as encoder seems to slow it down a lot (Week 18)
- Tests in tub for focus of different LEDs, field of view, depth of field, absorbance vs distance for two LEDs (Week 19)
- Carson cruise on Monday. System worked well enough but various comms issues involving back light and motor, possibly a ground loop (Week 20)
- Troubleshooting the coral hugger for comms issues when in water. Found a ground fault in backlight between insufficiently sealed debug connector, and circuit ground accidentally connected to chassis (Week 21)
- Data inventory for corals imaged in last deployment (Week 22)
- Looked through images and processed some for compilation and correction. Need to redo blanks for proper corrections. System is dropping frames which makes compilation difficult (Week 22)
- Updated code for new default values based on last deployment (Week 22)
- Coral hugger deployment went well, imaged many corals. Ground fault is back (Week 24)
- Working on code to interface with camera directly instead of using Vimba Viewer (Week 24)
- Continuing to work on some camera code (Week 25)
- Fixed up some of the camera interface code, but having troubles getting camera to connect to Harlequin (Week 26)
- Cataloged and sorted metadata for images and data from last cruise. Assembled multipage tiffs of the images we took for easier viewing and handover. (Week 27)

## 902305 - Event Detection Using the Sedimentation Event Sensor

- Meeting; measuring some battery voltages (Week 2)
- Tested batteries for next deployment. Drawdown under load is higher than expected, but after some convos w/ Paul M and Alana, think it's within reason considering losses through measurement setup (Week 3)
- Found the wrong model Aquaphox logger w/ Crissy, working on getting it exchanged (Week 8)
- Sent our incorrectly received oxygen logger back to Pyroscience (Week 11)
- Trying to figure out connector orders (Week 12)
- Weekly meetings; prepping for deployment in April (Week 13)
- Battery sphere conversion for standalone mode (Week 14)
- Changed batteries for modem. TT's modem somehow drained its batteries again, needs investigation (Week 14)
- Helping Crissy with O2 sensors (Week 14)

- In tank tests, SES modem flooded (pinched Oring?). Replaced with old SES modem (directional), with some older batteries installed. Overnight mission triggering TT seemed to work. (Week 15)
- Calibrated pH sensors (Week 15)
- Took a look at some schematics for ROVER (Week 21)
- Looked into Rover's fluorometer with Alana and got box of spare parts (Week 22)
- Looked into cameras for fluorocam, found one or two I think is good (Week 23)
- Reviewed draft of paper with KBB (Week 30)

## Out of Office

- 1/20/26: Photonics West
- 1/330/26: WFH / dr appointment
- 2/9/26: WFH / dr appointments
- 2/11/26: out with severe back pain.
- 2/19/26 - 3/2/26: OSM
- Rec com: LNY cookie break
- June 1: WFH
- June 2: out of office
- June 9: Carson
- May be periodically out of office in next few days due to crippling back pain.
- May be periodically out of office due to back pain
- July 8: WFH
- Took July 16-17 off

## Overhead

- Reccom 2026 budget (Week 2)
- Performance review writeup / form (Week 5)
- Rec com project update (Week 7)
- Rec com weekly meeting (Week 11)
- Rec com pi(e) day celebration (Week 12)
- Some work on project proposal abstract (Week 17)
- Proposal abstract (Week 18)
- Rec com meeting (Week 19)
- Proposal abstract presentation (Week 19)
- Rec com preparations for budget meeting (Week 20)
- Rec com budget planning meeting and follow up (Week 21)
- Computer is having lots of issues. Back and forth with IS, now reinstalled Windows and setting up computer again (Week 21)
- Hiring committee lunches for EEtech (Week 21)
- Rec com budget review meeting (Week 22)
- DOEST tour preparations (Week 26)
- Open House (Week 29)
- Rec com meeting; planning bike to work (Week 30)