OES BEACON

Newsletter of the Oceanic Engineering Society

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Members are encouraged to submit copy highlighting 1) Chapter Events, 2) People & Company News, 3) Student & Young Professional News, 4) Technology Updates, or 5) other material of broad interest to the OES. Please send to Beacon Editor-in-Chief, Harumi Sugimatsu <harumis@iis.u-tokyo.ac.jp>. Word format, 1-1/2 space; Photos (always encouraged): jpg, 300 dpi preferred. Material becomes property of IEEE-OES. Please send e-mail or physical address corrections or updates to the EIC.

Photos on the front cover are taken by Stan Chamberlain, the past OES photographer, at OCEANS' 94 Brest

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IEEE Spectrum

From the OES BEACON Editors

Harumi Sugimatsu and Robert Wernli

Welcome to the June 2025 issue of the Beacon. As you'll see in this issue, the OES continues to be very active with excellent support to our student and young professional members. And for those who want to get more involved, our AdCom elections are coming up soon and our President's article highlights several recent changes to some of our Committee positions.

Reports from our Executive Committee highlight recent and upcoming activities of the society and what we can expect this year. The VP for Workshops and Symposia describes the many events recently held and the many upcoming events this year that are keeping the society active around the world. Our recent workshops, symposia and conferences that OES was involved in include the Singapore Autonomous Underwater Vehicle Challenge (SAUVC) held in Singapore, the Biology of Marine Mammals (BMM) workshop held in Perth, Australia, the Marine Robotics workshop held in Buenos Aires, Argentina, the Winter School on Underwater Network Simulations (UNWiS) held in Padova, Italy and the Underwater Technology 2025 symposium held in Taipei, Taiwan.

Our Executive VP provides an article on several published IEEE reports that directly involve the ocean.

Our VP for OCEANS reports on the upcoming events that include OCEANS conferences scheduled this year in Brest and the Great Lakes and future events scheduled for Sanya, China, and Monterey, California, in 2026 and Aberdeen, Scotland, in 2027. Bids are being reviewed for Anchorage, Alaska, in 2027, and Adelaide, Australia, and San Diego in 2028.

The VP for Technical Activities reports on the status and future of the OES Technical Committees and our Distinguished Lecturers (DLs) and a report on the most recent DL presentation is included. Also included is a committee report on AI Standards in Oceanic Technology. DL nominations are being accepted for the 26–28 positions. Join the team.

Our VP for Professional Activities gives us the latest on our Young Professionals (YPs) and our Women in Engineering (WIE) and member activities that are planned for OCEANS Brest this year. This is highlighted by an article on our WIE PROPEL 25-26 Laureate. The latest activities of the Japan Chapter are also reported.

And don't miss this issue's report on our Who's Who in IEEE OES. In addition, see the article on one of our members who was recognized as a 2025 Emerging Leader by the Offshore Technology Conference's Emerging Leaders Program. Congrats.

Upcoming workshops and symposia are listed in the Conference Calendar and the Journal EIC again provides a list of recently released papers that are available to our members.

Harumi at UT 2025 Taipei.

Have you done something exciting lately? Received an award or professional recognition? Be sure to contact your editors about submitting an article. And don't miss the Who's Who in OES article on one of our outstanding members in each issue.

There is a wealth of other information and articles in this issue that we hope you enjoy. And, as always, we'll close by inviting you to participate in your society. Submit articles and material for the Beacon. Or… volunteer for other society activities as a participant or an elected officer. It's your society and it is here to help you reach your professional goals. Enjoy.

Alan Kenny and I, co-chairs of the OCEANS 2021 San Diego conference, with our Hawaiian Gala entertainers. Hopefully when you receive this June issue of the Beacon, San Diego will have been approved to hold OCEANS 2028, which will be the 5th time I have chaired/co-chaired the San Diego OCEANS conference going back to the OCEANS 1995 San Diego conference.

From the President

Elizabeth Creed, President, president@ieeeoes.org

The OES filled two recent vacancies on the Executive Committee (ExCom), Past President and Treasurer. Following the appointment process outlined in the OES bylaws, in concurrence with the present OES ExCom, I asked Christian de Moustier to serve as the OES Past President through December 31, 2026. He is well-qualified, given his prior service on the OES ExCom, which includes six years as Editor-in-Chief of the IEEE Journal of Oceanic Engineering, four years as Secretary, and most recently, four years as President of OES (2017–2020). Health issues kept him from serving as Past President from 2021 to 2024. He accepted the appointment as OES Past President effective 20 March, 2025, with the term ending on 31 December, 2026. The Past President's portfolio includes chairing the OES Awards Committee, the OES AdCom Nominations Committee, and the OES OTC Technical Committee. Christian is also the OES representative on the Offshore Technology Conference (OTC) Board.

At its 15 April, 2025, meeting, the Administrative Committee (AdCom) elected Weimin Huang to fill the vacant Treasurer's position. His term runs through 31 December, 2026. Weimin was the chair of the March 2024 Currents, Waves, and Turbulence Measurement Workshop and is currently the Chair of the OES/GRSS Newfoundland-Labrador Chapter and the Chair of the OES Oceanography and Meteorology Technical Committee.

Thanks to the VP for Professional Activities, Bharath Kalyan, and Webmaster, Rajat Mishra, the new OES website (ieeeoes.org) went live in March. If you haven't already done so, I encourage you to review the updated content and improved navigation. If you have any comments, please complete the Feedback form at the bottom of the webpage.

All members will be receiving an AdCom election ballot early this summer. Please vote. Your opinion matters.

We hope to see you at one or more of our upcoming conferences: OCEANS 2025 Brest, 16-19 June (https://brest25.oceansconference.org/), OCEANS 2025 Great Lakes, 29 September–2 October (https://greatlakes25.oceansconference.org/), and/or OTC Brazil, 28-30 October (https://otcbrasil.org/).

Executive VP Report—Top Tech 2025 in the Ocean

Malcolm Heron, Executive VP

Values

I was astonished, and alarmed to read a comment by a colleague that "integrity is not a value." Subsequently I found out that my colleague was thinking of the value of OES to the community and not core values. So my astonishment abated. But it started me thinking about the meaning of core values. The value of OES to the community is different from core values that provide a guide-rail to behaviour. The value of OES to the community is in developing and promoting ocean technology for the benefit of humanity, which of course is the banner motto of IEEE: "Advancing Technology for Humanity." IEEE released its 2025 – 2030 Strategic Plan at the beginning of 2025, which you can see at www.ieee.org/about/ieee-strategic-plan.html. I recommend that you go there to appreciate its brevity and the coherence of the document as well as its content. It is set out with six Core Values and then a related set of six Goals. The six Core Values of IEEE are:

- **Trust:** being a trusted and unbiased source of technical information, and forums, for technical dialog and collaboration.
- **Growth and nurturing:** encouraging education as a fundamental activity of engineers, scientists, and technologists at all levels and at all times; ensuring a pipeline of students to preserve the profession.
- **Global community building:** cultivating active, vibrant, and honest exchange among cross-disciplinary and interdisciplinary global communities of technical professionals.
- **Partnership:** promoting a culture of respect for the employee and volunteer, valuing contributions at all levels of the organization, investing in training and development to enhance capabilities, empowering individuals to make a positive difference, and building a membership organization based on a strong volunteer-staff partnership to serve the profession.
- **Service to humanity:** leveraging science, technology, and engineering to benefit human welfare; promoting public awareness and understanding of the engineering profession.
- **Integrity in action:** fostering a professional climate in which engineers and scientists continue to be respected for their exemplary ethical behavior and volunteerism.

These core values speak to behaviour in our professional lives when we sign up to IEEE. As IEEE members, you have signed up for these, but I encourage you to reflect on your own personal core values as you move through your career.

VPTA Column

Shyam Madhusudhana, VP for Technical Activities

With 2025 well underway, I am pleased to provide you with an update on the Technical Activities portfolio.

The Technology Committees (TCs) remain a critical pillar of our technical activities. We held our first TC Chairs meeting of the year in March—a virtual gathering that was well-attended, with representation from all TCs. These meetings are invaluable for cross-pollinating ideas, sharing progress, and discussing challenges. We are now preparing for our next meeting, which we plan to hold in person during the OCEANS conference in Brest, France.

One area where we are still pushing forward is the finalization of the keywords describing each TC. While the transition from verbose descriptions to concise, searchable keywords was initiated earlier this year, the process has proven more intricate than anticipated. Work continues, and we are optimistic about wrapping this up in the coming months.

Our latest cohort of Distinguished Lecturers (DLs) has started strong. Each of the new DLs has delivered at least one lecture within the first half of the year, reflecting their enthusiasm and commitment to the program. This positive momentum has been supported by active participation from our Chapters, many of whom have hosted DL talks as part of their technical programs.

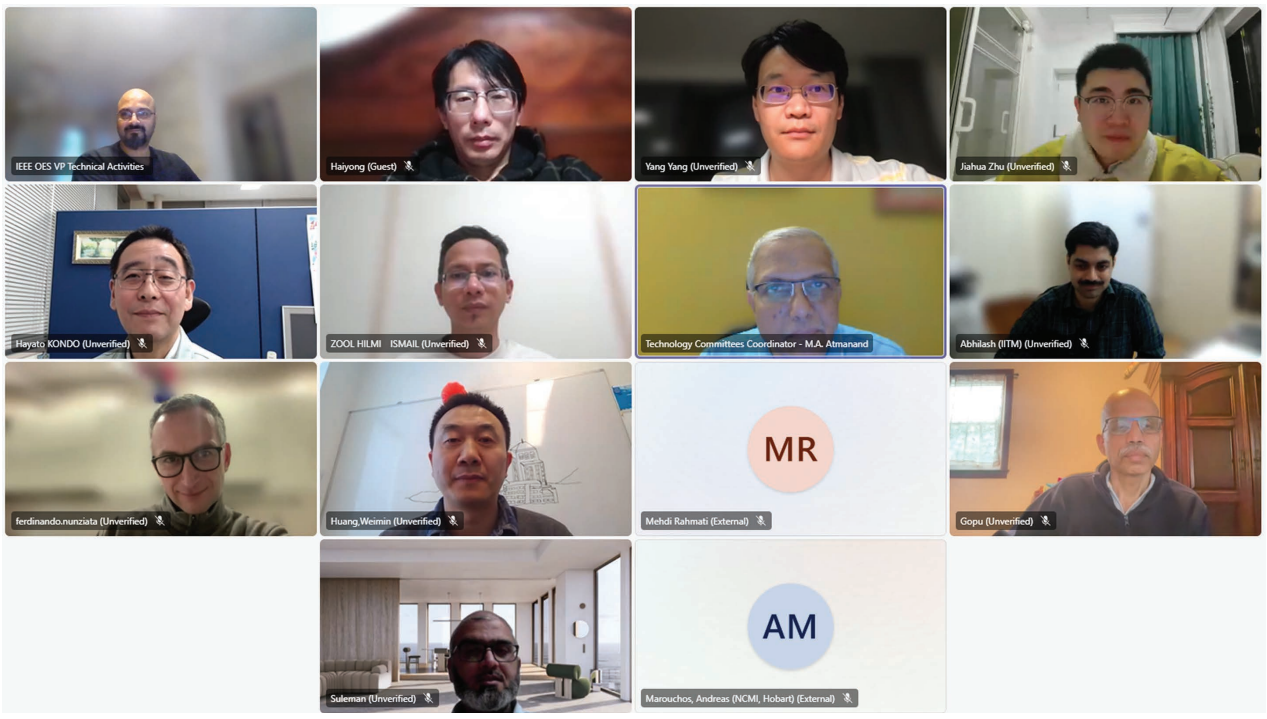
While there's a separate article detailing the open call for DL nominations for the 2026–2028 term, I'd like to reiterate its importance. The vitality of our DL program depends on nominating experts who can meaningfully engage with the global OES community. I encourage you to consider recommending candidates.

Chapters continue to play a pivotal role in OES' regional engagement. Their support in organizing DL events has been noteworthy. Under the leadership of our Chapters Coordinator, Maurizio Migliaccio, these activities are helping expand OES' visibility and outreach.

The IEEE-OES Summer School, which piloted at the Singapore OCEANS 2024 with notable success, was scheduled to be held this year alongside Brest OCEANS. However, regrettably, we have had to cancel the same. This was a tough call, given the program's successful debut last year. However, we remain committed to reinstating it in the future, potentially at Sanya OCEANS 2026, with the aim of delivering high-quality content and experiences to students and early-career professionals.

I remain grateful for the dedication of our DLs, TC Chairs, Chapter leaders, and all volunteers who contribute their time and expertise to the Society. Your continued engagement is what drives the success of IEEE-OES' technical initiatives.

Looking forward to the rest of 2025 and the opportunities it brings.



TC Chairs participated with much enthusiasm at our first (virtual) meeting of the year.

From the VP for Professional Activities—June 2025

Bharath Kalyan, Vice President for Professional Activities

As we reach the halfway mark of 2025, it's encouraging to see the steady engagement and growth within the IEEE Oceanic Engineering Society (OES) community. Together, we've made progress on some initiatives that I'm pleased to share with you.

A Revamped OES Website

This year, we launched a refreshed version of the OES website (https://ieeeoes.org/). The platform is now more user-friendly, with topic-based searches and a simpler process for nomination submissions. Multimedia content, like photos and videos, is hosted externally and integrated smoothly into the site for better performance.

We've also set up weekly scans to catch and fix broken links, helping keep everything up-to-date. Social media plugins for Instagram and LinkedIn are now part of the site, making it easier for members to stay connected. We've also added automated malware scans to keep the platform safe and secure.

OES Resource Centre–A One-Stop Knowledge Hub

I'm happy to introduce the OES Resource Centre (https://resourcecenter.oes.ieee.org/)—a dedicated space for OES-related articles and multimedia archives. It has already been populated with:

- Past *Beacon* editions
- Past *OCEANS* plenary addresses, where available
- A repository for all Distinguished Lecturer (DL) talks, henceforth
- An archive for all OES newsletters

It is also a proposed home for linking all past *Journal of Oceanic Engineering* (JOE) special issues. The OES Resource Centre serves as a central hub for preserving and accessing our collective knowledge. If you have materials that you think would be a good fit for the OES Resource Centre, feel free to send them to **vp-professional-activities@ieeeoes.org**. Your contributions are always welcome and help keep our community resources valuable and up-to-date.

OCEANS 2025 Brest & Member Reception

The upcoming *OCEANS 2025 Brest* conference is shaping up. OES will host an exclusive members-only reception on the evening of **Tuesday, 17 June 2025**. It's a good opportunity for members to connect, network, and reflect on our shared progress.

Our *Young Professionals* (YP) team are collaborating with MTS counterparts on the *Early Career Ocean Professionals* (ECOP) panel for *OCEANS 2025 Brest*. Scheduled for **Tuesday, 17 June 2025** during lunch, this session will focus on career development strategies, funding opportunities, and pathways in academia, industry, and government—providing practical insights for early-career professionals. Likewise, the *Women in Engineering* (WIE) team is organizing a panel session during lunch on **Wednesday, 18 June 2025**. This event will be a platform for discussion and mentorship, supporting growth and connectivity within our community.

As we move through 2025, I encourage all OES members to stay involved, make use of the programs and resources available, and continue supporting the growth of our community. Your involvement is what keeps IEEE OES strong and connected. If you have any feedback, you can contact me at vp-professional-activities@ieeeoes.org.

Thank you for your continued support.

From the Vice President for Workshops & Symposia

Gerardo "Gerry" Acosta, VP for W&S

Happy to contact you once more, sharing with you the great deal of activity of our OES members all around the world. Let's pay a look in a quick glimpse to workshops, symposia and conferences that we are supporting technically or financially.

You can find many reports on them in this same issue of our Beacon.

We started this year with another edition of the *Winter School on Underwater Network Simulations and experimentation (UNWiS)*, held in Padova, Italy, from February 10th to 14th. Its report is within this issue of the Beacon.

During March, from the 2nd to the 5th, the *IEEE/OES 2025 Underwater Technology (UT)* – https://ut2025.org/ in Taipei, Taiwan, was successfully developed. It was hosted by the Taiwan University and the support of Taipei Section OES Chapter and the Tokyo/Japan Joint Section OES Chapter. An article reporting the great performance of this event is attached in this Beacon. Also in March, OES supported the *Marine*

robotics: state-of-the-art and applications - Course and Workshop in Buenos Aires, Argentina, hosted by the Servicio de Hidrografía Naval, a branch of the Argentinean Navy, through our Argentina Section OES Chapter (from March 10th to 14th). About sixty attendees enjoyed the course and the workshop, including a high number of students and young professionals (more than forty). A brief report is in the next pages. In Singapore, OES was sponsoring the *SAUVC 2025 - Singapore AUV Challenge* (from March 14th to 17th), a new edition of this successful and exiting competition that once again is attracting several teams from twenty countries.

In the 20th of April until the 23rd, a new edition of the *SusTech 2025–IEEE Conference on Technologies for Sustainability* was held in Los Angeles, CA – USA. From OES we gave technical co-sponsorship to it in order to support and stay present in this important multidisciplinary IEEE conference.

AQ²UASIM: Advancing Quantitative and QUAlitative SIMulators for marine applications, is a full day workshop within the IEEE International Conference on Robotics and Automation–IEEE ICRA 2025, Atlanta, USA, held on May 23rd of this year. OES gave a non-refundable sponsorship contribution to allow students attendance there. This allows us to gain visibility in addition to achieve collaborative actions with other IEEE Societies.

In addition, the *RAMI – Robotics for Asset Maintenance and Inspections–Marine Robots Competition 2025* will be held in La Spezia, Italy (from the 29th of June to the 4th of July). The other meeting, in July and in Europe, that promises to be very exciting, is the *2025 Symposium on Maritime Informatics and Robotics–MARIS*, to be held in Syros, Greece, from July 2nd to 4th with the hosting by the University of the Aegean.

In North America, OES is giving support to the *2025 IEEE Canadian Atlantic Ocean Symposium (IEEE CAOS 2025)*, organized by the local OES Chapter in Halifax, Canada.

Our Oceanic Engineering Society is also participating in the *IEEE International Geoscience and Remote Sensing Symposium IGARSS 2025*, to be held from 3 to 8 August 2025 in Brisbane, Australia, sponsored by the IEEE Geoscience and Remote Sensing Society (GRSS). We have recently signed an important and strategic agreement, GRSS-OES, from which our presence in IGARSS is a concrete consequence.

In India, hosted by the IIT Madras at Chennai, OES is sponsoring the *7th International Conference on Ocean Engineering (ICOE 2025)* with a theme of Blue Economy and Sustainability, during the dates 14–18 September this year.

Metro Sea 2025, the IEEE International Workshop on Metrology for the Sea (https://metrosea.org/) will be held during October (8th to 10th) in Genoa, Italy. Our Society is giving a technical co-sponsorship to this event.

This November, from the 9th to the 16th,we are supporting a new edition of the successful format of the *Breaking the Surface* event, in this case in Limassol, Cyprus. This seventeenth edition promises to be as great as the previous ones (https://bts.fer.hr/). Also in November we are technically co-sponsoring the *2025 TechDef IEEE International Workshop on Technologies for Defense and Security*, to be held in Rome, Italy, during the 5th to the 7th of November.

For next December, we are waiting for the holding of the *2025 SYMPOL International Symposium on Ocean Technology*, from the 10th to the 12th, in Cochin, India. From OES we are also technical co-sponsors of it.

As we can see, our presence and visibility is a reality beyond our strategic plan, but in real facts that are really helping in advancing technology for Humanity!

If you wish to get involved in these workshops, symposia or conferences, or propose new ones, please contact me at vp-workshops-symposia@ieeeoes.org. In addition, keep in mind that our OES offers the possibility of both technical and financial sponsorship. In order to consider the latter in the budget, it is necessary to submit requests for support during the first half of the calendar year. Specifically, until the first days of June for the W&S that will be held during the following year. So requests for financial sponsorship should be made up to mid-May every year. On our website, there is a detailed guide for these presentations (https://ieeeoes.org/conferences/workshops-and-symposia/) and if you have any questions, do not hesitate to contact me. In particular, this 2025, the Administrative Committee meeting will take place in Brest, France, in occasion of the OCEANS 2025, one of the flagship events of this year.

Have a safe and pleasant navigation and always tell me how I can help you!

VP OCEANS Report

Venugopalan Pallayil, Vice President for OCEANS (VPO)

Dear OES Colleagues,

We have just completed our first in-person ExCom meeting for the year in Houston, alongside the Offshore Technology Conference (OTC) 2025. The meeting discussed the need for revising the registration fees for future OCEANS conferences, especially to explore reduced fee for student author member. A new fee structure will be proposed for discussion at the OCEANS Central Coordination Committee (CCC) and adopted for future OCEANS starting from 2026. The committee also noted that the recent cuts in Federal Grants are likely to see reduced participation in future OCEANS conferences as many researchers rely on such grants for their research, registration fee, travel and accommodation. This may warrant a re-evaluation of future OCEANS conference organization, especially the North American editions.

OCEANS 2025 Brest will be in session before this edition of the Beacon gets published. As per the latest information there are 620 registrations. 435 regular papers are expected to be presented along with 24 Student Poster Competition presentations. Preparations for OCEANS 2025 Great Lakes are ongoing and as per the latest information available 348 abstracts have been received, when the abstract submission has been closed. The calls for Town Halls and Panel Sessions have just been sent out and will be accepted until July 15. OES Technology Committee Chairs are strongly encouraged to submit their proposals for consideration by the Great Lakes's Technical Programme Committee.

The dates for some of the future OCEANS have now been finalized (see the table below).

Location	Dates
OCEANS 2026 Sanya	May 25–28
OCEANS 2026 Monterey	Sep 21–24
OCEANS 2027 Aberdeen	June 20–24

Bids have been received for hosting the North American 2027 edition of OCEANS in Anchorage and the 2028 edition in San Diego. These proposals are currently being reviewed by the Central Coordination Committee. A bid for OCEANS 2028 Adelaide is also under review. I plan to put up motions pertaining to these conferences in the OES Administrative Committee meeting scheduled for the 14th and 15th of June in Brest, France.

I attended the Underwater Technology 2025 (UT 25) Conference in Taipei. This was my third time attending the UT conference. The other two were in Chennai-2015 and Kaohsiung-2019. It was a very well organised conference and there is an article on the same elsewhere in this Beacon Newsletter. Apart from presenting my paper, I supported the conference as a member of the judging panel for Student Poster Competitions and also in identifying some papers for the special issue of Journal of Oceanic Engineering.

Judging panel for Student Poster Competitions at UT25 Taipei.

That is all from me for this edition of Beacon and I will be back with more OCEANS news in the next edition. Send your comments and feedback to vp-oceans@ieeeoes.org. Together we can make OCEANS better.

From the Journal Editor's Desk

Karl von Ellenrieder, Journal Editor-in-Chief

Congratulations to the authors of our most recently approved papers. The following papers were published as Early Access papers on IEEE Xplore and will appear in a regular quarterly issue of the Journal soon. You'll find these papers online now:

- M. Orescanin, D. Olson, B. Harrington, M. Geilhufe, R. E. Hansen, D. Duvio, N. Warakagoda, Classification of Imaging Artifacts in Synthetic Aperture Sonar with Bayesian Deep Learning.
  https://10.1109/JOE.2025.3538948
- C.-A. Guérin, Improved Calculation of the Second-Order Ocean Doppler Spectrum for Sea State Inversion.
  https://10.1109/JOE.2025.3550985
- J. Choi, Y. Choo, G. Kim, W. Hong, K. Lee, Model-Guided Deep Learning for Line Segment Detection in Time-Frequency Spectrograms of an Ocean Waveguide.
  https://10.1109/JOE.2025.3548665
- H. F. Tolie, J. Ren, J. Cai, R. Chen, H. Zhao, Blind Quality Assessment Using Channel-Based Structural, Dispersion Rate Scores, and Overall Saturation and Hue for Underwater Images.
  https://10.1109/JOE.2025.3553888
- S. Xu, H. Shen, Y. Yang, Rotation Invariant Sonar Image Segmentation for Undersea Cables.
  https://10.1109/JOE.2025.3557927
- S. Liu, J. Ye, M. Chen, J. Dong, Z. Liu, X. Guo, H. Wang, Full-Dimensional Nonlinear Dynamic Analysis for Lift Operation of a DP Crane Vessel.
  https://10.1109/JOE.2025.3557106
- H. Ji, L. Wang, S. Zhang, W. Zhou, C. Peng, Parameter Estimation by Alternating Reconstruction and Sensation for Sonar System.
  https://10.1109/JOE.2025.3529255
- Y. Ji, Z. Li, X. Cheng, J. Wang, R. Qu, Z. Zhang, W. Sun, Y. Wang, Motion Compensation Method for Target Echoes of Shipborne Bistatic HFSWR Using Calibrated Attitude Information.
  https://10.1109/JOE.2025.3560367
- J. Rzempołuch, K. Goddard, S. Chaudhary, G. Callender, R. G. Olsen, J. Dix, P. Lewin, D. Renew, Electric Fields Induced by Water Movement in Proximity to HVDC Submarine Cables.
  https://10.1109/JOE.2025.3556152
- D. J. M. Thomson, D. R. Barclay, Directionality of Tonal Components of Ship Noise Using Arctic Hydrophone Array Elements.
  https://10.1109/JOE.2025.3553955
- B. Cole, P. Traykovski, Geometric Programming for Aerodynamically-Actuated Wingsail Design Optimization.
  https://10.1109/JOE.2025.3536578
- I. McLeod, B. Walsh, T. Kelly, J. V. Ringwood, Free Surface Elevation Estimator as a Sensor for Wave-Powered Data Buoys.
  https://10.1109/JOE.2025.3551018
- C. Li, X. Cui, H. Huang, Y. Zhou, M. Xu, S. Cang, L. He, S. Du, H. Cui, J. Cheng, Z. Huang, H. Yang, A High-Responsivity Subsurface Buoy System with a Fiber-Optic Acoustic Vector Sensor for Continuous Low-Frequency Acoustic Monitoring in the Deep Ocean: Development and Sea Trials.
  https://10.1109/JOE.2025.3545248
- W. Luo, C. Lin, H. Zhou, Underwater Target Detection by Residual Spatial Cooperative Attention Module-Based Self-Supervised Learning.
  https://10.1109/JOE.2025.3556153
- S. Li, T. Li, A. Sun, S. Wang, Y. Wu, Automated Amplitude and Phase Attribute-Based Horizon Picking Applied to 3-D Sub-bottom Data.
  https://10.1109/JOE.2025.3550984
- J. Ahn, G.-H. Park, W. Kim, H.-M. Kim, D.-H. Lee, Analysis of Research Trends and Technological Maturity of Biomimetic Underwater Communication.
  https://10.1109/JOE.2025.3553982
- Y. Duan, X. Shen, H. Wang, Y. Yan, Multilabel Recognition Method for Ship-Radiated Noise Signals Based on Multidomain Information Fusion with Deep Equilibrium Models.
  https://10.1109/JOE.2025.3545239
- N. Martinez-Iturricastillo, H. Ezpeleta, A. Ulazia, J. V. Ringwood, Long-Term Evolution of Wave Loads Against Offshore Fixed Monopile Structures on the Irish Atlantic Coast (1900-2010).
  https://10.1109/JOE.2024.3516097
- A. Phung, G. Billings, G. Burgess, R. Camilli, An Autonomous Underwater Glider with Improved Onboard Navigation for Unattended Mapping.
  https://10.1109/JOE.2025.3538925
- Y. Ao, H. Duan, S. Li, Artificial Intelligence-Aided Design for Unmanned Underwater Vehicles: A Multiple Activation Function Network-Based Hull Resistance Prediction.
  https://10.1109/JOE.2025.3531926
- X. Shan, O. Bilgen, A Fully Coupled Electromagnetic-Hydrodynamic-Rigid Body Kinetics Model for Moored-Submerged Reconfigurable Ducted Turbine Arrays.
  https://10.1109/JOE.2025.3545219
- S. Guo, G. Liang, N. Zou, L. Qiu, Y. Hao, Y. Wang, A Ship Radiated Noise Recognition Method Applicable to Incomplete Training Data Sets.
  https://10.1109/JOE.2024.3519744
- D. Lu, W. Wang, X. Li, Experimental Study on Dynamic Characteristics and Vibration Mitigation Strategy of Jacket

Offshore Wind Turbines Under Typical Normal Operating and Mechanical Fault Conditions. https://10.1109/JOE.2025.3536021

- T. Noda, H. Kondo, K. Nagaokaya, T. Someya, Real-Time Underwater Localization in Three-Dimensional Environment. https://10.1109/JOE.2025.3551008
- Y. Ata, K. Kiasaleh, Impact of Natural Turbulent Waters on Quantum Key Distribution: Temperature and Salinity Considerations. https://10.1109/JOE.2025.3551076

OES Member Dr. Zheng Fan Named an OTC 2025 Emerging Leader

Elizabeth Creed, President

Congratulations to Dr. Zheng Fan for being named an Emerging Leader by the Offshore Technology Conference's (OTC) Emerging Leaders Program (https://2025.otcnet.org/awards/otc-emerging-leaders-program). Dr. Zheng was honored during the OTC Emerging Leaders ceremony on 6 May 2025, in Houston, Texas (https://2025.otcnet.org).

Dr. Fan is an Assistant Professor at the University of Houston, Department of Engineering Technology. He specializes in mechanical engineering technology. His research focuses on understanding and improving solid-state electrochemical energy devices. Information on his lab's activities can be found at: https://fan.egr.uh.edu/.

Dr. Fan first joined the OES as a Student Member in 2010 and is currently a Senior Member.

The OTC's Emerging Leaders Program recognizes young professionals with fewer than 10 years of experience in the offshore energy sector who are making key contributions to this sector in their field of work, service to the industry, innovation, and focus on safety. This year, ten early-career professionals were honored as OTC Emerging Leaders. Nominations for this award are submitted at the beginning of each year by the twelve OTC sponsoring organizations, of which the OES is a member. If you know of a young professional working in the offshore energy sector who should be considered for the 2026 award, please contact vp-professional-activities@ieeeoes.org for details on how to apply.

WIE PROPEL Laureates 2025–2026

Jacqueline Nichols, New OES Women in Engineering (WIE) Coordinator and AdCom Member

Author Position

Jacqueline Nichols

I'm honoured to introduce myself as the Women in Engineering (WIE) Coordinator for the IEEE Oceanic Engineering Society in 2025. It's a privilege to carry forward this important initiative and to help strengthen the visibility, support, and recognition of women across all areas of oceanic engineering. The work of our past WIE coordinators has laid a strong foundation, and I'm excited to continue building on their efforts to create a more inclusive and supportive community in oceanic engineering.

At Cellula Robotics, I work in the evolving field of autonomous underwater vehicles (AUVs) and have spent my career addressing complex challenges in ocean technology. This work has shown me the power of inclusive leadership and the value of diverse perspectives in driving meaningful, lasting solutions – benefiting not just our technical outcomes, but also the communities we serve and the long-term health of our oceans. As WIE Coordinator, I'm committed to fostering opportunities for women in ocean engineering to collaborate, develop, and lead with confidence and impact.

A cornerstone of OES WIE is the WIE-PROPEL Laureate Program. This initiative identifies and supports emerging women leaders within our community by providing leadership development, networking, and increased visibility through active engagement in events such as the OCEANS conferences.

In addition to our 2024–2025 Laureates, Grace Mena Naranjo and Luyuan Peng, I am excited to introduce Olaya Alvare-Tunon, our newest WIE-PROPEL Laureate.

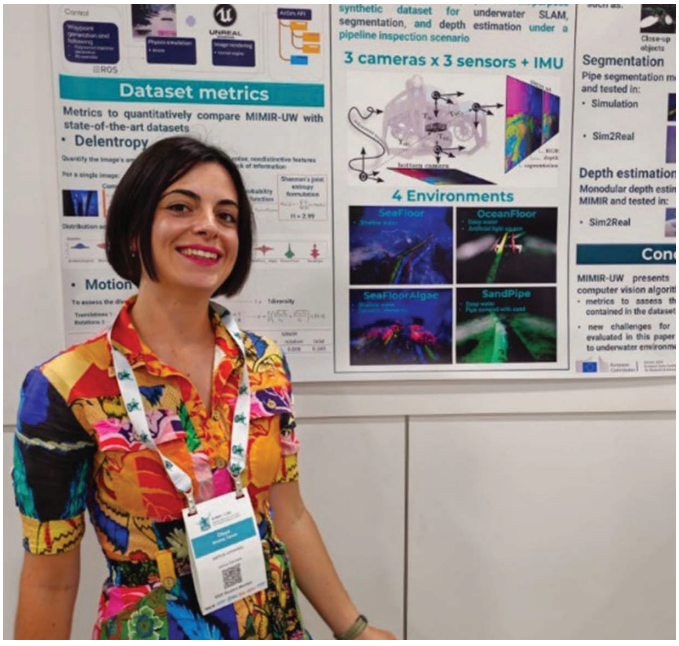
Olaya Alvare-Tunon, OES WIE-PROPEL Laureate 2025–2026

Olaya is a Computer Vision and Deep Learning Engineer specializing in Visual Simultaneous Localization and Mapping (VSLAM). With a PhD from Aarhus University as part of the Marie Curie ITN project REMARO, her doctoral research focused on advancing AI-driven solutions for underwater VSLAM. Her expertise lies in developing deep-learning-based algorithms that integrate geometric insights for reliable and efficient localization in complex environments.

Currently, Olaya works as a Robotics and AI Developer at EIVA A/S and as a Postdoctoral Researcher at ITU Copenhagen. She contributes to the IFD-funded project DeepODO, where she is developing a deep-learning-based visual SLAM system for autonomous underwater robot localization. Her work focuses on training neural networks for real-time, camera-based navigation, addressing the unique challenges of underwater environments to improve precision and reliability beyond traditional methods.

Olaya's research interests include machine learning, computer vision, and underwater robotics, with a particular emphasis on designing optimal architectures that fuse geometric understanding with deep learning models. She brings incredible energy and perspective to the role, and I know she'll make a lasting impact. I look forward to working alongside our current Laureates to strengthen our community.

Also on the horizon is the WIE Panel Session at OCEANS 2025 in Brest, France. This panel will feature a diverse group of leaders sharing their stories, lessons learned, and advice for navigating careers in ocean engineering. We aim to foster dialogue, connection, and inspiration, and I encourage everyone to take part. I'm excited to get started, and I hope to connect with many of you in the months ahead.



Olaya Alvare-Tunon

To learn more about the WIE program or to get involved, visit the OES WIE webpage. WIE Propel Laureate applications are anticipated to open in September this year.

Chapter News

Submit Chapter News to Beacon Co-Editors and OES Chapter Coordinator

Japan Chapter–The 13th Underwater Technology Forum • ZERO

HYBRID

Reported by Harumi Sugimatsu

The 13th Underwater Technology Forum • ZERO was held from 13:00–17:00 on 11 April, 2025, on the Institute of Industrial Science, The University of Tokyo in Meguro Research Campus (https://seasat.iis.u-tokyo.ac.jp/UTforum/). Since we have made it known in advance that online participation is limited to those who live in the distance, or have special circumstances, this time, we had 158 in-person attendees and 99 online attendees.

At the beginning of the forum, Prof. Yutaka Michida of University of Tokyo, a former Co-Chair of this forum, shared the memories of Prof, Eiichi Tokuyama, who passed away sud-

Prof. Yutaka Michida of University of Tokyo, a former Co-Chair of this forum, shared the memories of Prof, Eiichi Tokuyama, who passed away suddenly in January this year.

denly in January this year. Prof. Tokuyama had played an active role as a Co-Chair of this forum with Prof. Tamaki Ura for many years. We would like to express our deepest condolences to him.

After that, eight exciting talks followed.

Topics of them are as below:

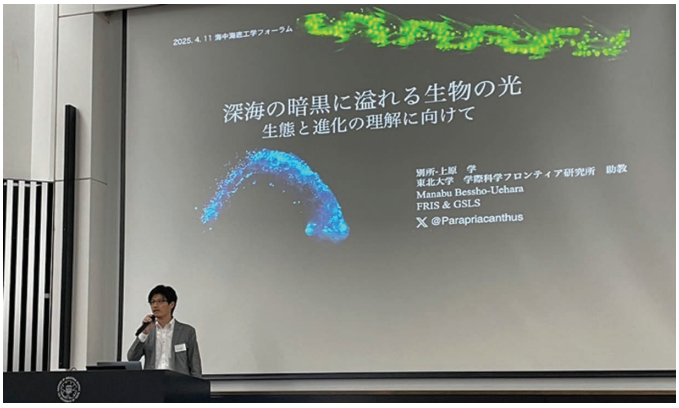
- The light of life in the darkness of the deep sea: Toward understanding ecology and evolution of living organisms
- Reproductive tactics of male spear squid determined by "Date of birth"
- Amazing stone (piece of the mantle) found in Shinkai by a HOV Shinkai 6500
- Cobalt-rich manganese crust survey by Autonomous Underwater Vehicles (AUVs)
- Development of the observation technology for underwater optical communication cables using an AUV with a camera
- Connecting landers and AUVs at the seafloor using underwater optical wireless communication
- Plankton and sedimentation particle sensing using an event-based vision sensor (EVS)
- Fujitsu's initiatives in the Marine Digital Twin

As you can see, the first three talks were about science, followed by engineering talks.

After the forum, a reception was held for the speakers and participants, which was a great success.

The next forum will be held on 17 October, 2025, at the Atmosphere and Ocean Research Institute, the University of Tokyo.

Please join us!



From the talk "The light of life in the darkness of the deep sea: Toward understanding ecology and evolution of living organisms".

From the talk "Development of the observation technology for underwater optical communication cables using an AUV with a camera".

At the reception after the forum.

Call for OES Distinguished Lecturers 2026–28 Nominations Close on July 31, 2025

Shyam Madhusudhana, VP for Technical Activities

The IEEE Oceanic Engineering Society (OES) invites nominations for OES Distinguished Lecturers. The IEEE OES Distinguished Lecturers Program provides high quality speakers to the Oceanic Engineering Community, especially, OES Chapters, Student Branch Chapters, and Student Clubs. Appointment as an OES Distinguished Lecturer is a major Society recognition.

Requirements

Distinguished Lectures are meant to appeal to a broader audience and not just technical experts. So, the talks should be prepared accordingly to attract as many members as possible from OES community. Distinguished Lecturers are expected to have

- high technical proficiency in their area;
- demonstrated ability to make technical presentations that are inspiring to audiences of both experts and general audiences;
- OES membership throughout the term of their appointment.

Technology Committee (TC) Chairs and Administrative Committee (AdCom) members are strongly encouraged to make nominations as long as there is no conflict of interest in the selection process. Nominations from Chapters as well as self-nominations are encouraged. All nominations are to be endorsed by the relevant TC. So, if you are looking for a nominator, we encourage you to contact the chair of the most relevant OES Technology Committee. A nomination email to the Vice President for Technical Activities (VPTA) should include a brief CV (1 page) of the nominee, contact details for the nominee, the nominator and endorsement by the relevant Technology Committee Chair.

The Distinguished Lecturer Committee will consider nominations and shortlist candidates, taking into account the diversity of topics and geographic spread of the pool of Distinguished Lecturers, in addition to the criteria given above. The selected Distinguished Lecturers will subsequently be approved by the OES AdCom.

Duties

The Distinguished Lecturers will start their three-year term in January 2026. Each Lecturer should submit topics in his/her field of expertise that will be posted on the Society website. The Distinguished Lectures should be readily available to travel within their geographical area upon contact by the Chapters or appropriate organizations and are expected to add small diversions to their international travels to present lectures whenever opportunities arise. Reasonable travel expenses will be paid by the Distinguished Lecturer Program based on the availability of funds.

Closing Date

Nominations for a three-year term 2026–28 close on **31 July, 2025**.

Advancing Marine Spatial Planning Through Passive Acoustic Monitoring

Tomonari Akamatsu, IEEE OES Distinguished Lecturer, Professor, Research Organization for Nano & Life Innovation, Waseda University

An IEEE OES distinguished lecture was delivered by Dr. Tomonari Akamatsu in collaboration with IEEE OES Providence Chapter on Mach 26th, 2025. The lecture was given at Massachusetts Institute of Technology and the title was "Advancing Marine Spatial Planning through Passive Acoustic Monitoring." Dr. Akamatsu serves as a distinguished lecturer responsible for 2025–2027. This lecture was supported by Professor Nicholas Makris, Director of the Laboratory for Undersea Remote Sensing at MIT.

Tomonari Akamatsu received a master degree of physics from Tohoku University in 1989 and PhD of Agriculture from Nihon University in 1996. He dedicated underwater bioacoustics research at National Research Institute of Fisheries Engineering until 2015. As a visiting scholar, he studied biologging science at National Institute of Polar Research in 1997 and fish auditory physiology at University of Kentucky during 1999–2000. Dr. Akamatsu is the specialist of echolocation behavior of cetaceans as well as passive acoustic monitoring of marine organisms. He was a senior research fellow and the director of Policy Research Division of Ocean Policy Research Institute, the Sasakawa Peace Foundation. Currently, he is the professor at the Research Organization for Nano & Life Innovation, Waseda University.

Abstract: Underwater sound recordings have been collected globally in recent years using both stationary and mobile acoustic receiving systems, which are now commercially available and widely deployed in coastal and offshore waters. However, identifying sound sources remains a significant challenge, limiting the detailed analysis of ocean acoustic data.

Acoustic biologging has provided insights into the echolocation characteristics of dolphins and porpoises, while passive acoustic monitoring (PAM) has facilitated their detection based on their frequent production of ultrasonic signals. PAM was applied to assess the environmental impact of Japan's offshore wind turbine sites, revealing a dynamic distribution change of acoustic presence of finless porpoises day-by-day (Fig.1). Using density estimation model, number of the top predator in a unit area could be calculated.

Beyond porpoises, annotated recordings of fish and crustacean sounds have enabled the visualization of the daily distribution of three distinct taxa on spatial maps, revealing coexisting predator-prey distributions with implications for fisheries resource management. In another case, unsupervised classification of long-term coral reef sound recordings has revealed phenological changes in ocean soundscapes. When sound sources are systematically annotated, the seasonal and diurnal acoustic presence of whales and fish can be monitored, providing valuable data for assessing climate change impacts.

Given the dynamic nature of the underwater environment, temporal variations must be considered in marine spatial planning for effective ocean management. Passive acoustic monitoring offers a promising tool for integrating spatiotemporal dynamics into future marine conservation and resource management strategies.

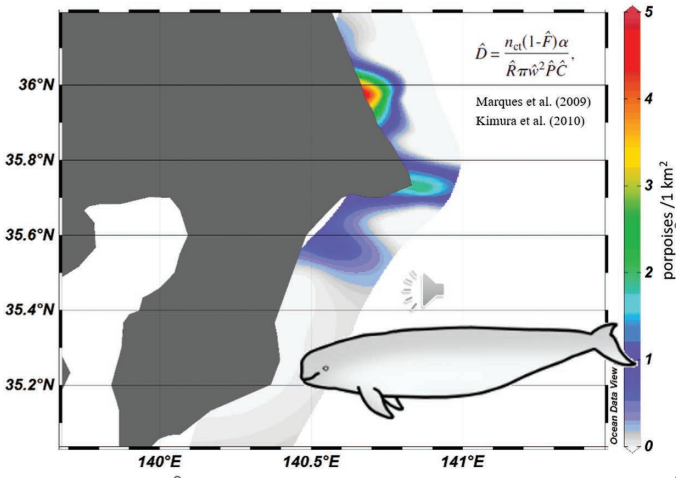


Figure 1. Distribution of finless porpoises observed by passive acoustic monitoring stations. Dynamic mapping of top predators can be used for future marine spatio-temporal planning.

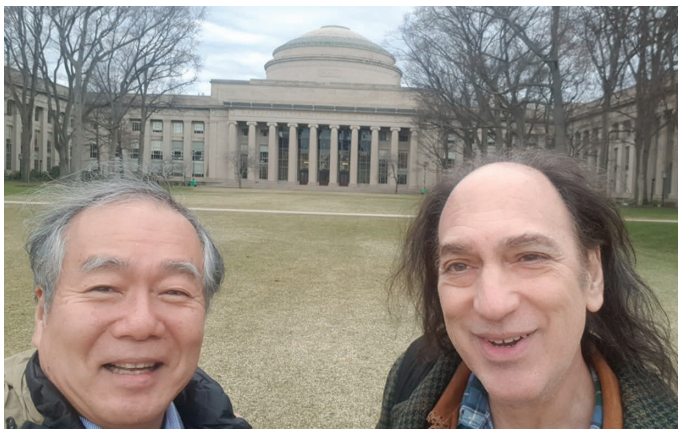


Figure 2. With Dr. Makris in front of Great Dome (MIT).

The Need for AI Standards in Oceanic Technology

Ananya Sen Gupta, Department of Electrical and Computer Engineering, University of Iowa, Iowa City, IA, (Member, AdCom), Gopu R Potty, Department of Ocean Engineering, University of Rhode Island, Narragansett, RI, (Chair, Technology Committee on Data Analytics and AI)

Artificial intelligence (AI) and machine learning (ML) techniques have transformed the landscape of how most technologies operate today, and oceanic technologies are no different. Ocean-relevant infrastructure, whether computational methods such as autonomous sonar target recognition, or hardware advancements such as smart marine robotics, have incorporated a variety of AI/ML tools and techniques at different layers of operation. Incorporating AI/ML techniques in marine technologies is important, if not critical, to meet the grand challenges posed by climate change, marine pollution, and other environmental factors, as well as the global need to grow resilience to coastal and maritime threats, whether environmental or geopolitical. However, given the lack of AI standards in marine technology, AI-enabled advancements can be challenging to implement effectively. In particular, lack of AI standards specific to the oceanic paradigm render it difficult to predict AI/ML algorithmic performance, which affects short-term usability and long-term impact of AI-enabled oceanic technologies. AI standards being proposed in non-maritime domains need to be understood and accounted for, *but in the context* of the applicability of these extra-domain standards in the oceanic domain. In this expository essay, we provide our thoughts regarding the grand challenges facing successful application of AI/ML in oceanic technologies, and where AI standards for oceanic technologies can make a difference.

Grand Challenges in Creating AI/ML Infrastructure for Oceanic Technology:

The grand challenges in creating effective AI/ML cyberinfrastructure for oceanic technology may be summarized along three related issues:

(i) **Insufficiency of training data available in the public domain**: Ocean data collection is costly, and time consuming and hence oceanic data sets are scarce. Moreover, the majority of oceanic technology applications intersect with military or otherwise protected data domains, limiting the availability of reliable training datasets. This leads to potential overtraining of AI/ML techniques in peer-reviewed public domain research, while limiting the agility of the developed AI/ML methods in the literature to the "real world," i.e., military and proprietary technical applications. Techniques such as random forest trees, which are resilient to training biases may be used, but the scale and variety of publicly available training data is severely limited, thus posing challenges to large-scale reliable adoption of AI/ML techniques into oceanic technology.

(ii) **Gap between domain knowledge and current AI/ML techniques**: Many popular AI/ML techniques (e.g., deep neural networks, support vector machines, random forest trees) used in oceanic applications operate at the "black-box" level, i.e., do not directly incorporate any domain knowledge, which is imperative in the oceanic domain due to the inherent temporal/spatial variability and unpredictability of the marine environment. No training data, which are typically collected under limited spatio-temporal scales or specific experimental conditions, can adapt an AI/ML method due to changing oceanic conditions. Nonetheless, the last few years have seen a worldwide momentum past black-box machine learning and incorporate hard-earned domain knowledge to well-known AI/ML architectures. Of particular interest are physics-informed neural networks (PINNs) where knowledge of physics-driven models has been incorporated into the neural-network architecture. While such efforts are commendable, some lasting questions remain. For example: *What physics should the machine learn? What oceanic conditions might prevail for the incorporated physics in the training set to be field-relevant? How sensitive is the AI/ML architecture to model errors, field unknowns and parameter uncertainties in the PINN architecture?*

(iii) **Interpretation and integration of machine-learnt features back into the scientific domain knowledge**: Related to the above points, a key challenge to reliable implementation of AI/ML methods to oceanic technology is a lack of interpretation and back integration. For example, in autonomous target recognition (ATR) in active sonar systems, a variety of AI/ML techniques have been applied to interpret and classify sonar target data. However, despite success of ATR classification and emergence of ML-integrated techniques like cognitive sonar, interpretation of the machine-classified features is often challenging, due to the unpredictability of the ocean state and uncertainty of the target geometry, experimental field conditions, among other things. Lack of robust feature interpretation also inhibits the integration of machine-learnt knowledge back into the scientific understanding of the domain. In the sonar example, despite successful ATR classification of a sonar target, it is difficult to interpret the learnt features in terms of acoustic physics, and therefore, difficult to understand what should be the persistent features in field-ping returns of a known target with measured parameters.

Despite the above mentioned challenges, the emergence of AI/ML integrated oceanic technologies is certainly welcome as it enables us the possibility of employing domain knowledge, improving existing models, and more generally, achieving

better performance of oceanic technology in the field. To ensure the success of the wide-ranging variety of AI/ML-enabled "smart" oceanic technology, developing standards for AI in oceanic applications is critically important. A coordinated effort involving various stakeholders and practitioners of AI is warranted to accomplish this objective. Professional organizations such as Oceanic Engineering Society (OES) has a key role to play in this effort.

OES Conference Calendar

Contact BEACON Editors, OES VPWS and VPTA

OCEANS

OCEANS 2025 Brest
June 16–19, 2025
Brest, France
https://brest25.oceansconference.org

OCEANS 2025 Great Lakes
Septeber 29–October 2, 2025
Chicago, USA
https://greatlakes25.oceansconference.org

OTC

OTC Brazil
October 28–30, 2025
Rio de Janeiro, Brazil
https://otcbrasil.org

OTC Asia 2026
March 31–April 2, 2026
Kuala Lumpur, Malaysia
https://www.otcasia.org

OES Sponsored (financial or technical)

RAMI 2025
June 29–July 4, 2025
La Spezia, Italy
http://rami2025.tilda.ws

IEEE CAOS 2025
July 21–23, 2025
Halifax, Canada
* More info will soon be updated.

IGRSS 2025
August 3–8, 2025
Brisbane, Australia
https://www.2025.ieeeigarss.org

ICOE 2025
September 14–18, 2025
Chennai, India
https://ge.iitm.ac.in/icoe2025/

Metro Sea 2025
October 8–10, 2025
Genova, Italy
https://metrosea.org

TechDef 2025
November 5-7, 2025
Rome, Italy
https://techdefense.org

BTS 2025
November 9–16, 2025
Limassol, Cyprus
https://bts.fer.hr

SYMPOL 2025
December 10–12, 2025
Kochi, India
http://sympol.cusat.ac.in

OES Patronaged
Maritime Information & Robotics
June 26–27, 2025
Ermoupolis, Syros, Greece
https://maritimesymposium.eu/

Non-OES but OES Members are Involved in

Non

Please contact us if you have any information about non-OES events that OES members are involved in.

Expanding OES Horizons

Shyam Madhusudhana, VP for Technical Activities

As part of the 25th Biennial Conference on the Biology of Marine Mammals, held in November 2024 in Perth, Australia, a full-day workshop titled ***Advancing Marine Mammal Research through Machine Learning*** was conducted on November 10. The event brought together over 150 participants (89 in person and 70 online) and was generously co-sponsored by the IEEE Oceanic Engineering Society (OES) and the U.S. Office of Naval Research–Global (ONR-G).

The workshop explored emerging applications of artificial intelligence and machine learning across three thematic areas: bioacoustics, computer vision, and ethical considerations in ecological AI.

In the bioacoustics session, researchers showcased scalable approaches to processing long-term passive acoustic data, including workflows for ecological inference and decoding cetacean communication. Talks covered the development of acoustic foundation models, use of transformer-based architectures, and efforts to characterize vocal behavior across species.

The ethics panel featured discussions on responsible AI development, emphasizing frameworks like the Montreal Declaration to guide ethical use of data and algorithms in wildlife monitoring.

The final session focused on computer vision, highlighting projects that apply machine learning to aerial imagery, video analysis, and photo-ID for a variety of marine mammals including elephant seals, dugongs, whales, dolphins, and sea otters. Presenters reported striking improvements in data processing speed and accuracy, with several tools now entering open-source release for broader use.

Lively group discussions followed each session, underscoring the enthusiasm and shared commitment to advancing marine mammal science through cross-disciplinary collaboration.

Importantly, this workshop aligns with IEEE-OES's growing involvement in marine ecological research. The Society's recently revamped slate of Technology Committees (TCs) now includes a TC on *Living Resources,* which aims to support and coordinate technological innovations for marine life monitoring, with a strong emphasis on passive sensing, remote observation, and data-driven ecological modeling. By engaging directly with leading researchers and end-users in the marine mammal community, IEEE-OES continues to foster impactful science-technology partnerships at the intersection of oceanic engineering and conservation biology.

Co-organizer Prof. Christine Erbe introducing the panelists on the bioacoustics panel discussion session (top). Captivating discussions during the Ethics in ecological AI panel session (middle). Workshop organizers acknowledging IEEE-OES' support for the workshop (bottom).

The Third Winter School on Underwater Network Simulations and Experimentation

Filippo Campagnaro, University of Padova, Italy, and Former IEEE OES Young Professional BOOST Laureate

The third Winter School on Underwater Network Simulations and experimentation (UNWiS) took place in Padova (30 minutes from Venice), Italy, from the 10th to the 14th of February, 2025, during the Venice Carnival season.

UNWiS was organized by the Department of Information Engineering of the University of Padova and its spin-off companies SubSeaPulse srl and Wireless and More srl. It has been a very successful event, where almost 40 students and professionals coming from all over the world exchanged ideas and opinions not only on underwater communication networks, but also on underwater robotics and autonomous systems, making UNWiS an occasion for very fruitful discussions.

Every day of the school was divided into two parts: frontal lessons in the morning, and hands-on exercises after lunch. A basic track for PhD students and professionals that approached the field of underwater networks for the first time, and an advanced track for fellow experts, allowed all the attendees to profitably improve their knowledge on this subject. The technical topics included a detailed review of underwater communication technologies, communication protocol for underwater multimodal acoustic and optical networks, and methodology on how to simulate and test underwater networks with the open-source DESERT Underwater Framework. Moreover, the attendees had the opportunity to test and evaluate underwater protocols with hands-on examples both simulating and testing the network with real acoustic modems provided by SubSeaPulse SRL. A newly developed Robot Operating System (ROS) MiddleWare for underwater networks was also presented, bringing the underwater communication and the underwater robotics communities closer to each other.

On February 13th, all attendees were engaged in a discussion organized by IEEE OES, where our former YP BOOST laureate Filippo Campagnaro presented the OES activities, with special focus on Young Professional BOOST laureate program, Women in Engineering propel programs, and the IEEE OES Ocean Decade Initiative. In the same event, a discussion on the importance of standardizing underwater networks and methodologies for underwater networks evaluation occurred, with interventions from representatives of the German and the Australian Navy presenting the NATO IST 216 work group.

Given that Padova is a very cultural city, and hosts many attractions such as Cappella degli Scrovegni (painted by Giotto), the Basilica del Santo, and Palazzo Bo, many attendees took advantage of such tourist attractions. The fact that Aperol is from Padova, and prosecco is made 40 km far from the city, makes the very famous Spirits cocktail the typical beverage. Every day all the participants of the winter school could enjoy some good Italian food and drinks, including some good pasta and pizzas from local restaurants. Finally, a cultural visit to the ancient Palazzo Bo of the University of Padova (that with its 803 years is one of the most ancient universities of the World) and a local home-made wine taste experience wrapped up the winter school. Afterwards, many attendees then had the occasion to autonomously go to Venice (located 30 minutes from Padova) to enjoy the Carnival.

Figure 1. Lectures on "ROS MiddleWare for Talking Underwater" held by Davide Costa, University of Padova, Italy.

Figure 2. IEEE OES Young Professional BOOST and Women in Engineering propeller programs, and the IEEE OES Oceans Decade Initiative presented by Filippo Campagnaro, former IEEE OES YP BOOST laureate.

Underwater Technology 2025 (UT2025): Where Oceans Meet Innovation

Chen-Fen Huang, UT2025 Treasurer and Secretariat, Institute of Oceanography, National Taiwan University

The IEEE OES International Symposium on Underwater Technology 2025 (UT2025) was successfully held from March 2 to 5, 2025, at the Grand Hotel Taipei. Organized through a collaboration between IEEE Oceanic Engineering Society (IEEE/OES), Tokyo/Japan Joint Section OE Chapter, Taipei Section OE Chapter, and National Taiwan University, this landmark event marked a significant milestone in the field's development. Bringing together researchers, industry experts, and students from 17 countries, UT2025 showcased the remarkable evolution of underwater technology research since the symposium series began in Tokyo in 1998, highlighting nearly three decades of international scientific partnership in advancing marine innovation.

Introduction and Overview

As depicted in the symposium's official poster, UT2025 featured Taipei 101 alongside the Grand Hotel Taipei, visually connecting Taiwan's architectural landmarks with the symposium's focus on innovative underwater technology. This thoughtful design symbolized the field's evolution—merging foundational knowledge with emerging technologies—while showcasing Taiwan's unique cultural identity as the host nation.

The symposium was conducted as a fully in-person meeting, fostering direct interaction among participants. The Grand Hotel Taipei, with its distinctive Chinese palace-style architecture, provided an impressive cultural setting for the event. Its comprehensive facilities—including multiple conference halls and versatile meeting spaces—efficiently accommodated the symposium's parallel sessions, keynote presentations, and exhibition requirements, creating an ideal environment for scientific exchange and networking.

Within this historic venue, the opening ceremony established the symposium's collaborative tone as Professor Jen-Hwa Guo,

Figure 1. Official poster of the 2025 IEEE International Symposium on Underwater Technology featuring Taipei 101 and the Grand Hotel Taipei alongside the symposium logo.

Figure 2. At the opening ceremony, Prof. Jen-Hwa Guo, a general co-chair of UT2025 gave a welcome address.

Figure 3. Group photo of attendees at the IEEE OES International Symposium on Underwater Technology 2025 held at the Grand Hotel Taipei.

general co-chair of UT2025, delivered a warm welcome address. His remarks emphasized how international cooperation drives innovation in underwater technology research, particularly highlighting the renewed value of face-to-face scientific exchange after recent years of limited in-person gatherings.

Distinguished Talks

The symposium featured exceptional keynote presentations from leading researchers and experts across three complementary domains of underwater technology. These distinguished talks, strategically distributed throughout the program, offered attendees a comprehensive view of historical developments, current innovations, and future directions in the field. From philosophical reflections on the evolution of underwater technology to cutting-edge applications in sensing systems and robotics, these presentations established key themes that resonated throughout the technical sessions.

Historical Perspectives and Strategic Insights

The symposium opened with Professor Tamaki Ura (University of Tokyo, Emeritus) delivering "Voices from the Seafloor–Bringing Underwater Technology to the Tea Room," artfully connecting technical achievements with broader societal understanding through the metaphor of Japanese tea ceremony traditions. Professor Ura also presented Robert Wernli's (IEEE OES) retrospective "Underwater Technology Symposium: A 27-Year Journey" on behalf of the author who could not attend. This comprehensive historical overview traced the evolution of the symposium series since its inception in Tokyo in 1998, quantifying the growing international participation and documenting the expanding scope of underwater technology research over nearly three decades.

Building upon these historical foundations, Admiral (ret.) Yeong-Kang Chen, current Member of the Legislative Yuan, expanded the discussion to strategic applications with his insightful presentation "Understanding the Ocean, Understanding Taiwan: Exploring Taiwan's Maritime Resilience Through the Lens of The Art of War." Drawing parallels between ancient Chinese military strategy and maritime security challenges, Admiral Chen highlighted Taiwan's unique geopolitical position and demonstrated how underwater technology advances directly impact regional maritime stability. His presentation effectively bridged theoretical research with practical applications, connecting the symposium's academic focus to broader national and international security considerations.

Environmental Sensing and Monitoring Systems

Recent breakthroughs in ocean monitoring capabilities were showcased through two complementary keynote presentations focused on advanced sensing technologies. Dr. Eiichiro Araki (Japan Agency for Marine-Earth Science and Technology, JAMSTEC) detailed significant advances in fiber-optic strain measurement techniques deployed in the Nankai Trough subduction zone. His presentation demonstrated how these systems achieve unprecedented precision in monitoring seafloor deformation, enabling simultaneous observations across wide bandwidths (0.1 mHz to 100 Hz) and dynamic ranges. These capabilities prove especially valuable for real-time monitoring of seismogenic zones where major earthquakes and tsunamis originate, potentially transforming early warning systems.

Extending the theme of ocean observation infrastructure, Dr. Bruce M. Howe (University of Hawaii) presented the Science Monitoring And Reliable Telecommunications (SMART) Cables Initiative—an innovative approach that transforms conventional telecommunications cables into multifunctional environmental sensing networks. This dual-purpose infrastructure integrates pressure, temperature, and acceleration sensors directly into repeater units of submarine fiber-optic cables, creating cost-effective global ocean observation systems. Dr. Howe highlighted two upcoming implementations that will demonstrate this technology: the Tamtam system connecting Vanuatu and New Caledonia, and the Atlantic CAM linking Lisbon, Azores, and Madeira. Both projects are scheduled for 2026 deployment and will provide critical data for climate monitoring, tsunami detection, and earthquake observation.

Autonomous Systems and Acoustic Technologies

Advancements in platforms for underwater exploration and communication were addressed by three distinguished speakers. Through a pre-recorded presentation, Dr. Hanumant Singh (Northeastern University) shared his research on "AI-Enhanced Perception for Underwater Robotics," examining how machine learning is transforming underwater imaging capabilities. His video presentation contrasted traditional computer vision techniques with emerging deep learning approaches, demonstrating substantial improvements in object detection and classification under challenging conditions. Dr. Singh presented comparative results from field deployments in extremely turbid waters and near hydrothermal vents, showing how convolutional neural networks achieve superior performance in environments where conventional geometric algorithms typically fail.

Dr. Fumin Zhang (Hong Kong University of Science and Technology) introduced "Motion Tomography," an innovative methodological breakthrough for reconstructing ocean flow fields from autonomous vehicle trajectories. Adapting principles from medical computed tomography (CT), his approach treats each vehicle's path as a sampling "beam" through the water column. By mathematically integrating data from multiple vehicles traversing the same region, the system generates high-resolution 3D maps of complex current patterns. Dr. Zhang demonstrated how these detailed environmental models significantly improve navigation accuracy and energy efficiency in autonomous marine vehicles, potentially extending mission durations by 15–30%.

Dr. Tomonari Akamatsu (Research Organization for Nano & Life Innovation, Waseda University) presented "Progresses of Underwater Acoustic Technologies," offering a comprehensive examination of both active and passive acoustic innovations. His presentation distinguished between active technologies—which emit sound waves to detect reflections from objects—and passive technologies that detect sounds from phonating objects in the marine environment. Dr. Akamatsu highlighted recent breakthroughs including multi-channel and wide-band methods in active sonar systems, advancements in acoustic tomography for

3D environmental mapping, and the emerging field of Distributed Acoustic Sensing (DAS) using fiber-optic cables. He emphasized how these technologies directly support autonomous underwater vehicle (AUV) operations through improved communication, navigation, and environmental awareness. Looking toward future applications, Dr. Akamatsu addressed the importance of developing underwater localization systems comparable to GPS and establishing baseline acoustic data for environmental impact assessment of emerging industries such as floating offshore wind farms and deep-sea mining—connecting technological innovation with sustainable ocean development goals.

Integration of Emerging Technologies

Together, these distinguished presentations created a comprehensive framework for understanding underwater technology's evolution, current capabilities, and future trajectory. The keynotes highlighted the increasingly interdisciplinary nature of the field, where historical perspectives inform strategic applications, environmental sensing enables ecological monitoring, and acoustic innovations enhance autonomous systems performance. This integration of diverse technologies—from fiber-optic sensing and telecommunications infrastructure to machine learning algorithms and acoustic tomography—demonstrates how advances in one domain catalyze innovations in others. These interconnected developments collectively drive progress toward more effective ocean observation, exploration, and sustainable utilization systems, themes that resonated throughout the subsequent technical sessions.

Technical Sessions

The technical program of UT2025 featured 111 high-quality presentations spanning the breadth of underwater technology research, from fundamental acoustics to advanced autonomous systems. This diverse scientific content reflected growing interest in ocean observation, exploration, and sustainable utilization technologies across academic, industry, and government sectors. The program provided a comprehensive snapshot of current underwater technology development, highlighting the field's evolution toward integrated solutions for complex oceanic challenges.

The symposium attracted 81 oral presentations and 30 student posters across 17 specialized topics organized in thematic clusters: (1) Sensing and Communication, including acoustics, tomography, and soundscape analysis; (2) Autonomous Systems, featuring robotics and human-autonomy interaction; (3) Environmental Applications, covering monitoring, observatories, and renewable energy; and (4) Resource Infrastructure, encompassing fisheries, construction, and underwater archaeology.

Marine Robotics emerged as the most popular area, requiring four separate sessions spread across multiple days. Other well-represented topics included Acoustics and Communications, Environmental Monitoring, Underwater Soundscape, Marine Sensors, Acoustic Tomography, and Observatory & Disaster Mitigation, reflecting the growing importance of autonomous systems and sensing technologies.

The program was organized into two parallel tracks running simultaneously in different venue rooms. Nine technical sessions were distributed across three days (March 3–5, 2025), with five keynote addresses strategically distributed throughout the program. These sessions generated extensive discussion during Q&A periods, reflecting the high level of engagement among participants. Regular coffee breaks were scheduled between sessions, creating valuable opportunities for informal networking and for viewing the student poster presentations displayed in the exhibition area.

Figure 4. Participants engaging during the Q&A period following a technical presentation.

To address emerging technological needs and research priorities, the program committee organized presentations around eight special focus areas: Underwater Acoustics, Communications, and Tomography (fundamental enablers for subsea operations); Autonomous Systems and Marine Robotics (the symposium's largest concentration with numerous breakthrough demonstrations); Environmental Monitoring and Disaster Mitigation (leveraging technology for climate resilience); Marine Sensors, Mobile Networks, and Observatories (creating persistent ocean observation capabilities); Technologies for Marine Resource Exploration and Renewable Energy (supporting sustainable blue economy development); Bio-inspired Underwater Technologies (adapting natural mechanisms for engineering challenges); Advanced Imaging and Data Processing for Underwater Cultural Heritage (preserving submerged historical artifacts); and Underwater Acoustic Sensing and Signal Processing for Soundscape Analysis (monitoring ecosystem health through acoustic signatures). This thematic organization facilitated cross-disciplinary connections and highlighted potential applications addressing critical oceanic challenges.

The UT2025 technical program successfully brought together over 200 attendees from 17 countries, creating a vibrant forum for international collaboration in underwater technology research and development. Many of these presentations are expected to be developed into full journal articles for the forthcoming special issue of the IEEE Journal of Oceanic Engineering dedicated to UT2025, further extending the symposium's impact on advancing underwater technology research. The cross-disciplinary connections established during these sessions are likely to catalyze new collaborative projects addressing critical challenges in ocean observation and sustainable utilization in the coming years.

Student Poster Competition

The Student Poster Competition, a cornerstone event of UT2025, showcased promising research from the next generation of underwater technology specialists. Structured to highlight excellence in emerging talent, the competition featured 30 high-quality posters from early-career researchers representing universities across Asia and Europe. Participants presented innovative work across three specialized categories: Acoustics & Communications (Category A), Marine Robotics & Control (Category R), and Environmental Monitoring & Sensing (Category E). This categorization reflected the symposium's commitment to fostering specialized expertise while recognizing underwater technology's inherently multidisciplinary nature. The impressive range of winning research—spanning from advanced acoustic signal processing techniques to autonomous vehicle innovations and ecological monitoring methodologies—demonstrated the breadth of critical challenges being addressed by early-career researchers in the field.

The competition was strategically integrated with the Technical Sessions, with poster presentations scheduled during coffee breaks and lunch periods to maximize visibility and engagement. Posters were displayed on stands in the exhibition hall of the Grand Hotel Taipei, allowing attendees to conveniently view them when moving between technical presentations or during refreshment breaks. This arrangement facilitated natural interaction between established researchers and emerging scholars throughout the symposium.

The awards ceremony took place during the symposium banquet on the evening of March 4th, with Dr. Chen-Fen Huang presiding. The ceremony began with a special tribute to William Kuperman, a pioneering figure in underwater acoustics who passed away in 2024. Dr. Huang's presentation, "Inspiring the Next Wave: William Kuperman's Legacy for Young Scientists (1943–2024)," highlighted his significant scientific contributions and mentorship that have shaped the field for decades.

Figure 5. Dr. Chen-Fen Huang presenting the concluding slide of her tribute "Inspiring the Next Wave: William Kuperman's Legacy for Young Scientists (1943–2024)" during the Student Poster Competition awards ceremony, highlighting his enduring influence through mentorship.

In Category A, first place was won by Yen-Hsiang Chen (National Taiwan University) for the paper "Comparison of Regularization Methods for Multipath Mitigation in Mirror-Type Coastal Acoustic Tomography." Second place went to Ryoichi Ishijima (University of Tsukuba) for "Efficient Parameter Determination for BPDN in Underwater Acoustic MIMO-OSDM Communications Using Stein's Unbiased Risk Estimate," and third place to Chien-Yu Ho (National Taiwan University) for "Robustness Analysis of Frequency-Difference Methods for Shallow-Water Source Localization Under Water Depth Mismatch."

For Category E, Hsiang-Chuan Huang (National Taiwan University) took first place with "Parameter Selection for Using Permutation Entropy in Cetacean Whistle Detection." Second place was awarded to Ryo Miyakawa (Kyushu Institute of Technology) for "Survey of the Tsuzuraozaki Underwater Archaeological Site Using Hovering Type Autonomous Underwater Vehicle," and third place to Fan Zhao (University of Tokyo) for "Underwater Sea Cucumber Detection using Consumer-grade Amphibious UAV and Deep-learning Based Computer Vision."

Figure 6. Award recipients for Category of Acoustics & Communications (A) with presenter Dr. Bruce M. Howe (second from left). Winners include Yen-Hsiang Chen, Ryoichi Ishijima, and Chien-Yu Ho.

Figure 7. Award recipients for Category of Environmental Monitoring & Sensing (E) with presenter Dr. Eiichiro Araki (second from left). Winners include Hsiang-Chuan Huang, Ryo Miyakawa, and Fan Zhao.

Figure 8. Award recipients for Category of Marine Robotics & Control (R) with presenter Dr. Fumin Zhang (third from left). Winners include Cailei Liang (not pictured), Satoshi Ogaki, Hiroki Yokohata, and Lisa Hakataya.

In Category R, Cailei Liang (University of Southampton) won first place with "Lifelong Clustering for Seafloor Images Interpretation in AUV Surveys." Second place went to Satoshi Ogaki (Chuo University) for "Development of a Peristaltic Ice Drilling Robot for Arctic Under-sea Ice Exploration–Evaluation of Excavation Performance of an Excavation Unit." There was a tie for third place between Hiroki Yokohata (University of Tokyo) for "Evaluation of the Water Entry Impact of an Air-Launched AUV" and Lisa Hakataya (University of Tokyo) for "A Method of Avoiding Floating Obstacles During AUV Surfacing Using Sonar and Camera."

The student poster competition highlighted strong representation from Asian institutions, particularly the University of Tokyo and National Taiwan University, with international participation from the University of Southampton (UK). The competition served not only to recognize excellence in student research but also to foster mentorship relationships and encourage knowledge transfer between generations of researchers. Many of these promising projects are expected to develop into significant contributions in their respective subfields, with several student presenters already planning expanded studies based on feedback received during the competition. The continued emphasis on supporting early-career researchers through such competitions remains vital for the sustainable growth of the underwater technology field, ensuring a pipeline of innovative solutions to address emerging oceanic challenges.

Social Events and Networking

Recognizing the critical importance of community building in scientific advancement, UT2025 incorporated several well-designed social events that complemented the technical program. These gatherings provided essential opportunities for researchers to establish connections, discuss potential collaborations, and experience Taiwanese culture in memorable settings.

The symposium began with a welcome reception on the evening of March 2, where participants gathered in an elegant hall at the Grand Hotel Taipei. This casual opening event created an atmosphere conducive to initial introductions, allowing attendees to establish connections before the formal sessions began. International participants particularly appreciated this opportunity to orient themselves and meet colleagues from diverse institutions in a relaxed environment.

The main program ran from March 3 to 5, with the awards banquet held on the evening of March 4 at Silks Palace, an elegant restaurant located adjacent to the National Palace Museum that celebrates Taiwan's rich cultural heritage through both architecture and cuisine. The banquet featured traditional Taiwanese performances that showcased the host country's artistic traditions, including vibrant drumming displays and elegant classical dance choreography. International attendees received an authentic cultural experience while celebrating the achievements of student poster competition winners. The banquet proved especially valuable for facilitating discussions between established researchers, industry representatives, and emerging scholars in a setting that encouraged cross-generational knowledge exchange.

As a distinctive memento of this significant gathering, participants received commemorative UT2025 teddy bears dressed in green and black hoodies featuring the symposium logo. These charming souvenirs quickly became popular conversation pieces among attendees and served as lasting reminders of

Figure 9. Cultural performance during the Symposium banquet featuring traditional Taiwanese drumming and dance.

Figure 10. Commemorative UT2025 teddy bears in green and black hoodies featuring the symposium logo, given to participants as souvenirs.

the connections made during the symposium. The teddy bears exemplified the organizing committee's attention to creating memorable experiences beyond the technical program.

Throughout the symposium, coffee breaks, lunches, and transitional periods between sessions were thoughtfully arranged to maximize interaction opportunities. These informal moments often proved as valuable as the scheduled events, with many participants later reporting that spontaneous conversations during these intervals led to new research ideas and international collaboration opportunities.

Exhibition

The UT2025 exhibition provided an important platform for industry-academia collaboration and technology showcase. Located in the corridor area of the International Reception Hall on the V floor of the Grand Hotel Taipei, the exhibition featured displays from leading organizations in underwater technology, marine instrumentation, and oceanic research.

The symposium attracted significant industry support with eight sponsors across different levels, including Diamond sponsor Bright Future Homeland Security Co., Ltd., Gold sponsors Monitoring & Information System Tech. Ltd., Kongsberg Discovery Pte Ltd., and GeOceanTech Co., Ltd., along with four Singular level sponsors. The exhibition accommodated eight exhibitor booths where industry participants presented their latest innovations in autonomous underwater vehicles, acoustic sensors, underwater communication systems, marine monitoring equip-ment, security and monitoring solutions, advanced marine technology systems, geological and oceanographic instrumen-tation, ship operation simulators, and society activities and publications.

The exhibition proved particularly valuable for early-career researchers and students seeking to understand how academic research translates into practical applications, with many participants noting productive discussions about internship opportunities and collaborative research projects across sectors including environmental monitoring, offshore energy, marine archaeology, and defense systems.

Technical Tour

The symposium activities began with a comprehensive technical tour on the afternoon of March 2, showcasing Taiwan's premier marine research facilities at National Taiwan Ocean University (NTOU) in Keelung. Departing from the Grand Hotel Taipei at 14:00, approximately 50 participants traveled together to observe underwater technology research infrastructure firsthand.

Upon arrival at NTOU's Department of Naval Architecture and Ocean Engineering, Director Jui-Hsiang Kao welcomed the group and efficiently divided them into two smaller units to maximize educational value. One group first visited the Center for Acoustic Studies in the Zhao Kui Building, guided by Professor Wei-Hui Wang. This state-of-the-art facility, certified by the Taiwan Accreditation Foundation under ISO/IEC 17025: 2005, specializes in underwater acoustics research and testing. Participants were particularly impressed by the center's capabilities for noise testing and acoustic studies, which contribute significantly to advancements in sonar systems and marine communication.

Simultaneously, the second group toured the Medium and Large Cavitation Tunnels under Director Kao's guidance. At the Medium Cavitation Tunnel in NTOU's Yen-Ping Subsea Technology Center, Director Kao explained this closed-circuit water tunnel's capabilities for testing propeller cavitation. Originally designed by Kempf & Remmers and established in 1996, the facility enables precise study of propeller performance under various flow conditions. Attendees observed demonstrations of how high-speed cameras and stroboscopes capture the formation and collapse of cavitation bubbles on propeller blades in real-time.

The tour continued to NTOU's Large Cavitation Tunnel, a premier hydrodynamic testing facility master-planned by the university with basic design from the Swedish Ship Research Laboratory. Director Kao described the impressive structure constructed entirely of SUS 316 stainless steel, weighing approximately 470 tons empty and 1,400 tons when filled with water. Housed within a six-story building with two underground

Figure 11. Participants examining ship operation simulators at the UT2025 exhibition, demonstrating industry innovations and fostering industry-academia collaboration.

Figure 12. Professor Wei-Hui Wang explaining features of the fully reverberant room at the Center for Acoustic Studies during the technical tour at NTOU.

Figure 13. Participants observing the Medium Cavitation Tunnel at NTOU's Yen-Ping Subsea Technology Center during propeller cavitation experiments led by Director Jui-Hsiang Kao.

levels, this facility enables precise testing of ship models under various flow conditions, demonstrating Taiwan's substantial investment in maritime research infrastructure.

After completing their respective specialized tours, the two groups exchanged locations, ensuring all participants experienced each facility. The technical tour culminated with a visit to the National Museum of Marine Science & Technology situated in Keelung's Badouzi Harbor. This educational center, spanning over 500,000 square meters, features the Main Exhibition Building, Ocean Theater, and Regional Exploration Building. The museum visit provided valuable context about Taiwan's maritime heritage and current marine technological developments.

Transportation back to the Grand Hotel Taipei was arranged, with participants returning in time for the Welcome Reception that evening. The technical tour successfully demonstrated Taiwan's significant capabilities in marine engineering research while providing an excellent networking opportunity before the formal symposium sessions began.

Conclusion and Future Outlook

As UT2025 concluded on March 5, Tokyo was announced as the host for UT2027—continuing the symposium's tradition of alternating between Asian host cities. This gathering in Taipei provided exceptional opportunities for renewing professional relationships and establishing new connections within the underwater technology community. Several collaborative research initiatives emerged during the symposium, particularly in autonomous systems and environmental monitoring, demonstrating the event's impact on international cooperation.

The success of UT2025 highlighted Taiwan's significant contributions to marine science and underwater technology, showcasing the nation's strengths in acoustic processing, marine robotics, and oceanic sensing. The symposium maintained the high standards of previous events while introducing innovations such as the thematically organized poster competition and specialized facility tour that enhanced engagement.

Looking ahead to UT2027 in Tokyo, the community anticipates advances in key areas identified during this symposium: AI integration with traditional sensing, energy-efficient autonomous platforms, underwater communication systems, and expanded environmental monitoring for climate research. Many presentations from UT2025 are expected to appear in a special issue of the IEEE Journal of Oceanic Engineering, extending the symposium's scholarly impact.

As the underwater technology community prepares to reconvene in Tokyo, the knowledge shared and connections established in Taipei will continue to influence development in this field, contributing to more effective ocean observation, exploration, and sustainable resource management worldwide.

Acknowledgments

The organizing committee extends sincere gratitude to all participants, speakers, and sponsors who contributed to the success of UT2025. Special appreciation is offered to the Grand Hotel Taipei for providing an exceptional venue, National Taiwan Ocean University for hosting the technical tour, and the National Museum of Marine Science & Technology for their educational contributions during the tour. The committee acknowledges the professional symposium management services provided by GIS Group, with particular thanks to Cheryl Lin for her dedicated coordination and execution support throughout the event. The continued support of the IEEE OES and all participating chapters ensures the ongoing vitality of this premier symposium series.

UT2025 Organizing Committee

Honorary Co-Chairs

- Tamaki Ura, Professor Emeritus of the University of Tokyo
- Forng-Chen Chiu, Ship and Ocean Industries R&D Center

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- Jen-Hwa Guo, National Taiwan University
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- Toshihiro Maki, University of Tokyo
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Student Poster Competition Chair

- Chan-Chia Yeh, National Taiwan University

Conference Administration

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- **Publications:** Yen-Hsiang Chen, National Taiwan University
- **Exhibition:** Sheng-Wei Huang, National Taiwan Ocean University
- **Administrative Support:** Yu-Ting Hung, National Taiwan University

The Singapore Autonomous Underwater Vehicle Challenge (SAUVC) 2025: The 10th Edition

Hari Vishnu and Bharath Kalyan (OES Singapore Chapter) With Inputs From SAUVC Organizing Committee

Group photo.

SAUVC celebrated another successful year with its 10th edition held during 14–17 March 2025. Continuing its trend of growth, this year's event hit new records in team registration and participation, reinforcing its position as the largest SAUVC to date. The event was endorsed by the United Nations Decade of Ocean Sciences, emphasizing its alignment with global initiative goals, notably addressing five of its ten challenges. This endorsement also underscores the critical role of IEEE OES in the Decade's framework.

A new addition to this event was a full-day marine robotics hands-on workshop exclusively for high-school students, conducted on 13 March. This initiative aimed to enhance marine robotics education at the school level and inspire students toward careers in this field. This plan to synergize the events worked out successfully, and further details will be covered in a separate article.

SAUVC in Numbers

Registration: 83 teams registered for the event. These teams had to prequalify for participation by submitting a video of their AUV swimming underwater, with a requirement that the video should show it swimming for at least 10s and demonstrating their AUV's depth control. The requirements were made more stringent this year considering how team videos have been getting better in previous years, limiting the video length strictly to a minute and with must-meet requirements.

- Participation: 73 teams participated by submitting videos as part of pre-qualification requirements.
- Selected: 51 teams were selected from these to attend the event in Singapore. All the videos were of very high quality, even better than last year. Even given the clear and strict criteria, the judging team had a hard time shortlisting the teams.
- Competed: 41 of the selected teams made it into the event, which again, is the highest ever for the event. Some teams could not make it due to technical or financial issues mostly. Students in the region (especially South Asia) often develop their AUVs on tight budgets and do not necessarily find the funds to travel so far for the event. Nevertheless, despite the travel, visa and funding issues, it is impressive that so many teams made it.
- ~440 participants made it to the event in total including students and their mentors, from
- 13 countries (India, Singapore, Indonesia, Malaysia, Turkey, Russia, Hong Kong, Saudi Arabia, Sri Lanka, Bangladesh, Macau, Australia and Azerbaijan). This year, we had the first ever teams from Azerbaijan and Australia participating at the event, and the second-ever team from Saudi Arabia, thus extending our reach now to Central Asia and the Pacific! Needless to say, both teams were elated to be here.
- 2 school teams - one from Alana Science High school, Turkey, which is a recurring team from last year, as well as a team from Pui Ching Middle School, Macau.

We had the highest participation yet in this event, and this was clear in terms of how the venue was packed throughout the event (see the header photo!). The representation of teams from developing countries across Asia was extensive, and shows the value that SAUVC brings to this region.

Teams being given briefings on the event, and on IEEE OES, in a fully packed hall.

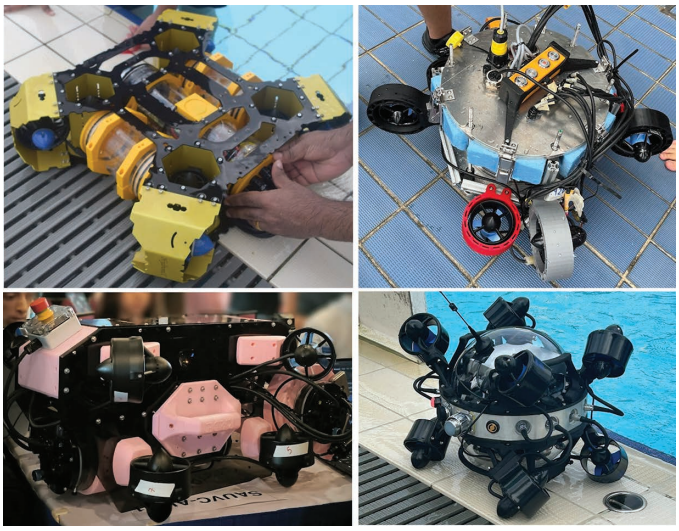
The Challenge

SAUVC 2025 maintained the challenges from the previous year, including an underwater communication task to promote teams to think about this important technological problem. However, the TCOMS Ocean basin facility bonus round with waves and currents was omitted due to logistical issues.

The competition involved a qualification and a final round. To qualify, AUVs navigated through a gate without surfacing or contacting any structures. The top 20 teams moved to the finals, where they completed tasks to assess their capabilities in navigation, positioning, actuation, communication, and robotic manipulation. The table below outlines the various functional capabilities tested in the corresponding tasks.

No.	Task	Aspect of operation
1.	Passing through a gate, avoiding red flare	Navigation, Obstacle avoidance
2.	Locating a particular bucket amongst 4 options, and dropping a ball into it	Target acquisition and manipulation, Acoustic/ Visual localization
3.	Moving out of the bucket arena, returning and reacquiring the ball dropped.	Target reacquisition and manipulation
4.	Bumping against a flare holding a ball to drop it, in a particular order	Underwater communication and Visual Localization

Judge Venu interacting with teams, judging the Innovation award.



Some cool AUV designs.

Points were awarded based on task difficulty, timing, and AUV specifications. A complete description of the tasks, static judging criteria and award of points are covered in the competition rule book available at https://sauvc.github.io/rulebook/.

SAUVC 2025 Award Winners

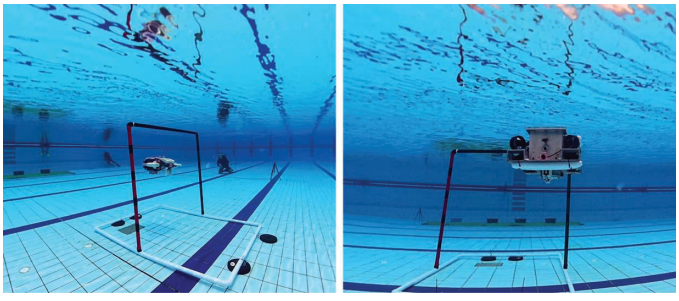
This year, there were 20 finalist teams. The winner of SAUVC 2025 was Team Mecatron from the Nanyang Technological University, Singapore, who were runner-up in the previous edition, showing notable improvement from the previous year. Due to close scoring, a joint runners-up award was presented to the next two teams.

Top 5 teams in the finals:

1. Mecatron from Nanyang Technological University, Singapore,
2. HYDROships from Shipbuilding Institute of Polytechnic Surabaya, Indonesia,
3. Nirma AUV from Nirma University, Ahmedabad, India,
4. Marine Belido from Universitas Multi Data Palembang Palembang, Indonesia,
5. Searious Business from The Hong Kong Polytechnic University.

Indonesian teams showed remarkable improvement this year. However, overall performance was not significantly better than 2024, as only two teams hit the flares, and none succeeded in underwater communication.

In addition to the top 3 finalists, the IEEE OES innovation award went to Team Manta Ray from The Hong Kong



Some of the winning AUVs in action underwater.

First prize winner from Nanyang Technological University, Singapore being given the award by Dr. Lim Joo Ghee from Singapore Polytechnic.

Joint runner-up teams from (above) Shipbuilding Institute of Polytechnic Surabaya being awarded by Dr. Daniel Tan from MPA, Singapore, and (below) Nirma AUV from Nirma University, India, being awarded by Mr. Raj Nagalingam from SUT, Singapore.

Polytechnic University. The award was sponsored by Kongsberg Discovery this year. It was judged by a panel consisting of the SAUVC technical committee, and included inputs from external judges (including Dr. Daniel Tan from Marine Ports Authority), the divers who observed the AUVs, and Dr. Pallayil did a walk-about talking to the teams. The Manta Ray AUV turned quite some eyes with their simplistic design using a transparent and inexpensive cat bowl hull to house the electronics, a simulator developed in Minecraft to

Winners of the OES Innovation award, Team Manta Ray, who were awarded by Mr. Chee Kong from Kongsberg Discovery, Singapore.

test the AUV, and a Macbook mini as the computer inside their vehicle (they also had a schematic showing that the overall cost of the system was manageable despite the Macbook used, and they were even ready to throw their AUV into the pool!). The AUV ranked a joint 6th in the overall competition.

Gala Dinner, Award Ceremony and Panel discussion

The event concluded with a gala dinner and award announcement at the Shaw Foundation Alumni House on March 17th. This ceremony celebrated achievements, facilitated networking, and included exciting technical talks from marine engineering experts including Dr. Daniel Tan from Marine Ports Authority Singapore, and Mr. Raj Nagalingam from the Society for Underwater Technology. Additionally, a video showcasing Schmidt Ocean Institute's research vessel Falkor Too and the OES Berths of Opportunity program was presented. Following this, the attendees attended a hearty gala dinner sponsored by Schmidt Ocean Institute.

Some intense moments at the challenge.

Talks being given by Dr. Daniel Tan (above) and Mr. Raj Nagalingam (below) at the workshop.

Event Publicity and Social Outreach

This year's event saw an even more concerted social media campaign over Facebook, Instagram and LinkedIn, being well-covered in terms of photos and videos. Our Facebook and Instagram handles showed a reach of 16k and 68k respectively, and Linkedin showed 47k impressions over January to April alone. There were 77k and 428k views over the last 3 months. The posts reached a diverse audience, mainly from South Asia, Indonesia, Turkey, U.S., and Singapore.

Summary of social media statistics for the event.

Sponsors of SAUVC 2025.

Sponsorship

IEEE OES has always been a regular sponsor of SAUVC in terms of sponsorship, as it was in this year. Other sponsors included Schmidt Ocean Institute, Sonardyne, IEEE TryEngineering STEM grant, Kongsberg Discovery, Society for Underwater Technology, BlueRobotics, Sea and Land Technology and Breaking the Surface 2025. SAUVC is run solely on sponsorship, for which organizers express their gratitude.

Concluding Remarks and Success Stories

SAUVC has established itself as a leading and prominent student competition for autonomous underwater vehicles across Asia, Australia, and Europe over its ten editions. It has garnered considerable interest within the student robotics community and has had a tangible impact on student learning and ocean education outcomes. Previous SAUVC winners have gone on to join marine robotics labs and/or industry jobs worldwide, which is a matter of pride for us.

The competition's policy of no registration fees aims to encourage broad participation, particularly from developing nations, and supports educational outreach by facilitating interactions with experts and mentors. This policy aims to encourage novice teams to compete, with OES membership drives conducted as part of the registration process, and we once again thank our sponsors for supporting this. The substantial representation in terms of participating countries, number of students, and diversity is deemed encouraging. This approach supports the growth of marine robotics interests globally and fosters innovation among young engineers. The event's educational outreach extends beyond competition, as participants gain invaluable hands-on experience and mentorship from marine robotics experts and committee members.

SAUVC's commitment to nurturing talent is evident in the success stories of former participants—at least four marine robotics-based startups have originated from teams participating

in SAUVC. These include BeeX in Singapore (from team Bumblebee), BRACU (from the Bangladesh-based BRACU Duburi team), Tiburon from the National Institute of Technology Rourkela, India. Teams from Nirma Institute of Technology and Christ College of Engineering are also undertaking R&D projects in India. Another success story we have learnt is that many of these winners have gone on to win other competitions like RoboSub, showcasing how the learning experience at SAUVC fostered their growth, and more SAUVC winners are eyeing other competitions as well.

Overall, SAUVC continues to serve as a pivotal platform for fostering marine robotics education and innovation, leveraging its extensive reach and support from sponsors to create lasting impacts in the field. The event's continuous growth and success highlight its significance as a catalyst for student learning and technological advancement in underwater vehicle systems.

The SAUVC 2025 organizing committe.

Marine Robotics Workshop in Argentina, March 10–14, 2025

Gerardo "Gerry" Acosta, VP for W&S

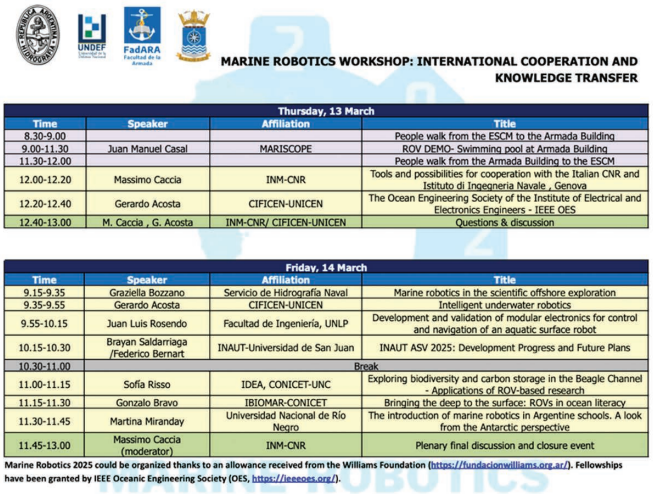
This event was free of charge, with prior registration, and consisted of:

- A course on marine robotics of about 12 hours (from March 10th to 12th). This course was taught by Professor Massimo Caccia, an expert in this field, from the Italian National Research Council.
- A workshop where academia and industry showed their current activity, of about 12 hours (from March 13th to 14th)

The venue was the Escuela de Ciencias del Mar (Sea Sciences School), located at Av. Antártida Argentina 425, in Puerto Madero, Buenos Aires City, Argentina. The local organizer was the Naval Hydrography Service, part of the Ministry of Defense, also with the support of the Argentinean Navy. Thanks to an allowance received from the **Williams Foundation**, Prof. Caccia's travel was made possible. Also thanks to Oceanic Engineering Society **IEEE OES**, there were travel grants for students and young professionals attending the whole week.

During the first three days, the marine robotics course was taught by Professor Massimo Caccia of the Istituto di Ingegneria del Mare, Consiglio Nazionale delle Ricerche, Genoa, Italy. During the last two days, the workshop was held in which the Argentinean R&D groups presented their progress and current work. Another attendee was Mariscope, a company that manufactures remotely operated underwater vehicles (ROVs), based in Puerto Madryn (Argentina), Chile and Germany. They

Figure 1. organizing Institutions.



MARINE ROBOTICS WORKSHOP: INTERNATIONAL COOPERATION AND KNOWLEDGE TRANSFER

Thursday, 13 March			
Time	Speaker	Affiliation	Title
8.30-9.00			People walk from the ESCM to the Armada Building
9.00-11.30	Juan Manuel Casal	MARISCOPE	ROV DEMO- Swimming pool at Armada Building
11.30-12.00			People walk from the Armada Building to the ESCM
12.00-12.20	Massimo Caccia	INM-CNR	Tools and possibilities for cooperation with the Italian CNR and Istituto di Ingegneria Navale , Genova
12.20-12.40	Gerardo Acosta	CIFICEN-UNICEN	The Ocean Engineering Society of the Institute of Electrical and Electronics Engineers - IEEE OES
12.40-13.00	M. Caccia , G. Acosta	INM-CNR/ CIFICEN-UNICEN	Questions & discussion

Friday, 14 March			
Time	Speaker	Affiliation	Title
9.15-9.35	Graziella Bozzano	Servicio de Hidrografía Naval	Marine robotics in the scientific offshore exploration
9.35-9.55	Gerardo Acosta	CIFICEN-UNICEN	Intelligent underwater robotics
9.55-10.15	Juan Luis Rosendo	Facultad de Ingeniería, UNLP	Development and validation of modular electronics for control and navigation of an aquatic surface robot
10.15-10.30	Brayan Saldarriaga /Federico Bernart	INAUT-Universidad de San Juan	INAUT ASV 2025: Development Progress and Future Plans
10.30-11.00	Break		
11.00-11.15	Sofía Risso	IDEA, CONICET-UNC	Exploring biodiversity and carbon storage in the Beagle Channel - Applications of ROV-based research
11.15-11.30	Gonzalo Bravo	IBIOMAR-CONICET	Bringing the deep to the surface: ROVs in ocean literacy
11.30-11.45	Martina Miranday	Universidad Nacional de Río Negro	The introduction of marine robotics in Argentine schools. A look from the Antarctic perspective
11.45-13.00	Massimo Caccia (moderator)	INM-CNR	Plenary final discussion and closure event

Marine Robotics 2025 could be organized thanks to an allowance received from the Williams Foundation (https://fundacionwilliams.org.ar/). Fellowships have been granted by IEEE Oceanic Engineering Society (OES, https://ieeeoes.org/).

Figure 2. Talks at the two days workshop.

conducted an underwater test of an ROV on Thursday morning at the Libertad Building of the Argentine Navy. Their presentations can be appreciated in the program of Fig. 2.

A grant from the IEEE OES funded the participation of advanced students and young professionals. Even when the event registration was free of charge, to help in transport and allowances expenses, the IEEE OES offered scholarships. To qualify for them, in addition to completing the event registration forms, interested people were invited to fill in another scholarship application form on the website. This form requested additional information, such as the candidate's CV, age, graduation date, workplace, motivation for attending, among other information. Seven candidates were finally selected. The selection results were communicated via email, and the successful candidates were asked for an expense estimate, as they came from very different locations of Argentina, some from places as far away as Bariloche or Puerto Madryn, and others from Rosario. Funding was also not granted to anyone from the proximities of Buenos Aires Capital or La Plata, as an exclusionary condition.

In Fig. 3, Dra. Bozzano is explaining the great assistance of marine robots in offshore exploration. In Fig. 4, Dr. Acosta is presenting the IEEE OES to the general public at the Escuelas de Ciencias del Mar.

As part of the first morning after the course, attendees had the opportunity to feel the experience of driving an ROV in a swimming pool within a Navy building, provided by the Mariscope enterprise.

Figure 3. Dra. Graziella Bozzano (SHN), in one talk.

Figure 4. Dr. Gerardo Acosta (IEEE OES) is presenting OES.

Figure 6. Workshop attendees. From left to right: Dr. Gerardo Acosta (IEEE OES), Dr. Mariano De Paula (INTELYMEC-CIFICEN), Dr. Massimo Caccia (Professor in charge of the course on Marine Robotics), Dra. Graziella Bozzano (SHN and Workshop Chair).

Figure 5. Attendees participating in the hands-on workshop with the Mariscope's ROV (Dr. De Paula is driving the ROV in the rightmost snapshot).

IEEE Symposium on Maritime Informatics & Robotics
26 & 27 June 2025, Ermoupolis, Syros, Greece

Dimitris Zissis, University of the Aegean, Greece

Welcome to the Maritime Symposium 2025 in Syros!

For those of you who have visited other Greek islands, Syros stands out with its rich maritime history and industrial legacy. It is fitting that this symposium, focused on maritime innovation and blue technology, takes place on an island that was once a hub of pioneering advancements.

Shipping and shipbuilding were central to this thriving economy, and the entire island was deeply connected to the maritime industry. The port of Hermoupolis hosted one of the Mediterranean's most intricate transit warehouses, and Syros was home to Greece's first ship register and the Hellenic Steamship Company, founded in 1856.

Today, Syros's legacy calls on us to confront new complex challenges. With the exponential growth of data, artificial intelligence, and autonomous technologies, we stand at the forefront of a radical transformation in the way ships operate—and in how society functions at large. Massive amounts of data are reshaping the maritime industry at an unprecedented rate, offering the potential to make ships greener, safer, and more efficient.

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The Symposium will feature selected presentations and panel sessions presenting recent developments in autonomous systems, robotics, IoT, Artificial Intelligence, big data analytics and machine learning, and the applications they enable in the maritime domain. The event will include the 3rd edition of the Aegean Ro-Boat Race.

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- Human-robot interaction in marine settings/ human-in-the-loop
- Applications for marine systems, including autonomous vehicles
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Bob Wernli – Beacon Co-Editor-in-Chief and Photographer Stan Chamberlain

We elect 6 new Administrative Committee members each year for a three-year term. They do an excellent job of keeping OES running smoothly and meet at each OCEANS conference to make that happen. So, as a thanks to our past AdComs, here are a few photos of those who attended some of the past OCEANS AdCom meetings. ***THANKS***

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OCEANS 2017 Aberdeen AdCom meeting attendees.

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Who's Who in the IEEE OES

Tomonari Akamatsu, IEEE OES distinguished lecturer, Professor, Research Organization for Nano & Life Innovation, Waseda University

It was a great honor for me to deliver a keynote address at the 2025 IEEE International Symposium on Underwater Technology in Taipei, titled "Progress in Underwater Acoustic Technologies." When I began my professional career more than 35 years ago, I never imagined I would one day speak on this topic at an international conference.

Figure 1. I gave a talk at UT 2025 in Taipei.

From Theoretical Physics to Dolphin Acoustics

Back then, I had studied theoretical physics and earned my master's degree from Tohoku University in 1989. I expected to become a researcher or engineer working in fields like nanotechnology or quantum simulation. However, I ended up joining the National Research Institute of Fisheries Engineering—a decision that changed my life.

The field of theoretical physics was highly competitive, filled with exceptionally bright minds. I felt there was little room for me to thrive academically, so I looked for a path where I could make a more direct contribution. The institute was looking for someone with a background in acoustics to help develop ultrasonic devices to deter dolphins from getting entangled in fishing nets. At the time, many dolphins, porpoises, and seabirds were being caught in drift nets primarily used to catch salmon. International pressure to protect marine life was mounting, and the use of gill nets was under threat of being banned. My supervisor, Dr. Hatakeyama, and his team developed a high-power ultrasonic transmitter and tested it in open water. The device was effective over a few hundred meters, but a single gill net could be as long as 15 kilometers. Deploying dozens of transmitters along each net wasn't feasible due to the cost and complexity. I had switched fields, but quickly found myself without a clear research direction.

Unraveling the Mystery of Entanglement

One puzzling question drove me forward: Why were dolphins and porpoises getting caught in nets, despite their advanced biosonar capabilities[1] that should allow them to detect obstacles easily? I hypothesized that these animals might not always use echolocation and could sometimes "switch it off." Motivated by this idea, we secured a small research grant and developed a miniature ultrasonic event recorder called the A-tag (Acoustic Tag). We attached it to finless porpoises in a shallow lake in

Figure 2. Bering sea, North Pacific Ocean in 1990. A Dall's porpoise got entangled and hauled out on the deck of a fishing vessel.

Figure 3. Attaching a miniature datalogger on a finless porpoise 2006 Semi-natural Reserve, Hubei, China with my long-term colleague Dr. Ding Wang (left).

China—a safe environment for capture and release. The data confirmed that while porpoises echolocate every few seconds[2], they do occasionally stop for several minutes.

This insight led us to believe that if these animals produce echolocation clicks frequently, we could detect their presence acoustically. We attached the A-tag to a towed cable and conducted a large-scale survey from Yichang to Shanghai to search for the Chinese river dolphin (baiji)—one of the world's most endangered aquatic mammals. Although we ultimately could not locate any baiji during the 3,400-km expedition[3], we did detect many finless porpoises both visually and acoustically.[4] This technique was later applied to search for other endangered species, such as the vaquita in Mexico and Ganges river dolphins[5] in India. Today, acoustic remote sensing has become a standard method in the study of toothed whales. I consider myself fortunate to have contributed during the early developmental stage of this technology, which was evolving simultaneously in research groups around the world in the 2000s.

Figure 4. Preparing a passive acoustic monitoring device to search baiji in the Yangtze River in 2006.

Figure 5. Searching vaquita with NOAA team in 2008 in Gulf of California, Mexico.

Figure 6. Searching for Ganges River dolphins in 2008, using an ultrasonic array system developed by Dr. Ura, Ms. Harumi and colleagues at University of Tokyo supported by Dr. Bahl at IIT, India. A-tag was also applied to detect echolocation sound of the dolphins in a very turbid water system.

Seeing with Sound: Acoustic Remote Sensing of Aquatic Life

Once we confirmed that dolphins and porpoises could be detected through sound, we began developing various tools, systems, and software to "visualize" their presence, density and behavior. We deployed receivers on the seafloor and even attached them to large marine animals like blue whales and Amazonian manatees.

Biologging—attaching sensors to individual animals—became increasingly popular. Acoustic biologging allowed us to monitor vocal behavior, including how often and how loudly animals produced sounds. These parameters are crucial for

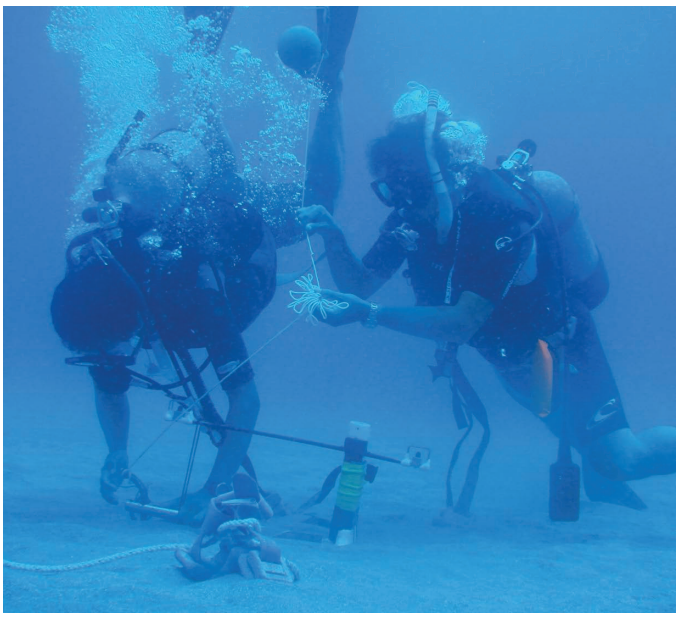

Figure 7. Deploying A-tag (long term version) on a seabed off Ogasawara Islands, Tokyo in 2010.

Figure 8. Acoustic biologging on a blue whale, the heaviest animal in the earth life history - off Husavik, Iceland, in 2011.

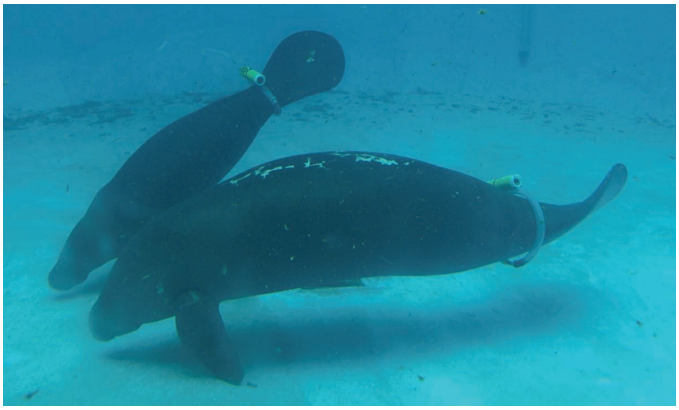

Figure 9. A recorder was attached on Amazon manatees housed in a tank of INPA using tail ring in Manaus, Brazil, 2011.

Figure 10. Field survey team of Bangladesh and UK off Chittagong in 2012.

estimating animal population densities.[6] Simply counting received sounds is not enough—animals that vocalize more frequently or loudly can cause underestimation of true population numbers. Accurate density models require detailed sound source parameters.

Figure 11. A-tag towed in Istanbul strait, Turkey in 2013.

At the same time, we developed a simple but effective survey method by towing A-tags on ropes. This allowed us to estimate population numbers even without a trained visual observation team. By using two A-tags as independent "observers," we applied acoustic mark-recapture techniques[7] to estimate the number of animals within a certain distance of the survey line.

From Acoustics to Ocean Policy

In 2020, I joined the Ocean Policy Research Institute of the Sasakawa Peace Foundation as a director of the research division. This role broadened my horizons significantly. I managed diverse projects ranging from maritime satellite communication, AI-driven ocean policy analysis, blue carbon credit and sustainable island economies. I also helped establish an international research fund called Ocean Shot. Though most of these topics had little to do with acoustics or biology, my background in theoretical physics proved invaluable. My mentors at the

Figures 12. A symposium organized by OPRI, Tokyo in 2023. I was a coordinator.

university taught me to identify the fundamental issues, separate core challenges from peripheral ones, and find practical solutions—skills that are applicable across disciplines.

Underwater Acoustics and Sustainable Development

After the 2011 earthquake in Japan, renewable energy became a national priority, especially offshore wind power. However, construction activities like pile driving generate extremely loud underwater sounds. Environmental impact assessments (EIAs) are now essential, both for protecting marine ecosystems and for supporting fisheries, in line with the UN's Sustainable Development Goal 14.

Figure 13. The first offshore windmill off Choshi, Japan.

Figure 14. Pile driving ship to construct a basement of an offshore windmill, off Kitakyusyu, Japan in 2024.

As a specialist in underwater bioacoustics, I've advised developers, EIA contractors, and government agencies at both local and national levels. I've also contributed to international standards for underwater acoustics as a member of ISO, and to conservation efforts through IUCN. One valuable lesson I've learned at OPRI is the importance of considering the views of all stakeholders. Solutions must be sustainable and balanced—but sometimes no immediate solution exists. In such cases, we must accept the challenge and continue searching, often by reflecting on the past to find ideas for the future.

Perhaps it was this journey—from physics to fisheries, from acoustics to policy—that led to my invitation to present at the 2025 IEEE symposium. I'm deeply grateful to everyone who has supported my work and curious enough to read this reflection. I welcome your feedback, ideas, and questions. Your insights could spark the next wave of collaboration, just as many of mine began in unexpected places around the world.

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