# 600034 - Precision Control Technologies for ROVs and AUVs

## Week 51

1. Kent Headley
    a. Though the OI toolsled cruise was canceled, a lot of progress was made on Terrain Relative Navigation (TRN) for Ventana. The code developed earlier this year was refactored to be more flexible and scalable, and to address a number of bugs exposed during analysis of data from May and October cruises. In addition, new code was developed to use bathymetry from the OI toolsled,which are mounted on a rotating platform. This potentially enables using TRN on vertical surfaces with sufficient maps, e.g. canyon walls, icebergs, etc.
    b. Possibly reported earlier: mbtrnpp (TRN with multibeam filtering) is being integrated with the Dorado fast simulator. This was demonstrated recently. mbtrnpp is a TRN extension for MB-System, used with Dorado and WHOI's Sentry vehicle. There is still some integration cleanup pending.

## Week 49

1. Kent Headley
    a. Demonstrated TRN sim integration w/ Rich, Rob

## Week 48

1. Kent Headley
    a. Refactoring ROV TRN code for Dec cruise; feature complete, testing/debugging
    b. Working w/ Rob, Rich to integrate MB-System TRN beam filtering with Dorado simulator. Got this running for the first time this week. Testing.

## Week 46

1. Kent Headley
    a. Refactoring ROV TRN to allow arbitrary number of TRN instances and multiple bathy sources
    b. Updating for ocean imaging toolsled (with multiple bathy inputs)

## Week 44

1. Kent Headley
    a. Working with Rob and Rich to integrate TRN into the dorado simulator. Set up a VM with MB-System that Rob can use for testing. Chatted with Rich about TRN process synchronization in the simulator loop.
    b. Working on ROV TRN processing for Dec ocean imaging cruise

## Week 41

1. Kent Headley
    a. Working w/ Rob M to integrate mbtrnpp into Dorado simulation. This week, we're using a test utility I wrote to stand in for mbtrnpp so that the simulator TRN pub/sub components can be tested w/o mbtrnpp installed.

## Week 38

1. Kent Headley

    a. Completed pub/sub components for simulator, pending integration w/ Rob

## Week 37

1. Kent Headley
    a. Working with Rob to integrate mbtrnpp filtering/TRN processing with Dorado simulation. I've been developing some new C++ TRN client components for QNX, and working on making them portable to OSX/linux. The integration is progressing, and we are currently working out synchronization design to enable repeatable/deterministic simulation behavior; the two systems are not coupled/synchronized in real time, but must be in discrete time to ensure deterministic results.

## Week 34

1. Kent Headley
    a. Rob and I have made some good progress on Dorado TRN/fastsim integration. The simulator is publishing empty beam data, which is being picked up by a test client. I've made some updates to the test client to fix bugs and add features. Helping Rob with various network and software issues, and MB-System installation as needed so we can test more of the TRN path.

## Week 33

1. Rob McEwen
    a. Integrating Kent's SimMB1Svr into Simulator.cc. Copied the guts of SimulatedMbTrnRecv.cc into Simulator::multibeam(). I'm working through the bugs now, expect to be done tomorrow. I may re-architect this later because this approach should work, but is messy.

## Week 32

1. Kent Headley
    a. Chatting w/ Rob re TRN integration with Dorado simulation
    b. Wrapping up a pull request
2. Rob McEwen
    a. Integrating Kent's SimMB1Svr with Simulator.cc

## Week 28

1. Rich Henthorn
    a. Proposal work
    b. LRAUV sim with Rock
    c. Refining CoNav - renaming member functions and variables

## Week 27

1. Kent Headley
    a. Testing new input modules for ROV TRN
    b. Developing design for adapting ROV TRN code for OI toolsled (with dynamic acoustic measurement reference frames)
2. Rich Henthorn
    a. CoNav refinement and testing
    b. Some 2023 proposal work

## Week 26

1. Kent Headley

    a. Working on TRN code for OI.
2. Rich Henthorn
    a. Refining CoNav source code
    b. Meeting w/Rock to discuss 2023 proposal

## Week 25

1. Kent Headley
    a. Roughed in LCM input modules for messages used by the ROV simulation and Ocean Imaging tool sled. Next step is to refine the processing and get TRN running with the ROV simulator; Rob M is organizing a meeting this week.
    b. Added Octree utility and other updates and bugfixes to libtrnav
    c. Working on updates to help with packaging/installing TRN
2. Rich Henthorn
    a. CoNav dev

## Week 24

1. Kent Headley
    a. ROV TRN testing
2. Rich Henthorn
    a. Some TRN investigation

## Week 23

1. Kent Headley
    a. Working to resolve ROV TRN issues
2. Rich Henthorn
    a. TRN Replay for DeltaT data in CSV format

## Week 21

1. Kent Headley
    a. Working out reference frame issues for TRN inputs; easy to say, very time consuming to do

## Week 20

1. Kent Headley
    a. Working through ROV TRN cruise data with Steve et al to test software and resolve issues.

## Week 19

1. Kent Headley
    a. Finished initial round of post-cruise updates to ROV TRN middleware
    b. Produced some test data for validation
    c. Added new logging/playback features to TRN core (pending review)
2. Rich Henthorn
    a. TRN for ROV and LRAUV

## Week 18

1. Kent Headley
    a. Tested ROV TRN software on dive at Portuguese Ledge with Steve Rock, Mike Risi, Dave Caress and Giancarlo Troni. The primary cruise mission was to test control system software and collect a data set

that could be used to continue developing a TRN application for the ROV. Despite marginal weather, the Carson/Ventana crews were able to give us more hours than expected, given the forecast, enabling us to reach our objectives. I was able to run TRN software during the dive; data flow and first long operation with real data went well. TRN results were encouraging and helped to expose some issues that would've been hard to find on shore, and I'm still sifting through data to resolve various TRN pipeline issues; the data set collected should enable this. Mike's control tests were also successful.

2. Rich Henthorn
    a. Reviewing results from Feb TRN runs on LRAUV at PL

## Week 17

1. Rich Henthorn
    a. Resuming CoNav development
        i. Wrapped up first cut at data logging
        ii. Began next phase: config file, refining, documentation
    b. Combing through TRN syslog files to detect convergence
        i. No network connection to BSC
2. Mike Risi
    a. Working with Rob M. on TRN simulations of Portuguese Ledge

## Week 16

1. Kent Headley
    a. Ran pre-cruise data plumbing checks with Mike Risi and DJ Osborn
    b. Wrote initial implementation of beam transformation
    c. Testing and debugging ROV TRN application code
2. Rich Henthorn
    a. Integrating Delta T measurements into TRN Replay
3. Rob McEwen
    a. Preparing to add Trn to the ROV simulator.

## Week 15

1. Rich Henthorn
    a. TRN Replay for DeltaT
2. Mike Risi
    a. Created rov-control interface to OI-Sim for testing
    b. Completed rov-ventana-intfc for ROV TRN testing in May

## Week 14

1. Rob McEwen
    a. Talking with S. Rock about an ROV simulation.

## Week 13

1. Kent Headley
    a. Met with Rob to talk about integrating TRN with Dorado simulation. Sent some sample code for the MB1 record server API.
2. Rich Henthorn
    a. Dorado TRN driver rework

## Week 12

1. Kent Headley
    a. Wrote an MB1 record server for embedding in the Dorado simulation code. This is part of enabling the integration of MB-System real-time bathymetry filtering and TRN with the Dorado simulation.
    b. Updates/maintenance and synchronization between MB-System and libraries libtrnav and mframe
2. Rich Henthorn
    a. Dorado mbtrnpp simulation component
3. Rob McEwen
    a. Reworking my diagrams to incorporate mbTrnUpd8 and mbtrnpp.
    b. Planning to add lastLat/Lon feature to WaypointDepth as discussed with Dave c.
    c. Planning to adjust offset code to retain its value when disableTrn  is set.

## Week 11

1. Kent Headley
    a. Working with Rob on design and implementation of Dorado code for integrating MB-System real-time pre-processing (mbtrnpp) into the Dorado simulation loop

## Week 10

1. Rob McEwen
    a. Participated in Caress TRN sea days.
    b. Working on a few code improvements identified during the dive.
2. Mike Risi
    a. Finishing off rov-control command set

## Week 9

1. Rich Henthorn
    a. Dorado TRN prep and testing on Carson
    b. More cleaning and polishing seems likely before June mapping deployment
2. Rob McEwen
    a. Participating in Dave's Axial test dives at Portuguese Ledge.  The objective is to test mbtrnpp and Mbtrnupd8 and the new Resons, on both Mappers.

## Week 8

1. Rich Henthorn
    a. Prep for Carson TRN cruise
2. Mike Risi
    a. Continuing moving rov-control over to PCF

## Week 7

1. Ben Raanan
    a. Tethys sea trial at Portuguese Ledge with TRN running on the backseat
2. Mike Risi
    a. Moved rov-control command line UI to ZMQ

## Week 6

1. Rich Henthorn
    a. Adding to and improving data logging

    b. Reviewing latest TRN logs

## Week 5

1. Rich Henthorn
    a. Integrating CoNav DAT measurement cleaning into application
    b. CoNav class data logging
2. Mike Risi
    a. Continuing port of rov-control to PCF

## Week 4

1. Rich Henthorn
    a. CoNav syslogging
    b. CoNav development

## Week 3

1. Rich Henthorn
    a. Finishing touches on data-logging
    b. Computation debugging
    c. Syslogging

## Week 2

1. Rich Henthorn
    a. CoNav data logging - almost finished
2. Mike Risi
    a. Geting rov-control to work with new PCF code

## Week 1

1. Kent Headley
    a. Code review for lrauv cooperative navigation that Rich is implementing
2. Rich Henthorn
    a. CoNav testing and data logging
3. Mike Risi
    a. Looking into blob tracker configuration for Molly Z. at ARL.