

901205 - SURF Center

Week 51

1. Scott Jensen
 - a. Support with build of two new portable units
2. Brent Roman
 - a. Helping Nadia bring up a couple new ESP 3G portable units
 - b. Added convenient methods to derive wiring tables from software network configuration
 - c. Participated in call with Bad Wolf software consulting on REDI-net implementation

Week 50

1. Scott Jensen
 - a. Development of the vacuum actuated manipulator. A simple machined model of the concept has shown that there is significant holding force ample to remove a puck from the bottom of a stack.
2. Brent Roman
 - a. Trouble with NOAA GLERL recent deployments appears to be due to cell comms failure
 - i. My current theory is that a wire in the telebuoy tether broke.

Week 49

1. Scott Jensen
 - a. Fabricated prototype to test vacuum manipulation
 - b. Delivered materials to begin fabrication of wiring harness for portable instruments
2. Brent Roman
 - a. Helped Nadia re-install ESP into Saildrone Surveyor
 - b. Met with Birch, Gomes and Jensen to discuss ESP sampler project kickoff
 - c. Still working with NOAA GLERL to replicate their ESP comms failures

Week 48

1. Brent Roman
 - a. Participated in NOAA GLERL telecon to discuss how to support their 2G ESPs better

Week 46

1. Scott Jensen
 - a. Envisioned a different method for puck manipulation for the sampler. Lots of details but first tests look promising.
 - b. Firmware is in a state that some instrument level testing could begin.

Week 45

1. Brent Roman
 - a. Continued testing with updated ESP 3G firmware looks good
 - b. Preston discovered bug in Ruby event schedule caused by pressing Control-C
 - i. At a very inopportune time.
 - ii. Added Exception deferral to better manage this
 - c. Creating stress tester for the Ruby event scheduler

Week 44

1. Brent Roman
 - a. Meet with crew to discuss "Readi-Net"
 - b. Much of the trouble I'd been having with ESP gateway firmware rewrite appears to have been due to early serial interrupts from Linux host during gateway initialization. Latest version seems solid. Bill Ussler is set to test it.

Week 42

1. Scott Jensen
 - a. Continued progress on firmware for prototype sampler mechanism
2. Brent Roman
 - a. Looking into a couple odd, minor, transitory bugs that occurred during this season's deployments

Week 41

1. Brent Roman
 - a. Mad scramble to deploy ESPmv1 for CANON resulted in replacing most of its electronics
 - i. Trouble with its Intake valve early on has mysteriously corrected itself. We'll see...

Week 40

1. Brent Roman
 - a. Working with Preston and Jensen to diagnose myriad electrical problems on ESPmv1
 - i. Ended up replacing almost all boards
 - b. Found and fixed firmware bug preventing in situ updates when ≥ 5 elves on I2C bus.
 - i. I2C clock was being momentarily pulled up by elves as they booted.
 - c. Added facility to periodically pause sampling to retare pressure sensor
 - i. To cope with mv1 sensor's significant drift

Week 39

1. Scott Jensen
 - a. Diagnosed MV1 Failure and repaired faults
 - b. Found issue with hostgate board and implement fix
 - c. Assembled cylinder on next copy of sampler
 - d. RFID tag was working but now failed. Still trying to figure out the issue

Week 37

1. Scott Jensen
 - a. More coding on the brass board for the next prototype sampler
 - b. Preparations for the Wyoming recovery

Week 35

1. Scott Jensen
 - a. The constant acceleration routine is working
 - b. Command line function and ready for actual commands

Week 33

1. Scott Jensen
 - a. Good progress being made on bring-up of brass board.

- b. G3 Cartridge heater received, assembled and first article tested, awesome!
- c. Support of Alaska deployment
- d. Support of Wyoming deployment

Week 32

- 1. Scott Jensen
 - a. Working on brass board initial coding

Week 31

- 1. Scott Jensen
 - a. Brass board development

Week 30

- 1. Doug Pargett
 - a. Transferring G3 ESP build knowledge
 - b. Some final design mods to the new handoff mechanism for G3

Week 29

- 1. Scott Jensen
 - a. Deployed Jackson instruments
 - b. Working on electronics "brass board" for sampler
- 2. Doug Pargett
 - a. Knowledge transfer of ESP parts, models, and assembly methods.
 - b. Building bulkhead valve assembly
 - c. Revising drawings for outside shop
- 3. Brent Roman
 - a. Supporting Nadia in her efforts to measure the thermal properties of the new cartridges

Week 28

- 1. Doug Pargett
 - a. Starting assembly of G3 sub-assemblies.
 - b. Ordering housing caps
 - c. Getting some parts reworked.
- 2. Brent Roman
 - a. Supported Nadia in her ongoing struggle to make cartridge heating sufficiently uniform

Week 27

- 1. Doug Pargett
 - a. Started assembly of parts for G3 bench instruments
 - b. Ordering housing caps, material and finish options. Payment issue remains.

Week 26

- 1. Doug Pargett
 - a. Ordering housing caps for G3 ESP
 - b. Starting build of sub-assemblies

Week 25

1. Brent Roman
 - a. Finally Switched from 32-bit to 64-bit Linux
 - b. Choose embedded Open Source OS “RIOT” for new ESP Sampler development
 - c. Playing with STM32 Nucleo dev board
 - d. Convinced Function to remove the divot from the cartridge backing plate

Week 24

1. Scott Jensen
 - a. An iteration of the sampler electronics is being worked on to increase fidelity a little bit and possibly use a microcontroller that may actually be used.
 - b. Preparation for the Ohio recovery.
2. Doug Pargett
 - a. Making new drawings of housing caps for CNC machining.
3. Brent Roman
 - a. Working with Scott Jensen on microcontroller for new ESP sampler. Ordered a couple protoboards.
 - b. Evaluating various RTOS's for ESP sampler. Leaning towards RIOT

Week 23

1. Brent Roman
 - a. Finished last of the seven 2hr ESP training sessions via Zoom
 - b. Google disabled Gmail login for ESPs yesterday
 - i. Disabled user chosen passwords for 3rd-party apps
 - ii. Switched to one of their generated passwords

Week 22

1. Scott Jensen
 - a. Preparing sampler for demonstration and eventual fluidics work
 - b. Flow sensor options were investigated
2. Doug Pargett
 - a. Ordering parts and making drawings for CNC fabrication of the 10m housing end caps.

Week 21

1. Scott Jensen
 - a. Investigated ways to push the high level communications out to an external module.
 - b. Untangled carousel position codes and now have a means to position the carousel.
 - c.

Week 19

1. Scott Jensen
 - a. Work on Sample prototype continues. Moving axis with candidate stepper drive. Assembled carousel encoder and accuracy seems very reasonable.
 - b. Preparing drawings for third terrestrial housing.
2. Brent Roman
 - a. Had to revert to older ESP gateway firmware after discovering weird crash bug in version that includes ability to be reflashed in place. Bummer.

Week 18

1. Brent Roman
 - a. Frustrated by MBARI-Staff network's WiFi flakiness.

Week 17

1. Scott Jensen
 - a. Preparing drawings for third terrestrial housing build
 - b. A little help with saildrone
 - c. Sampler fluidics prototype
2. Doug Pargett
 - a. Rebuilding the MV1 ESP valve assembly to solve a combined leak and no-flow error.
 - b. Reassembling the MV3 ESP to prepare it for Saildrone deployment. Making a new bleach bottle holder and external valve assembly.
3. Brent Roman
 - a. 2 stepper motor connectors had ripped off Elf boards on ESP tower
 - i. disassembled, replaced damaged boards, updated all firmware

Week 16

1. Scott Jensen
 - a. Submitted next print round
 - b. Beginning build of third terrestrial housing
2. Doug Pargett
 - a. Calls and zoom meetings to support what I can remotely.
 - b. FEA of 10m housing redesign

Week 15

1. Doug Pargett
 - a. Making mods to 10m housing design
 - b. Disassembled MV3 instrument to modify existing 10m housing end cap
 - c. Inventoried more G3 ESP parts for coming build
 - d. Sent fab requests to shop for part machining.

Week 14

1. Doug Pargett
 - a. Repair of ESP MV1 oil diaphragm
 - b. Getting quotes, ordering parts
 - c. Checking inventory of parts in lab

Week 13

1. Scott Jensen
 - a. Received parts for sampler. Working on fine tuning and automating
 - b. Collecting quotes and placing orders
2. Doug Pargett
 - a. Function cartridge status meetings discussing leaking and operation issues with the latest demo versions.
 - b. Meetings with NOAA and Seatrak to discuss issues and possible locations to mount the ESP.
 - c. Ordering long lead parts for the 2022 G3 ESP build-o-rama!

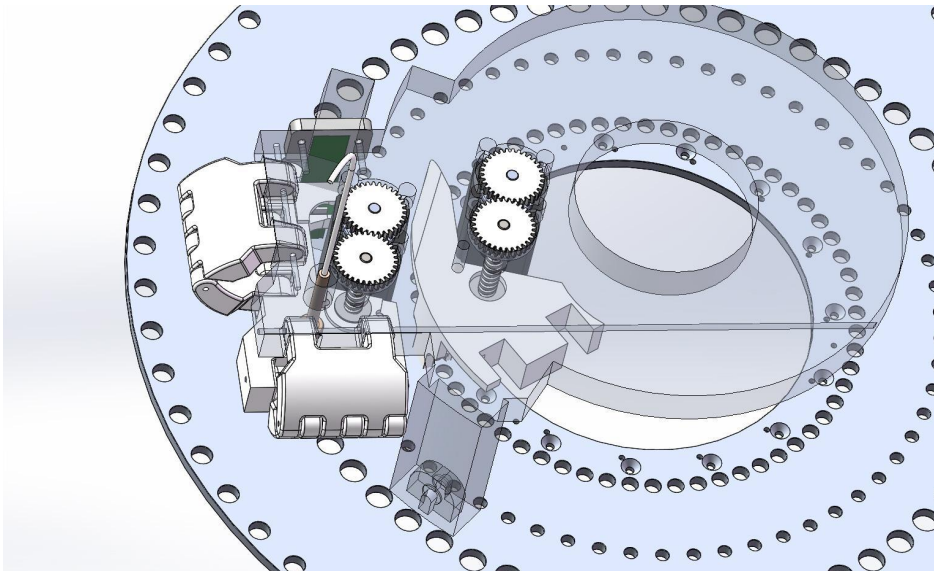
- d. Investigating external valves for the G3 ESP and how to get that installed on the existing system quickly for the Saildrone deployment.
- 3. Brent Roman
 - a. Working toward enabling in-situ updates of ESP 3G's STM32 gateway microcontroller
 - i. Goal is to allow complete remote firmware updates of ESP
 - b. ESP 2G training course to start in mid-May
 - c. Rescued another old MacBook Pro from the dumpster

Week 12

- 1. Scott Jensen
 - a. Submitted drawings, ordered parts and begin fabricating parts for first build
- 2. Brent Roman
 - a. Added feature where SPR stays "on" for 10 minutes after any protocol error for Ussler
 - b. After numerous position errors, determined that Honu had been reassembled
 - i. Worked with Ussler to tweak syringe positions for the new build

Week 11

- 1. Scott Jensen
 - a. Beginning to finalize first prototype for fabrication
- 2. Doug Pargett
 - a. Redesigning actuators (for Function cartridges) to have greater throw and fit inside the limited space. Using shorter X208 stepper motors and Sarrus linear motion linkages. Currently iterating the linkage geometry for full range of motion but also to not interfere with other parts. About 60% design stage.



- b.
- c. Organizing and ordering parts for 2022 build of ESP instruments and equipment.

Week 10

- 1. Scott Jensen
 - a. Sample design continues with a few details worked out
- 2. Brent Roman
 - a. Added ability to track fluids into and out of 2G pucks
 - b. Added ability to simulate pressure in fluid containers
 - c. Worked with Kevan to test fluid tracking against WCR protocol on ESPwaldo

Week 9

1. Scott Jensen
 - a. Sampler design, theory of operation
2. Doug Pargett
 - a. Redesigning the handoff mechanism for G3 ESP.

Week 8

1. Scott Jensen
 - a. Struggling with some design decisions and their trade-offs.
2. Brent Roman
 - a. Completed new fluid volume tracking module for ESP 2G
 - i. Working with science types to verify estimate volumes are accurate

Week 7

1. Doug Pargett
 - a. Working on a bill of materials for the next ESP build
2. Brent Roman
 - a. Adding reagent volume tracking to core ESP Ruby software
 - b. Participated in initial telecon regarding ESPs on IBM's "Mayflower" autonomous boat

Week 6

1. Scott Jensen
 - a. Continued support of sampling development
2. Brent Roman
 - a. Working on code to track volume of reagents consumed and waste produced
 - i. Implemented method returning reagent bag connected to specified syringe

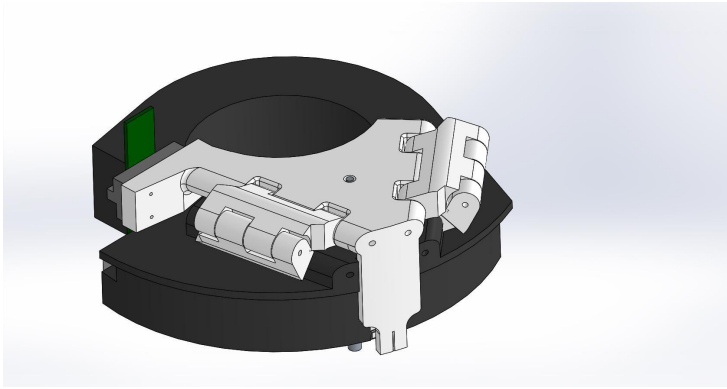
Week 5

1. Scott Jensen
 - a. ESP development
2. Doug Pargett
 - a. Ordered new 3d printed toroid valve rings.
 - b. Documenting Bill of Materials for next ESP builds
 - c. Completed redesign of the linkage for the G3 valve actuator, had to modify to reroute cables and include an aluminum motor mount plate.
 - d. Inspected latest cartridge parts
 - e. Inspected SeaTrac vehicle for installing a G3 ESP into.
3. Brent Roman
 - a. Found and fixed old bug in 3G ESP firmware that was causing it to crash occasionally after recent code simplification.
 - i. Bug was causing a thread to be woken prematurely.
 - b. Helped Nadia test and debug Gripper issues on ESPbetty.
 - c. Working on adding the ability to track reagent use to better estimate volumes required for 2G missions.

Week 4

1. Doug Pargett
 - a. Thermal FEA of latest Function design. Estimating the power split to better balance the temperature of the filter.

- b. Redesigning the linkage for the G3 valve actuator to clear interferences and maintain linear motion.



- c.
- d. Reviewing G3 pump calibration process

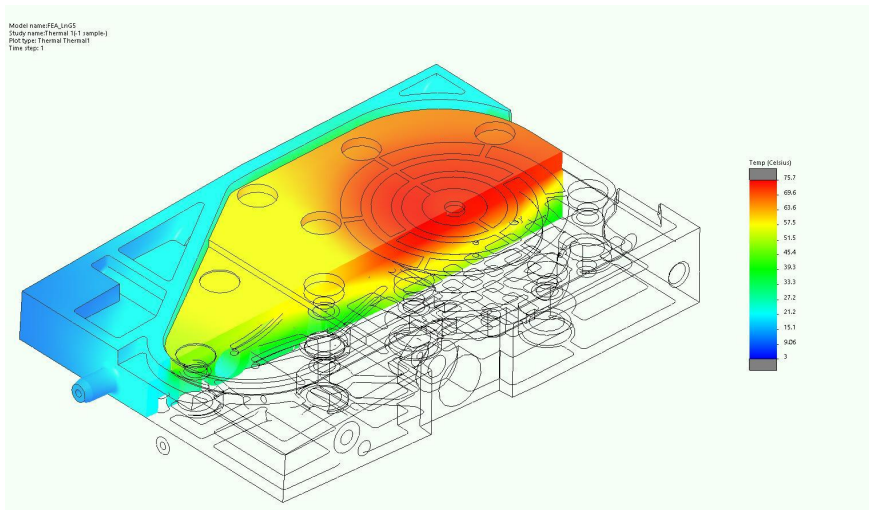
2. Brent Roman

- a. Supporting Nadia in her efforts to bring up ESPhonu, ESPbetty and ESPwaldo
- b. Testing up updated ESP3G firmware looked good, until I discovered a flakey crash bug :-(
 - i. Now appears that was caused by assuming chips had 2x the RAM they actually do.
 - ii. Testing continues ...
 - iii. New firmware framework allows for remote code updates.

Week 3

1. Doug Pargett

- a. Coordinating work in machine shop and ordering new parts.
- b. Lots of FEA work for the new cartridges.



c.

2. Brent Roman

- a. Rewrote ESP 3G “core” Elf microcontroller firmware to allow remote reflashing.
- b. Helping with initial cleaning and chemistry tests on ESPbetty.
- c. Participating in evaluating thermal design tradeoffs for “Function” 3G cartridges

Week 2

1. Scott Jensen

- a. The puck heater is being redesigned and working on a means to layout the heater elements in a circular pattern

2. Doug Pargett

- a. Running thermal and pressure FEA models of new cartridge with the mods needed for injection molding.

Week 1

1. Doug Pargett
 - a. Disassembled the bad toroid valve ring and delivered it to the shop as a test article for machining the new one.
 - b. Working (from home) on the design for the new toroid valve actuator to fit in the reduced space but still use the same motor and similar mechanism.