Junsu Jang

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EDUCATION

University of California San Diego – Scripps Institution of Oceanography — La Jolla, CA
Ph.D. in Oceanography — Aug 2025
Dissertation Title: *Passive Acoustic Localization and Tracking in Marine Environments*
Advisor: Florian Meyer

Massachusetts Institute of Technology – The MIT Media Lab — Cambridge, MA
M.S. in Media Arts and Sciences — Aug 2020
Thesis title: *Marine Snow Tracking Stereographic Imaging System*
Advisor: Allan Adams

Carnegie Mellon University — Pittsburgh, PA
B.S. in Electrical and Computer Engineering — Dec 2017

ACADEMIC APPOINTMENTS

Woods Hole Oceanographic Institution (WHOI) — Woods Hole, MA
Weston Howland Jr. Postdoctoral Scholar — Sep 2025-Present
(Mentors: Madison M. Smith and Gil Averbuch)

RESEARCH EXPERIENCE

Situational Awareness Lab - Scripps Institution of Oceanography — La Jolla, CA
Graduate Student Researcher — Sep 2020 – Aug 2025

Navigation of autonomous underwater vehicles (AUVs) using passive acoustic ranging in shallow water

- Devised a range estimation method leveraging the waveguide invariant and the statistics of a ship sound in shallow water.
- Developed a navigation filter that fuses range and range rate information with motion-related data on an AUV, bounding the self-localization error.

Various aspects of this project were presented in four conferences (FUSION and ASA) and resulted in a conference paper. A manuscript for a journal is being prepared.

Automated tracking of whales using passive acoustics

- Devised a data processing chain that automatically detects and tracks multiple clicking odontocetes in 3-D using estimated time-difference-of-arrivals (TDOAs) from volumetric hydrophone array measurements.
- Enhanced echolocation click signals detection rates by developing a generalized cross-correlation method adapted to whiten the instrument noise.

- Developed a calibration method for acoustic vector sensors used for humpback whale tracking in Hawaii.

This work resulted in two publications in JASA.

Navigation based on side-scan sonar on unmanned surface vehicles (USVs)

- Mentored a team of undergraduate students to integrate a side-scan sonar with the data collection system on USVs from Platypus LLC and Seafloor Systems.
- Collected side-scan sonar data on a USV deployed from a small boat.

This work resulted in a conference paper. A manuscript has been submitted to JOE.

Future Ocean Lab / Responsive Environments – The MIT Media Lab Cambridge, MA
Research Assistant (Advisors: Allan Adams and Joseph Paradiso) Jan 2019 – Aug 2020

Marine Snow Tracking Stereographic Imaging System

- Designed and prototyped a low-cost (<$1,000) in-situ stereographic imaging system with 30μm/px resolution that takes images of particulate organic carbon (i.e., marine snow) in the ocean's twilight zone, studying the biological carbon pump.
- Applied particle tracking velocimetry and multi-object tracking algorithms to analyze the size spectrum and particle sinking rate.

Micro-Conductivity, Temperature and Depth (CTD) sensor

- Devised the electrical system for a mass-deployable underwater CTD senso (test-deployed in Alaska in June 2019).

Modular environmental DNA (eDNA) Sampler

- Developed the electrical system of the wirelessly configurable end-to-end eDNA sampler and web application (test-deployed in Channel Islands in Dec 2019).

Signal Kinetics – The MIT Media Lab Cambridge, MA
Research Assistant (Advisor: Fadel Adib) June – Dec 2018

Underwater Backscatter Networking

- Developed the first end-to-end underwater backscatter communication technology.
- Successfully integrated external pH and pressure sensor data into the backscatter signal payload.

This work resulted in a publication in ACM-SIGCOMM 2019 and won the best paper award.

WiTech Lab – Carnegie Mellon University Pittsburgh, PA
Research Assistant (Advisor: Swarun Kumar) Jan – Dec 2017

Wi-Fi Sensing Platform for Autonomous Navigation

- Developed the initial system to localize and sense the materials of both visible and occluded objects in using commodity Wi-Fi.
- Devised an algorithm based on synthetic aperture radar to compute the direction of arrival of the reflected Wi-Fi signal.

This work resulted in a publication in MobiComm 2019.

PUBLICATIONS

1. **J. Jang** and F. Meyer, "Statistical Model and Estimation Method for Ranging a Moving Ship Using a Single Acoustic Receiver in Shallow Water," *accepted by JASA in Sep 2025.*
2. E. Davenport, K. Nguyen, **J, Jang**, C. Ma, S. Fish, A. Wu, L. Lenain, and F. Meyer, "A Landmark-Aided Navigation Approach Using Side-Scan Sonar," in IEEE J. Ocean. Eng., 2025.
3. P. Gruden, **J. Jang**, A. Kügler, T. Kropfreiter, L. Tenorio-Hallé, M. Lammers, A. Thode, and F. Meyer, "Automating multi-target tracking of singing humpback whales recorded with vector sensors," J. Acoust. Soc. Am., 2023.
4. **J. Jang** and F. Meyer, "Navigation in shallow water using passive acoustic ranging," in *Proc. FUSION*, 2023.
5. E. Davenport, **J. Jang**, and F. Meyer, "Towards terrain-based navigation using side-scan sonar," in *Proc. FUSION*, 2023.
6. **J. Jang**, F. Meyer, E. Snyder, S. Wiggins, S. Baumann-Pickering, and J. Hildebrand, "Bayesian detection and tracking of odontocetes in 3-D from their echolocation clicks," *J. Acoust. Soc. Am,* 2023.
7. **J, Jang** and F. Adib, "Underwater backscatter networking," in *Proc. ACM SIGCOMM,* 2019. **[Best Paper Award]**
8. D. Zhang, J. Wang, **J. Jang**, J. Zhang, and S. Kumar, "On the feasibility of Wi-Fi based material sensing," in *Proc. MobiCom,* 2019.

ABSTRACTS AND PRESENTATIONS (*Oral, **Poster)

J. Jang* and F. Meyer, "Waveguide invariant navigation of an AUV with a towed line array," *at the 186th Acoustical Society of America Meeting* **[Session Chair]**	ASA 24 Ottawa
J. Jang* and F. Meyer, "Waveguide Invariant Navigation of an Autonomous Underwater Vehicle," *at the 185th Acoustical Society of America Meeting* **[Best Student Paper Award]**	ASA 23 Sydney
J. Jang* and F. Meyer, "Navigation in shallow water using passive acoustic ranging," at *the 26th International Conference on Information Fusion*	FUSION 23 Charleston
J. Jang**, F. Meyer, E. Snyder, S. Wiggins, S. Baumann-Pickering, and J. Hildebrand, "Passive acoustic tracking of whales in 3-D," at *2023 IEEE International Conference on Acoustics, Speech, and Signal Processing*	ICASSP 23 Rhodes Island
J. Jang* and F. Meyer, "Bayesian navigation in shallow water using passive acoustics," *at the 184th Acoustical Society of America Meeting*	ASA 23 Chicago

J. Jang*, F. Meyer, Eric Snyder, Sean Wiggins, Simone Baumann-Pickering, and John Hildebrand, "Bayesian detection and tracking of odontocetes in 3-D from their echolocation clicks," *at the 184th Acoustical Society of America Meeting* — ASA 23 Chicago

J. Jang*, E. Snyder, F. Meyer, S. Wiggins, S. Baumann-Pickering, and J. Hildebrand "Toward Automated Tracking of Marine Mammals in 3-D Using Volumetric Hydrophone Arrays," *at the Ocean Sciences Meeting* — OSM 22 Virtual

J. Jang**, E. Snyder, F. Meyer, S. Wiggins, S. Baumann-Pickering, and J. Hildebrand "Toward Automated Tracking of Marine Mammals in 3-D Using Volumetric Hydrophone Arrays," *at the Detection, Classification, Localization and Density Estimation of marine mammals workshop* — DCLDE 22 O'ahu

J. Jang* on behalf of F. Tonolini. "Networking across boundaries: Enabling communication through water-air interface," at Special Interest Group on Data Communications — SIGCOMM 18 Budapest

AWARDS, HONORS AND FELLOWSHIP

Best Student Paper Award at the 185th Acoustical Society of America Meeting	2023
Scripps Fellowship ($32,000)	2020
Best Paper Award (ACM – SIGCOMM 2019)	2019
E. M. Williams Award in recognition of a high academic achievement at CMU	2018

TEACHING EXPERIENCE

Teaching assistant for Observational Physical Oceanography (SIO 176) — La Jolla, CA, Jan – Mar 2024

- Held tutorials on using MATLAB to process oceanographic data
- Provided guidance for building ocean depth and temperature sensor instrument
- Gave a lecture on ADCP and created homework assignment on acoustics

Department tutor on underwater acoustics — La Jolla, CA, Oct 2023 – Mar 2024

FIELD WORK

Multiple day-long cruises in Point Loma aboard R/V Beyster 2023- 2024
Designed and performed: acoustic data collection system engineering test, Iver3 (AUV) acoustical self-noise data collection, and Iver3 navigation error characterization experiment

6 days in Santa Lucia Escarpment aboard R/V Sproul (Student-led cruise) May 2024
Collected marine mammal acoustical data using a passive acoustic drifter system in collaboration with NOAA, funded by the UC Ship Funds Program

4 days near the Channel Islands aboard R/V Sproul (Student-led cruise) Sep 2022
Collected sediment cores and investigated their acoustical properties, funded by the UC Ship Funds Program

8 days near the Channel Islands aboard R/V Sally Ride Sep 2022
Participated in the hydrophone array engineering test experiment

14 days near the Channel Islands aboard R/V Sally Ride Aug – Sep 2021
Participated in the hydrophone array engineering test experiment

7 days in Alaska aboard National Geographic Quest June 2019
Collected underwater images with Drop-Cam and tested custom-built low-cost CTD prototypes

PROFESSIONAL EXPERIENCE

Carnegie Robotics, LLC Pittsburgh, PA
Software Engineering Intern (Python / C++) Jan – May 2018

- Developed a firmware update to enable non-volatile memory retention
- Wrote an algorithm that matches the sensitivity of the stereo cameras to enhance the calibration process

KunJip (On-Demand Storage) - Startup Seoul, Rep. Korea
Co-founder (Python, Django, MSSQL, Azure WebApp) May – Nov 2016

- Developed and launched a mobile-friendly app to manage orders and stored items
- Attracted 150 users and with 40 items stored from customers over two months
- Won 1st place in Asan Nanum Foundation Startup Competition against 528 teams

UN Mission in South Sudan (UNMISS) Bor, South Sudan
UN Peacekeeper 2015-2016

- Served as the staff of the Operations Department and the interpreter for Defense Security Command at UNMISS Korea

REFERENCES

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University of California San Diego
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Founder & CEO of Aquatic Labs
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