

Akshay Hinduja Sorted By Project

901809 - Deep Sea Bioinspiration

- Finished maintenance and clean up of titanCAM repo (Week 1)
- Completed new feature requests (Week 1)
- Looked up cloning for CT BSP for Jetson Orin, seems a bit involved and requires opening up the bulkhead, will wait for next week. (Week 1)
- Fixed issues with allied cameras on CTI boards. First board was defective/damaged hence probably why there were issues with it. Unfortunately not covered by warranty. (Week 2)
- Change code to access camera feeds. Currently using V4L-ctl, but not able to consistently set parameters for fps with it. Explore the use of Vimba Python library instead. (Week 2)
- Looking into VimbaPy to get better control over camera config setting (Week 3)
- V4L system has issues where sometime settings are not registered as expected on startup (Week 3)
- Resume writing Triton drivers using VmbPy as backbone instead of GenICAM. Will offer more control over settings. (Week 20)
- Go through documentation on Orin setup again to prepare deployment ready version. (Week 20)
- Resume writing VmbPY based driver for Triton. (Week 21)
- Worked on Multicam driver for allied vision CSI/2 MIPI cameras. (Week 22)
- Migrated to VmbPy backend to have better control over camera settings. (Week 22)
- Driver can now run at max frame rate and resolution (Week 22)
- Modularized driver to choose individual settings for each camera parameters and saving (Week 22)
- Wrote profiles for setting + custom profiles (Week 22)
- Working on video streaming (Week 22)
- Alpha version for AVT multicam driver complete, tested with external triggering (Week 23)
- Working on beta version which modularizes the framework and will add config changing and video streaming features (Week 23)
- Refactored triton camera driver to be more modular (Week 25)
- Fixed bugs with saving images in different formats (Week 25)
- Added offset configuration and set cropping for 2K res for all 3 cameras (Week 25)
- Added video recording in h264 and h265. Files are chunked as per config (Week 25)
- Halfway through setting up rtsp streaming of video (Week 25)
- TODO: Finish RTSP streaming, add lcm broadcast (Week 25)
- Implementation of LCM broadcasting into Triton camera driver (Week 27)
- Test lcm broadcasting (Week 28)

- Implement bug fixes on thread safe shutdown (Week 28)
- Intern support for setting up detection pipeline (Week 28)
- Meet with Joost to go over DeepPIV objectives (Week 30)
- Start initial research on video stabilization and image denoising pipelines (Week 30)
- Literature review for DeepPIV ML based improvements (Week 32)
- Prep work for ML@MBARI workshop (Week 32)
- Prepare plan for testing pipelines for OceanShot project (Week 33)
- Begin testing video stabilization models for DeepPIV pipeline (Week 34)
- Testing deepPIV data on GaVS pipeline which involved (Week 36)
 - Setting up COLMAP and GLOMAP (Week 36)
 - Setup SAM for foreground masking (Week 36)
 - Setup ProPainter (Week 36)
- Tested with GaVS sample dataset (Week 36)
- Testing with DeepPIV data, running through entire pipeline to generate the specific dataset (Week 36)
- Literature review on other options (Week 36)
- Met with CVision for project update meeting and to touch base on further development on OceanShot 3D pipeline (Week 37)
- Identified approach for image stabilization, installed several SOTA models to test with DeepPIV data (Week 37)
 - Concluded that no current SOTA model works for the kind of data we have (Week 37)
 - Proposed using segmentation models with fixed aspect ratio framing works 80% (Week 37)
- Identified potential approach for data denoising and masking for 3D slicer (Week 37)
 - Testing Diffusion models for automated image masking (Week 37)
 - Testing with a small dataset to train model on DeepPIV data (Week 37)
- Waiting on CVision contract to resume work on OceanShot project for DeepPIV (Week 45)
- Meetings with the team to discuss next plans for OceanShot project milestones and approach. (Week 47)
- Preparations for kick-off meeting with CVision for DeepPIV pipeline automation (Week 49)
- Meetings with CVision to kickstart Oceanshot bigelow grant work (Week 50)
- Sync up and attend OceanShot 3d meetings with CVision, prep work for the same (Week 51)

902101 - LRAUV Technology Development

- Nc4 log reader looked at and extracted relevant information, Will contact Brian to meet to see where these data fields can be fed into simulator. (Week 3)
- Shift priority to LRAUV (Week 4)
- Look through ExternalSimulator class (Week 4)
- Plan for nc4 data extraction and conversion to gazebo messages for sim (Week 4)
- Deep dive into ExternalSimGazebo class for LRAUV-applications (Week 5)

- Understand code flow (Week 5)
- Wrote new class to read nc4 log files, and translate to gazebo messages (Week 5)
- Check logic flow manually and then run and debug (Week 5)
- Meet with John Ryan and LRAUV team for IC listen hydrophone integration (Week 6)
- Meet with brian to troubleshoot data stream errors in gazebo simulator (Week 6)
- Finished writing nc4 to gazebo conversion tool pending test and integration (Week 6)
- Finding simulator bug in LRAUV application (Week 7)
- Causes some data to not be transferred through from gazebo from csv (Week 7)
- Continue working on finding log replay bug (Week 8)
- Continue finding bug in lrauv application during sim (Week 9)
- Working on developing a log playback visualizer to replay vehicle dynamics (Week 45)
- Setup log reader which extracts variable values from nc4 files (Week 45)
- Using tethysdataviz repo to try plug in visualization in same WebGL app. Animation causes crashes in browser window, will pivot to standalone viewer (Week 45)
- Setup simple orientation animation viewer using matplotlib, will use as backbone for more intricate animation in 6DOF (Week 45)
- Have v1 matplotlib based simulated LRAUV log playback ready. Downsides are slower performance, but good for diagnosing vehicle issues, and observing state behaviour visually (Week 46)
- Working on quick tangential option of using holoocean simulator using Unreal Engine for higher fidelity animations (Week 46)
- Diving into LRAUV codebase to integrate with gazebo (Week 46)
- Finished matplotlib based visualizer (Week 47)
- Tried out HoloOcean and Unreal Engine based simulator for log playback, ran into physics issues as velocity estimates from LRAUV were incomplete and cause the simulator to show no pitch or yaw motions. (Week 47)
- Started working on RVIZ and ROS2 playback. Finished stage 1, works well with faster than realtime playback achieved. Working on making improvements to visuals, and playback control. Facing random issue of RVIZ flickering, seems to be internal QT related bug. (Week 47)
- Plan to wrap up by end of month (Week 47)
- Improvements to tethystales - lrauv log visualization. (Week 48)
 - Added panel for playback, scrubbing and log selection (Week 48)
 - Added panel to visualize attitude (Week 48)
 - Added realistic mesh for lrauv from osrf files (Week 48)
- Working on simplifying package setup for end user (Week 48)
- Spoke with Mike about possibly adding Monterey Bay geotiff to rviz map (Week 48)
- Finished v1.0 of tethystales, pending feedback on install and runtime from users (Week 49)
- Meet with LRAUV team to scope next iteration requirements (Week 49)
- Finished v1.0 of tethystales, completing initial requirements from LRAUV dev team (Week 50)
- tagged in mbari-org github (Week 50)
- Pushed to dockerhub mbari/tethystales (Week 50)

- Tested on Irauv lab computers, pending announcement for broader mbari users (Week 50)
- Analyze potential issue with frame of reference assumptions, looks ok and normal (Week 51)

902204 - Scalable Robotics

- Cleaned up uncertainty estimation and base values for factor graph in SBN (Week 1)
- Fixed localization matching with better method from above and verified performance is unaffected (Week 1)
- Made modifications to loop closures, pending test (Week 1)
- Beta development of Norbit driver in C++. Expected to be functionally same as alpha driver, but will get rid of some bloat, and experience speed improvements due to c++ arch. Expected to be tested by Thursday 01/09 in time for first cruise of January in week of 01/13 (Week 2)
- Finished Norbit beta driver development to test on cruise days Jan 14 and 15 2025 (Week 3)
- Changes from alpha: Streamlined, and removed redundant features from alpha driver (Week 3)
- Added verbose/debug modes to both drivers to limit console prints (Week 3)
- Cruise days Jan 14/15 (Week 3)
- Beta driver development finished (Week 4)
- Background/legacy research on s7k conversion tool (Week 4)
- Go through Ocean Imaging repositories on reson and 7kcenter (Week 4)
- Norbit c++ driver documentation writeup (Week 5)
- Met Giancarlo to look at next steps for SLAM and localization using FLS and WBMS (Week 6)
- Attended mapping meeting with Caress and Troni group for unifying mapping system for MBARI (Week 6)
- Met with Mauro to go over S7K conversion tool, and discuss with Dave (Week 7)
- Get frontend lcm log reader reader and converge WBMS and Navigation data together (Week 7)
- Start formal exploration of wbms based relocalization module to supplement visual SLAM and usbl readings (Week 7)
- LCM→7K translation. Wrote subscriber to take in relevant lcm topics (Week 8)
- Decode raw binary data to get required data fields (Week 8)
- Current work on repacking to 7k datagrams (Week 8)
- Finished front end lcm subscriber for norbit + nav data (Week 9)
- Wrote container classes for s7k datagram (Week 9)
- Work on integrating front end with s7k writing (Week 9)
- Debug and test LCM to S7K tool (Week 10)
- Scoping meeting for Norbit WBMS localization (Week 10)
- Setup timeline analysis for Localization (Week 10)
- Working on s7k conversion tool for Norbit WBMS (Week 13)
- Met Dave to understand more details on MB system requirements (Week 13)

- Focusing on record 7027 to reach minimal viable product to test in tank (Week 13)
- Write module to tie in nav messages into 7027 (Week 13)
- Familiarize with mutlibeam submap module. (Week 13)
- Norbit Driver: Change socket read behavior to non-blocking, update socket reads to run on independent threads instead of single. Able to achieve lcm message rate parity with norbit ping rate. (Week 14)
- Norbit sk7 translator: Integrated navigation information into bathy records through nearest neighbor search based on timestamp. Changed log reading behaviour to replicate live stream instead of earlier possibly more efficient way of using dequeues per message type. This allows better nearest neighbour search for nav - wbms integration. (Week 14)
- BlueBoat: Updated driver, wrote service scripts for gui and config mode (Week 14)
- Finish up changes to norbit driver for binary read and write (Week 15)
- Work on s7k translator (Week 15)
- Start MBES localization module work. Met with Sebastian to discuss action plan steps on 04/09/25 (Week 15)
- Finished bug fixes and updates to norbit lcm driver, now records in binary without lcm as option (Week 16)
- Finished bathy translation in s7k translator, will finish water column and snippet by EOW (Week 16)
- Test surface vehicle operations with blueboat on Thursday April 17 (Week 16)
- Continued development of S7k translator tool, last missing pieces are Water Column and Snippet data (Week 19)
- Assisted in dock deployment of blueboat and collected data (Week 19)
- Processed RTK data to repackage as LCM and combine logs to make complete logs with all required message types as GPS fix messages from RTK were missing (Week 19)
- Fixed a bug causing S7k logs to have some missing data. (Week 19)
- Converted two logs with bathy + nav data to provide to Aaron Micallef before next Tuesday deployment. (Week 19)
- Added an interactive console client to update norbit settings in real time without needing to restart driver. (Week 20)
- Added GUI to control norbit settings, using the console client as the backbone. GUI also contains a low bandwidth snapshot mode for taking snaps of bathymetry plots for debugging and viewing sonar data. (Week 20)
- Water tank testing for new changes, investigate why soundings were poor in last paragon off shore test. Possibly loose cable covering Norbit. (Week 20)
- Changes made to 7k-writer, asv branch created for use with blueboat lcm channels to generate s7k records from seismosands survey (Week 21)
- Updates to norbit driver, reverting back to vehicle frame for bathy messages (Week 21)
- Worked on MBES localization system. (Week 22)
- Finished first module + unit tests for database management and submap query system based on location. This covers databases for both reference and query maps. (Week 22)

- Working on registration system + pose graph backend next. (Week 22)
- Working on MBES localization framework. Finished modules on database management, submap matching and registration management. (Week 23)
- Working on backend pose graph optimization framework (Week 23)
- Finished the Pose Graph manager module (Week 25)
- Finished integration script to run localization (Week 25)
- Testing on parameter tuning (Week 25)
- Added visualization of trajectories (Week 25)
- Working on fixing bugs with ground truth trajectories (Week 25)
- TODO: Final map visualization, lcm channel broadcast, test with larger datasets, MBSys^{tem}→DB (Week 25)
- Testing Sonar based navigation stack (Week 26)
 - Improved matching metrics with Hausdorff distance implemented (Week 26)
 - Wrote new lcm publisher for state estimate (Week 26)
- Wrote MB system point cloud to database script (Week 26)
- Bug fixes to Norbit driver + standalone gui (Week 26)
- Cruise preparations for Thursday 26th June (Week 26)
- Testing localization system with older logs from LASS, (Week 27)
- Testing new reference database generated from MBSys^{tem} grids (Week 27)
- Continue with setup of GIM tool for Arctic Sled data from 26 June, 2025 (Week 28)
- Intern support (Week 28)
- Meet Dave and Jenny to investigate issues with seismo sands survey s7k data (Week 28)
- Worked with Sebastian to get the GIM robotics front end submap generator (Week 30)
- Searched for MBSys^{tem} grids to test with as reference grids (Week 30)
- Wrote scripts to generate and assess databases made from grd file generated pointclouds (Week 30)
- Generated s7k records for recent BlueBoat data to test for heave data (Week 30)
- Made changes to 7k-writer's snippet record generator based on Norbit feedback, however their feedback seems to conflict with data (Week 30)
- Feature adds and deployment readiness for sen-norbit, 7k-writer in preparation of arctic cruise (Week 32)
- Improvements to mbes_localization pipeline for UTM coordinate reference frames (Week 32)
- Continue improvement on mbes_localization system using older data, might be not ideal due to possibly poor overlap. (Week 32)
- Improvements to reference_preprocess submodule to move from mb-grid → submap database (Week 32)
- Prepare and push deployment ready versions of sen_norbit, 7k_writer, and mbes_localization (Week 33)
- Facilitate technology knowledge transfer for team travelling to arctic cruise (Week 33)
- Update Atuncita with latest versions, verify modules work (Week 33)
- Update readmes and write guides for offshore team (Week 33)
- Finished technology transfer before Arctic cruise deployment (Week 34)

- Working on LCM→FBT converter addition to 7k-writer. (Week 34)
- Meet with Johann and Michael to migrate ASV framework to single user system (Week 45)
- Update drivers on ASV to latest versions and test. (Week 45)
- Worked with Johann to checkout latest versions of norbit driver for ASV operations, setup scripts to enable single operator modes (Week 46)
- Random issue with image display is unresolved, perhaps a change in system packages caused a break? Was working a day before (Week 46)
- Help Johann with dock survey on Thursday 11/13 (Week 46)
- Support ASV deployment for dock surveys (Week 47)
- Found hardware issues with Norbit dropping out frequently. Cause currently unknown (Week 47)
- Driver remains to work as expected (Week 47)
- Tie up loose ends on config read/write between driver, gui config client and console config client (Week 48)
- Assist survey of dock (Week 48)
- Assist in lcm log conversion to s7k (Week 48)
- Test data collected last week for harbor surveys (Week 49)
- Resume Sonar based navigation development (Week 49)
- Refined and finished getting data for ASV surveys of MBARI dock, assist with data verification (Week 50)
- Getting back into Sonar based navigation, looking at data from sponge ridge for localization and loop closure detection (Week 50)
- Assist team with s7k conversion of harbor survey lcm-logs (Week 51)
- Improvements made to 7k-writer and mbs-tools yaml file read for sonar settings (Week 51)
- Converted data to s7k to meet EOW deadline for DMO using 7k-writer, and fixed bugs in lcm-logs from 11/26 (Week 51)
- Resume ironing out sonar based navigation troubles with loop closure detection and optimization. (Week 51)

Out of Office

- 12/31 1:30-4:30, dropping family off at SFO
- WFH Feb 27 and Feb 28
- Tue 04/08/2025- Sick leave
- Flying to Pittsburgh for commencement Wed 05/07/2025 and return on 05/12/2025. Will work remotely when possible.
- July 3 - July 8 Vacation
- July 3 - July 7 Vacation
- Thursday 11/20 WFH apart from 3:30-5:30 daughters appointments @Stanford
- Monday 11/24 WFH apart from 8:30-10:30 am for daughters appointments @Stanford

Out of Office Offshore Jan 14/15

Out of Office WFH 01/08

Out of Office WFH Feb 13, Feb 14 Off

Out of Office WFH Feb 6

Out of Office WFH Jan 23

Out of Office WFH Jan 31

Overhead

- Performance review training (view recorded meeting) (Week 3)
- ML@MBARI-workshop (Week 32)
- Intern support (Week 33)
- Attended project management workshop (Week 37)
- Trailant training (Week 46)
- Project updates (Week 46)