Akshay Hinduja Sorted By Project

901809 - Deep Sea Bioinspiration

- Meeting with CVision, Joost and Emily to track progress for DeepPIV pipeline automation (Week 2)
- Look at NNInteractive plugin in Slicer, tryout with deepPIV data (Week 2)
- Set up and run NNInteractive in Slicer 3D to determine suitability of the method for segmentation tasks (Week 3)
- Conclusion is that it can be great manual segmentation tool as long as binary masks are good. (Week 3)
- Look at SAM3 suitability towards segmentation (Week 3)
- OceanShot Bigelow Meetings (Week 4)
- Prepare tool to use SAM3 for segmentation with presegmented image prompts (Week 4)
- Meetings for lab, deepPIV and dev (Week 5)
- Testing Sam3 for deepPIV image segmentation (Week 5)
- Looking at using pre-available masks as prompts to segment similar organism scans (Week 5)
- Go through CVision implementation (Week 5)
- Tie up meetings with CVision to end first stage (Week 6)
- Verify and demo deliverables from contractors (Week 6)
- Found areas for improvements on intermediary outputs to help modularize efforts to pickup from the middle. (Week 6)
- Asynchronous meetings with BiL team to discuss next steps in March (Week 6)
- Meeting with CVision, get upto speed on current status (Week 11)
- Review of latest version pushed to oceanshot repo by CVision (Week 12)
- Attend meetings for deployable AI/LRAUV work with Bioinspiration lab + Ivan's lab (Week 12)
- Meeting with Brian from CVision to go over final changes as this stage of collaboration ends (Week 13)
- Bug fixes on TritonCAM (Week 14)
- Added new information logging for frames processed per camera to get understanding of how the cameras worked and basic settings after each run (Week 14)
- New lrauv-backseat-helper branch for sending INFO and FAULT syslogs to improve logging on dash to understand if systems are working properly at comms events (Week 14)
- Modifications to triton-detection to send frame counts to backseat helper. (Week 14)
- Troubleshooting camera connection issues with Paul (Week 14)

- TritonCAM, triton-detection and lrauv-backseat communication debugging. (Week 15)
    - “Important” messages relay frames processed, but inexplicably don’t relay counts (Week 15)
    - Would need to setup pipeline to test offline and offshore (Week 15)
- DeepPIV support for setting up pipeline on lab computers, and meeting with CVision (Week 15)
- Debug archiving issue with tritonCAM. Seems to delete everything which should not be happening. (Week 16)
- Setup test bench to run on desk and observe behaviours. (Week 16)
- TritonCAM backaseat computer backup system being prepared (Week 17)
- Also making a new version with latest deepstream version with intent to update all eventually (Week 17)
- LRAUV-DSBI meeting (Week 18)
- Setup Orin clone for TritonCAM. Working well. (Week 18)
- Testing archival code to find delete bug seen in deployed version, but none found (Week 18)
- Made improvements and bugfixes (Week 18)
- Wrote lcm logger to use instead of image saving and archival. (Week 18)
- Push some updates to Triton and test (Week 18)
- Lab meeting (Week 19)
- Resume setup of backup orin for Deployable AI (Week 19)
- TritonCAM improvements and backseat computer back up creation (Week 20)
- Intern meeting (Week 20)
- Deployable AI meeting (Week 20)
- Dev meeting (Week 20)
- Meetings (Week 21)
- Improved lcm mjpeg support, modified helper scripts to accept mjpeg lcm messages (Week 21)
- Give ~20Mbps write saving allowing about ~23hrs per TB (Week 21)
- Fix INFO and FAULT bugs in communications of triton-detection to lrauv-backseat-helper (Week 21)
- Triton setup for deployable AI, improvements to comms between detection and backseat helper modules (Week 22)
- Improvements to logging for lcm (Week 22)
- Modifications to start scripts, and testing (Week 22)
- Setup pipeline to convert Triton lcmlogs to hevc using gpu encoding. Might have to think about on device/share conversion as it copies files over network and back to convert which is the main bottleneck. (Week 24)
- Prepare for next weeks deployment, get new detection/backseat module tested and installed on Triton backseat. (Week 24)
- Triton deployments and TritonCAM dev (Week 25)
- Setup new backseat app from collaborators on Triton, failed to work (Week 25)
- Debug on test bench while being on support for Triton 57 deployment, (Week 25)

- Integration of new backseat app on test bench (Week 26)
- Improvements in configs for easier operator control (Week 26)
- Install deployable version on Triton backseat (Week 26)
- Improvements to the integrated backseat app for tritoncam, mainly in the detector node. (Week 27)
- Push updates to triton and getting it ready for deployment. (Week 27)
- Continue supporting triton deployments (Week 28)
- Implement new syslog capabilities to understand vehicle behavior during dives. (Week 28)
- Triton deployment support (Week 30)
- LRAUV pilot training (Week 30)

902101 - LRAUV Technology Development

- Attended kick off meetings, learn more about the years tasks (Week 3)
- Attended bi-weekly meetings, brief discussion on terrain following using mutlibeam sonars (Week 5)
- LRAUV dev meeting, discuss terrain following and awareness project (Week 11)
- Setup simulator on omega for algo development (Week 11)
- Prepare requirements document for TFTA (terrain following, terrain awareness) (Week 11)
- Ready requirements doc, and organize meeting with LRAUV team to go over terrain following project needs and inputs. (Week 12)
- Brief chat with Piscivore post doc Ciara on data prep for shark behaviour paper, use of tethystales and animation/chart generation to help the project (Week 12)
- LRAUV group meetings + meetings with Brett to go over Imagenx sonar data and documentation, discussion on how the module might work (Week 13)
- Go through LRAUV app and understand how missions and behaviours work (Week 13)
- Finished setting up basic simulation with dvl and profiling sonar, will be useful to test algorithms before integrating with LRAUV-app (Week 13)
- Prepare setting up nvidia orin nano as backseat computer to test with (Week 13)
- Reading into backseat-helper and preparing insert for terrain avoidance behaviour. To be used with main algorithm running on backseat (Week 14)
- Meeting to discuss current standing for TFTA, future requirements of hardware, possible proposal to write (Week 15)
- Been on standby due to other projects, but will resume sim development soon (Week 16)
- Write scripts to control holoocean simulator to keep constant altitude using dvl + sonar inputs (Week 17)
- Wrote and tested terrain following and awareness module in holoocean sim (Week 18)
- Ready to port into gazebo for tuning, need to first setup plugins and example scenarios (Week 18)
- Setup lrauv-app and lrauv-tools for gazebo sim (Week 19)

- Group meeting (Week 20)
- Meetings (Week 21)
- Setup lrauv-application docker (Week 21)
- Meetings (Week 24)
- PIC training (Week 25)
- Work plan for terrain awareness work for proposal (Week 26)
- Setup lrauv gz sim (Week 28)
- Setup plugin for fls multibeam in sim (Week 28)
- Test mission parameters for pitch and depth commands in sim (Week 28)
- Wrote terrain avoidance module to interface over lcm and slate (Week 28)
- Testing (Week 28)
- Dev for lrauv-terrain-awareness, tie up with mission structures and setting terrainavoidance as an insert (Week 30)
- Closed out sim testing of lrauv-terrain-awareness on yoyo missions (Week 30)
- ToDo: More testing in other scenarios, default Portuguese ledge is very flat. (Week 30)

902204 - Scalable Robotics

- Made sweeping changes towards handling constraint addition to graph, unified to be std dev instead mishmash of std dev and covariances. (Week 2)
- Bug fixes and cleanup (Week 2)
- Unified logic for reference match and loop closure match checks to be the same workflow (Week 2)
- Use std dev to weaken or strengthen constraint type. (Week 2)
- Continue refinements on loop closure and factor graph implementation for Sonar Based Navigation stack (Week 3)
    - Made key fixes and improvements on system. (Week 3)
    - Optimized database look up for reference search, uses 65% less time for the task (Week 3)
    - Unified and tested loop closure and reference matching pipelines to be similar for ease of understanding and changes. (Week 3)
    - Loop closures starting to look better behaved (Week 3)
- Implementation of NDT matching to complement/replace ICP for more robust multi resolution matching (Week 3)
- Found that databases for the submaps store the point cloud in local coordinates, which may create issues when trying to match up against grd file conversions to db (Week 4)
- Looking at sponge ridge data over multiple days to test SBN with. (Week 4)
- Attended meetings (Week 5)
- Have working solution for live ←→ live loop closures + reference matching. Need to test out coordinate frame shift for matches, transforms might need a slight tweak. (Week 5)
- Test system with grd conversions to databases for 3cm, 5cm and 1m res (Week 5)
- Got localization against MBSystem maps working (!) (Week 6)
- Good success with 5cm scale maps and 1m scale maps (upscaled using ML sampling methods https://github.com/Holmes-Alan/PUFM) (Week 6)

- Implemented NDT matching, global FPFH search to speed up matching performance. (Week 6)
- Implemented standalone localizer, which does not use pose graph optimization (Week 6)
- Added LCM publishing for pose data updates. (Week 6)
- Improved NDT matching voxelization pre process, which gives better results so far. (Week 6)
- Support sur ridge cruise from shore (Week 11)
- Wrote log splicing script to merge dive logs missing raw channels with norbit binaries broadcasted to lcm (Week 11)
- Added lcmlogging functionality to sen_norbit as a flag (Week 11)
- On shore support to CompasLab team out on packard cruise. (Week 12)
- Wrote pipeline to tie in raw bin files from norbit to a final lcmlog compatible with mbs-tools. Merged these tools into mbs-tools with new pip installable package mb-rawtools to complement mb-convert. (Week 12)
- Test packard cruise data with sonar based navigation stack, figure out which surveys are actually relevant first, and run the system (Week 13)
- Test SBN with Sponge Ridge data from Packard Cruise. Works well, even with a small dataset not optimal for SBN purposes. (Week 14)
- Test SBN on Portuguese Ledge data from Packard cruise, need to first prepare reference database tuned to general survey area. (Week 14)
- Setup plan for April Carson cruise for SBN test run (Week 14)
- Test SBN pipeline with Packard cruise data (Week 15)
- Setup Atuncito with pipeline (Week 15)
- Generate new profiles for docker mbari_deploy_mbes (Week 15)
- Tested data from Portuguese Ledge on SBN, results were iffy, not a good dataset (Week 16)
- Spong Ridge data tests performed well, with complete surveys to test against. Still limited in terms of height variability (Week 16)
- Got successful matches on RC cruise April 14 for a short while before hardware troubles with the Reson (Week 16)
- Test data from LASS cruise with parameter tuning. (Week 17)
- Focus on quality matches rather than quantity (Week 17)
- Look at possibility of very densely packed reference databases (Week 17)
- Test portuguese ledge data for SBN (Week 18)
- Write abstract for Oceans for SBN, assist abstract for ASV shallow surveys (Week 18)
- Abstract for OCEANS poster session submitted (Week 19)
- Tweaks and experimental improvements to SBN pipeline (Week 19)
- Spring meetings (Week 20)
- Made improvements to mbari_deploy_mbes pipeline mainly to point_cloud_accumulator. Fixes and allows more consistent submap sizing based on spatial distance rather than temporal. Also makes distance between submaps

more accurate, leading to 20x space savings from avoiding subamps with 99% overlap being written continuously. (Week 20)
- Found bug in registration transformation composition in mbes_localization. Bug was masked by another bug in DR pertubance modes, and was only caught during last cruise. Took a while to find, but fix is in progress, but will require a lot of tuning later. (Week 20)
- Test recent changes for eigenvalue analysis supported ICP registration pipeline (Week 21)
- Test point-cloud-accumulator (Week 21)
- Survey state of the art place recognition/point feature descriptors for more robust candidate selection in SBN (Week 21)
- Improvements to registration workflow in SBN (Week 22)
- Finished degeneracy aware ICP workflow (Week 22)
- Tested against self with offset, works (Week 22)
- Testing with LASS maps ongoing (Week 22)
- Resume looking at sonar SLAM pipeline improvements (Week 25)
- Literature review on SOTA place recognition techniques (Week 26)
- Ran audit on SBN repo to identify overlooked bugs (Week 27)
- Implemented bug fixes on SBN pipeline. (Week 27)
- Identify areas of improvement mainly for place recognition (Week 27)
- Finished degeneracy aware SBN pipeline implementation. (Week 28)
- Empirically found that Portuguese ledge surveys are a poor choice to test SBN, and may never be a good location for it to work at LASS survey altitudes. (Week 28)
- Testing in Sponge Ridge datasets (Week 28)
- Implementing new bounded terrain correlated correction, should help provide a coarse estimate as vehicle moves over larger distances. (Week 28)
- SBN improvement efforts: (Week 30)
    - Terrain correlation branch completed and tested. No consistent improvement seen, likely a no-go (Week 30)
    - Continue improvement on degeneracy branch. Improve smoothness, and GNC factor pruning in backend. Improve odometry factor setup (Week 30)
- PR review for sen-norbit split comms (Week 30)

Out of Office

- Thursday 8th, daughter’s dr’s appointment in Palo Alto.
- Friday, Jan 16, daughters drs appointment 9am -12 pm
-
- Feb 9 -March 9 parental leave
- Apr 14, 2026 Rachel Carson LASS
- Apr 16, 2026 Possibly RC LASS again
- Jun 1, 2026 - Jun 6, 2026 Vacation
- PFL/Vacation: Jul 13, 2026 - Jul 17, 2026

Overhead

- ML advisory meeting (Week 12)
- Watched proposal workshop (Week 16)
- Working on a potential abstract (Week 16)
- Proposal abstracts (Week 17)
- OCEANS abstract (Week 17)
- Attended internal proposal presentations (Week 19)
- ML advisory group meeting (Week 20)
- OCEANS reviews. (Week 24)