OES BEACON

Newsletter of the Oceanic Engineering Society

DECEMBER 2025, Volume 14, Number 4 www.ieeeoes.org (USPS 025-095) ISSN 2164-8042

IEEE

IEEE Oceanic Engineering Society

The OES BEACON is published four times a year as a benefit to the membership of the IEEE Ocean Engineering Society. The OES Beacon is printed and distributed from IEEE headquarters in New York City, New York, USA.

Editor-in-Chief:
Harumi Sugimatsu—harumis@iis.u-tokyo.ac.jp
Co-Editor-in-Chief:
Robert L. Wernli—wernli@ieee.org

Associate Editors:
Masakazu Arima
Toshihiro Maki
Takumi Matsuda
Katsunori Mizuno
Takeshi Nakatani
Farley Shane
Blair Thornton
Masahiro Yagi

Contributing Editors:
Australia—Mal Heron
China—Lian Lian
Canada—James S. Collins
France—Philippe Courmontague
Germany—Christoph Waldmann
India—M. A Atmanand
Japan— Hayato Kondo
England—Blair Thornton
Korea—Son Cheol Yu
Scotland—John Watson
Singapore—Venu Pallayil
Taiwan—Jenhwa Guo
USA—Stan Chamberlain

Publication Copy-Due schedule:
1st Qtr: March 2026: Februray 14 2nd Qtr: June 2026: May 14

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.

IEEE OCEANIC ENGINEERING SOCIETY EXECUTIVE COMMITTEE

President
ELIZABETH CREED

Executive Vice President
MALCOLM (MAL) L. HERON

Vice President
Technical Activities
SHYAM MADHUSUDHANA

Vice President
Professional Activities
BHARATH KALYAN

Vice President
Workshops & Symposia
GERARDO ACOSTA

Vice President
OCEANS
VENUGOPALAN (VENU) PALLAYIL

Secretary
ROSMIWATI MOHD MOKHTAR

Treasurer
WEIMIN HUANG

Journal Editor-in Chief
KARL VON ELLENRIEDER

Past President
CHRISTIAN DE MOUSTIER

ELECTED ADMINISTRATIVE COMMITTEE

2023–2025
ANDREAS MAROUCHOS
NIKOLA MISKOVIC
VACANT
JOHN WATSON
ALBERT (SANDY) J. WILLIAMS 3RD
STEPHEN WOOD

2024–2026
MONIKA AGRAWAL
GABRIELE FERRI
WEIMIN HUANG
TOSHIHIRO MAKI
GIULIA DE MASI
KONSTANTINOS PELEKANAKIS

2025–2027
FRANCESCO MAURELLI
LAURA MEYER
MAURIZIO MIGLIACCIO
JACQUELINE NICHOLS
ANANYA SEN GUPTA
HARUMI SUGIMATSU

IEEE OES Beacon Newsletter (ISSN 2164-8042) is published quarterly by the Oceanic Engineering Society of the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 3 Park Avenue, 17th Floor, NY 10017-2394. $1.00 per member per year (included in Society fee) for each member of the Oceanic Engineering Society. Printed in U.S.A. Periodicals postage paid at New York, NY and at additional mailing offices. Postmaster: Send address changes to IEEE OES Beacon Newsletter, IEEE, 445 Hoes Lane, Piscataway, NJ 08854
©2025 IEEE
Permission to copy without fee all or part of any material without a copyright notice is granted provided that the copies are not made or distributed for direct commercial advantage, and the title of the publication and its date appear on each copy. To copy material with a copyright notice requires specific permission. Please direct all inquiries or requests to IEEE Copyrights and Permissions Office.

IEEE prohibits discrimination, harassment, and bullying.
For more information, visit http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html.

Table of Contents

Member Benefits—Did You Know?

Members Can Access Hundreds of Free eBooks Through IEEE *Xplore*

IEEE members have free access to over 380 classic eBooks from IEEE Press. The collection features technologies across 15 content areas from practical handbooks and professional books to advanced texts and reference works. New eBooks are added regularly. Find your next great read now.

To access the eBook Classics collection, log in to IEEE Xplore (https://ieeexplore.ieee.org/browse/books/title) using your IEEE member account. Once you are logged in, select the "Classics" tab to find a listing of all the titles available via this program.

From the OES BEACON Editors

Harumi Sugimatsu and Robert Wernli

Welcome to the December 2025 issue of the Beacon. As you'll see in this issue it has been a busy year. The OES continues to be very active. Accordingly, refer to the Table of Contents for a listing of the many activities that OES has been involved in this year and next.

Reports from our Executive Committee highlight recent and upcoming activities of the society and what we can expect this year and next. The VP for Workshops and Symposia describes the many events recently held and next year's nine planned W&S that are keeping the society active around the world. Five recent workshops, symposia and conferences that OES was involved in are reported in this issue.

Our VP for OCEANS provides the latest on the OCEANS conferences. A report on the recent OCEANS 2025 Great Lakes conference is also included. Next year's approved events include future OCEANS conferences scheduled for Sanya, China, and Monterey, California.

Included is an article on the awards OES gave to our outstanding members at the OCEANS 2025 Great Lakes. And, this issue includes the call for OES Award nominations for next year. Also included from OCEANS 2025 Great Lakes are the Student Poster Competition (SPC) results including articles by the 1st and 3rd place winners and the winning SPC paper.

The VP for Technical Activities reports on the status and future of the OES Technical Committees and our Distinguished Lecturers (DLs). A report on a recent DL lecture is included. There is also lots of activity ongoing as described in our Chapter Coordinator's report and articles on the activities of many of our chapters. Our Student Branch Chapters are also very active as reported in this issue.

Our VP for Professional Activities gives us the latest on activities including those held at OCEANS 2025 Great Lakes. Also included are plans for OES to participate in other upcoming events including nest year's Offshore Technology Conferences.

And don't miss this issue's report on our outstanding members in this issue's Who's Who in IEEE OES.

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.

Have you done something exciting lately? Received an award or professional recognition? Be sure to contact your editors about submitting an article.

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.

Harumi at OCEANS 2025 Great Lakes.

Harumi and me at OCEANS 2017 Aberdeen and OES will return there again with OCEANS 2027 Aberdeen.

From the President

Elizabeth Creed, President, president@ieeeoes.org

As 2025 draws to a close, I would like to thank the Administrative Committee (AdCom) members whose three-year term ends on 31 December 2025 (Andreas Marouchos, Nikola Miskovic, John Watson, Albert J. (Sandy) Williams, and Stephen Wood) for their wisdom and time commitment. They, along with the rest of the Administrative Committee, recently completed revising the OES Constitution and Bylaws to bring them into alignment with the IEEE Constitution and Bylaws. The biggest change to the Constitution is that Graduate Students now have the same rights and privileges as those with the grade of Society Member.

I would also like to congratulate the incoming AdCom class (2026 – 2028), M.A. Atmanand, Filippo Campagnaro, Andreas Marouchos, Gaultier Real, Karen Renninger-Rojas, and Christopher Whitt on their election to the AdCom and welcome them to the OES Administrative team.

2026 is shaping up to be an exciting and busy year, and we need your help to make it a success. There are a number of ways that you can get involved:

- Join an OES Technology Committee (https://ieeeoes.org/key-activities/technology-committee/) and help organize a stand-alone workshop or a technical program at an OCEANS Conference.
- Participate in your OES Chapter's activities, or if an OES Chapter does not exist in your area, our Chapter Coordinator, Maurizio Migliaccio (migliaccio@uniparthenope.it), will help you start one.
- Attend / help organize activities at an OCEANS Conference
  The OES will be the sole organizer of the OCEANS Conferences, starting with OCEANS Sanya, 25–28 May 2026 (https://sanya26.oceansconference.org/), followed by OCEANS Monterey, 21–24 September 2026 (https://monterey26.oceansconference.org/). We are looking for volunteers to help put together a cutting-edge program for these and future OCEANS Conferences by helping leadership organize townhalls, panel sessions, technical sessions, etc., to make the OCEANS Conference THE place where professionals interested in aspects of science, engineering, and technology that address research, development, and operations pertaining to all bodies of water come to share their ideas on the creation of new capabilities and technologies from concept design through prototypes, testing, and operational systems to sense, explore, understand, develop, use, and responsibly manage natural resources.
- Participate in the OES program at an Offshore Technology Conference (OTC) (https://2026.otcnet.org/).
  As a sponsor of the Offshore Technology Conferences (OTC), the OES will be hosting technical programs at both of the 2026 OTC events
  - OTC Asia, 31 March – 2 April, 2026, at the Kuala Lumpur Convention Center, Malaysia, and
  - OTC Houston, 4–7 May, 2026, at the NRG Park, Houston, TX.
- Attend the 2026 AUV Workshop
  - 1–3 September 2026, National Oceanography Centre, Southampton, UK
  - In addition to standard symposium papers, **open-access peer-reviewed papers** will also be published as an IEEE Journal of Oceanic Engineering Special Issue and presented at the symposium.
  - Information about the **peer-review track** and the **standard track** can be found on this website (https://www.auv2026-southampton.com/).
- Mentor a student team participating in the annual Singapore AUV Challenge (SAUVC) (https://sauvc.org/).

If you are interested in assisting with any of the activities mentioned or have suggestions for additional OES activities, please share your ideas with the OES VP for Professional Activities (vp-professional-activities@ieeeoes.org), the VP for Technical Activities (vp-technical-activities@ieeeoes.org), and the VP for OCEANS (vp-oceans@ieeeoes.org).

Executive VP Report

Malcolm Heron, Executive VP

IEEE technologies have direct benefits to humanity, and some work indirectly through applications to benefit society. The Oceanic Engineering Society (OES) is tasked to develop all aspects of science, engineering and technology that pertain to research, development, and operations, involving all bodies of water. Through this work, OES delivers benefits to humanity by enhancing knowledge, improving practical operations, and promoting sustainability of oceans, rivers and lakes. This underscores that OES embraces a wide range of technologies and serves humanity through their application.

This became clear to a group of OES volunteers who staffed an information booth at the Region 10 flagship conference, TENCON 2025, held in Malaysia in October (look for the report in this issue). The delegates to TENCON come from a wide range of technological backgrounds, and students who were there for the Innovation Challenge and Robotics Workshop on Day 0 of TENCON primarily hailed from traditional electrical engineering faculties. Most questions at the booth were about the technologies applicable to the ocean, rather than the higher-level challenges in ocean science, engineering and operations. They wanted to know how their training would apply in OES. This is quite a contrast to the more science-oriented events like the Ocean Sciences Meeting and AGU conferences, where people want to know more about the challenges in the ocean environment. At TENCON the OES volunteers found themselves talking about the breadth of technologies needed in Ocean Engineering rather than the environment itself. This approach by OES volunteers helped to focus the attention of students and other delegates, whatever their specific technological experience or the flavour of their degree. The experience highlighted the importance of tailoring brochures and materials to align with the anticipated interests of booth visitors at each event.

Another notable observation is that most delegates to TENCON are already members of IEEE, so there is only a very low financial hurdle to join OES. This also applies to IEEE members in your Sections and Councils where you have personal contacts. Promotion of the Society within IEEE is fertile ground for membership drives.

VPTA Column

Shyam Madhusudhana, VP for Technical Activities

As we close out 2025, I am pleased to reflect on a productive year and share important updates on the Technical Activities portfolio.

After considerable effort spanning multiple quarters, the Technology Committee overhaul process is now complete. The TC Chairs have provided and cross-vetted the final list of keywords describing each TC, and the Administrative Committee (AdCom) has approved the same. These concise, searchable keywords will make TC scopes clearer and more accessible to our membership. I am also delighted to announce that Atmanand M. A. has been reappointed as TC Coordinator to serve his second term (2026–2028). His leadership and dedication have been instrumental in guiding our TCs through this transition.

The Distinguished Lecturer (DL) program continues to thrive. We have broken previous years' records by having 16 DL talks this year. Furthermore, I am pleased to report that the AdCom has approved a slate of six newly appointed DLs for the 2026–2028 term:

Giulia de Masi (endorsement by DAAI TC)
Sorbonne University, Abu Dhabi
Roee Diamant (endorsement by UCP TC)
University of Haifa, Israel
Robert Petroccia (endorsement by UA TC)
NATO STO CMRE, Italy
Gopu Potty (endorsement by UA TC)
University of Rhode Island, USA
Fumin Zhang (endorsement by AMS TC)
Hong Kong University of Science and Technology, China
Xuebo Zhang (endorsement by UA TC)
Northwest Normal University, China

These exceptional individuals bring diverse expertise and perspectives to our global membership, and I look forward to their contributions to the program.

Our Chapters remain the backbone of regional engagement and activity. On November 13th, we held our final Chapter

Chairs meeting of 2025, organized brilliantly by our Chapters Coordinator, Maurizio Migliaccio. The meetings were held over two sessions, with the sessions timed so as to be convenient to folks from both Eastern and Western hemispheres, thereby facilitating wider participation from Chapters around the globe. The first session saw representatives from ten Chapters, and the second session had representatives from three Chapters. Each Chapter representative presented their activities from 2025 and outlined plans for 2026. The energy and commitment displayed during these sessions were truly inspiring. You can read more about it in Maurizio's article elsewhere in this issue.

Looking ahead to 2026 and beyond, several important initiatives are underway. Plans for organizing the IEEE-OES Summer School alongside the Sanya OCEANS conference are already in motion, building on the successful pilot we held in Singapore. The TC and Chapter activity funding scheme introduced earlier this year will be strictly followed going forward. TC Chairs and Chapter Chairs interested in organizing events in 2027 and seeking financial support from OES must submit their requests before June 2026. As 2026 will be my last year as VPTA, I will be working on recording all recently-introduced changes in practices into our Technical Activities Policies and Practices document, ensuring continuity and institutional knowledge for future leadership.

As always, I extend my sincere gratitude to all our TC Chairs and co-Chairs, Distinguished Lecturers, Chapter leaders, and volunteers who dedicate their time and expertise to advancing IEEE-OES' technical mission. Your continued engagement drives our success. Here's to a strong finish in 2025 and an exciting year ahead.

From the VP for Professional Activities—December 2025

Bharath Kalyan, Vice President for Professional Activities

OES had a strong and visible presence at OCEANS 2025 Great Lakes (29 September–2 October 2025). The OES booth drew significant interest, and the YP and WIE lunch panels were well attended, generating good discussions on professional growth for early-career professionals. The student mixer and the OES–MTS members' reception also saw strong turnout, further strengthening our community spirit.

OES also had an excellent booth presence at TENCON 2025 in Kota Kinabalu, Malaysia, (27–30 October 2025). A dedicated OES networking event was held, and further details will be shared in a separate article. Breaking the Surface (BTS), one of OES's supported events, concluded in Cyprus (9–16 November 2025). The event featured a diverse and high-quality program spanning marine robotics, oceanography, and marine biology.

Figure 1. A snapshot from Student Mixer.

Looking ahead, OES will have strong representation at OTC Asia, Kuala Lumpur, and OTC Houston in 2026. The year 2026 will be particularly exciting as we transition to hosting the flagship OCEANS conference independently. OCEANS 2026 will be held in Sanya, China, from 25–28 May 2026. We look

Figure 2. OES-MTS Members' Reception.

Figure 3. Remarks by the Past President Christian de Moustier during the OES-MTS Members' reception.


Figure 4. YP & WIE Luncheon.

forward to meeting members, strengthening engagement, and enhancing OES's global visibility at all these upcoming events.

Finally, I would like to extend my warm congratulations to Jacqueline Nichols on her election as VPPA for 2026. I wish her the very best in the year ahead.

If you have any feedback, you can contact me at vp-professional-activities@ieeeoes.org

Figure 5. Engagement at the OES booth by incoming VPPA 2026, Jacqueline Nichols, & VPO, Venu Pallayil.

From the Vice President for Workshops & Symposia

Gerardo "Gerry" Acosta, VP for W&S

Good to get in touch with you again from here, to keep you updated about our OES great activity in workshops and symposia spread all over the world. In these days that we are closing the calendar year, and we are making balances of goals and aspirations for the year, it is very gratifying to see that our Society once more succeeded on being the home for people willing to share experiences, knowledge, and networking around the oceans, from a technological and scientific standpoint. We will see part of the great deal of activity in workshops and symposia carried out reported in this issue of our Beacon, as well as the interesting upcoming events. For instance, you will find news about INORE's 2025 EU Symposium in Aalborg, Denmark; ICOE 2025 in Madras, India; Metrosea 2025 in Genoa, Italy; RAMI 2025 in La Spezia, also in Italy, and the great TENCON2025 reported from the Australia Chapter.

The *2025 IEEE Canadian Atlantic Ocean Symposium (IEEE CAOS 2025)*, organized by local OES Chapter in Halifax, Canada, was postponed due to organizational reasons to next year. It will be held from 20 to 22 July, 2026.

During **September** we had in India, and hosted by the IIT Madras at Chennai, the *7th International Conference on Ocean Engineering (ICOE 2025)* with a theme of Blue Economy and Sustainability, held from the 15th to 18th.

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

This **November**, from the 9th to 16th, we were 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 were 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. In addition to this hyperactive month, the OES also supported the *Symposium on Innovations and Technologies in Underwater Communications* in New Delhi, India, during 17-18 November, in a hybrid mode.

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

For next year we will also be involved in a great deal of workshops and symposia, which are mentioned in what follows.

Symposium on Marine Robotics for Ocean Sustainability, will be organized in Abu Dhabi, in a date to be defined.

OES traditional and successful competition *Singapore AUV Challenge – SAUVC26* will be held from 28-31 May, Sanya, China just after the OCEANS 2026 Sanya.

The *Underwater Robotics: Hands-on Remotely Operated Vehicle (ROV) Workshop for Primary and Secondary School Students in Malaysia - ROV Workshop 2026* will be held in Malaysia, in May, 2026, to empower STEM education in schools. Also in Malaysia, and with similar objectives about motivating young students, but during October, the *Underwater Robot Challenge 2026 (URC* 2026*)*, will be organized also by the local OES Chapter.

RAMI 2026 - Robotics for Asset Maintenance and Inspection, a marine robots' competition, is foreseen to happen in La Spezia, Italy, tentatively during July.

The *Underwater Communications and Networking conference (UComms 2026)*, a NATO-owned event co-sponsored by OES, will take place in Italy, during late August/early September, next year.

One of our most important symposia, the AUV 2026, will be co-sponsored with the University of Southampton, and will take place in this UK city, during 1-3 September 2026.

The *IEEE 11th International Conference on Underwater System Technology: Theory and Applications (USYS2026)* will take place during September, 2026, in China.

The 2026 edition of *Breaking the Surface (BtS)* will take place in Croatia in late September/early October.

Finally, a new edition of *MetroSea* will also take place in Sibenik Croatia, during 5–7 October 2026, with the support of OES.

If you wish to get involved in these workshops, 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 and co-sponsorship, as well as patronage with grants for students and young professionals. 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 last days of May for the W&S that want to be held during the following 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 during the remaining days of this year.

For the next two years, I am happy to announce that our OES will have **Dr. Bharath Kalyan**, the current VP for Professional Activities, as the **new VP for Workshops and Symposia**. He is a very active and generous volunteer who has been doing brilliant work in our Society. So, I wish him all the best in this new role. I also want to thank all of my colleagues in the ExCom and the AdCom for these years of learning and enjoying serving IEEE OES members from this position. During this time, all the successes were collective while the mistakes were individually mine. This is not a goodbye, I'm simply taking some time off to attend to the greater demands of my professional work. I hope to be back soon to keep on serving IEEE and our Society.

And as I always said, have a safe and pleasant navigation and tell me how I can help you!

VP OCEANS Report

Venugopalan Pallayil, Vice President for OCEANS (VPO)

Dear OES Colleagues,

We are coming to the end of another year and for OCEANS it has been a year of mixed success. While OCEANS Brest was a great success on all fronts, the Great Lakes conference was missing the usual North American vibe. We saw a significant reduction in delegate participation (about 40%) and exhibitors (about 35%). Though the number of papers presented were less, the overall technical programme was strong with a number of Town Halls filling up the shortage of technical papers. It is believed that the large cut in federal grants and the ongoing economic restructuring in the U.S. probably resulted in a smaller turn out at the Great Lakes OCEANS. This edition of Beacon carries a separate report on OCEANS Great Lakes and associated ancillary events. As many of you already know, this was also the last in the OCEANS Conference ongoing series where MTS will be partnering with IEEE OES. OCEANS will continue to be organized under the OES umbrella in the coming years without losing its technical and scientific appeal. We are also hopeful of continued support from our commercial partners and exhibitors. So, it will be OCEANS as usual in 2026 and beyond.

Preparations for OCEANS 2026 Sanya are progressing well. You may want to check out the conference website, https://sanya26.oceansconference.org, for details and updates. The abstract submission is open since 15 Oct 2025 and will close on 22 Dec 2025 as per the current announcement. There is also a call for organizing special sessions and this would be a great opportunity for OES Technology Committees to showcase their fields of interest at the conference by organizing workshops/tutorials or town halls at the conference on specific topics. We also encourage researchers who have recently published their research in Journal of Oceanic Engineering (JoE) to send an abstract if they wish to showcase their research in person to a wider audience for a better dissemination of their research outcomes. These abstracts require no reviews and will not be published in the Conference Proceedings.

We are expecting close to 700 delegates and 100 exhibitors at the conference. Also note that Sanya offers visa free entry for 59 countries as per the information given here: https://sanya26.oceansconference.org/visa-info/. So, make the best use of this opportunity to visit Hainan, China.

A call for future OCEANS for the years 2029 (Europe and North America) and 2030 (Asia and North America) had been put out in the last edition of Beacon Newsletter. You can also see the call details on our OES website at this link: https://ieeeoes.org/conference-events/conferences/. The current last date to receive the Letter of Interest (LoI) is 30 Nov 2025 and

may be extended if there are genuine requests. Hosting an OCEANS conference helps to showcase the local technical and scientific expertise in your country in the field of oceanic engineering through a larger participation of local researchers and industry leaders. It also provides an opportunity to network with international experts in your field of interest, help to foster research collaborations and exchange of ideas. Is there a local topic in the areas of ocean science and engineering that you would like to bring to the attention of researchers worldwide and discuss? OCEANS provide opportunities for organizing special topics of local interest at the conference. So, I look forward to your submissions soon for evaluation by the OCEANS Conference Coordination Committee (OCCC). Let me know if you need more time, we can discuss.

I will be back with more updates on OCEANS in the next edition of Beacon Newsletter. Note that OCEANS is your conference and we would like to hear your feedback on how we have been doing and how can we better serve our members and our ocean scientific community. Write your comments to vp-oceans@ieeeoes.org.

From the Journal Editor's Desk

Karl von Ellenrieder, Journal Editor-in-Chief

It was my great pleasure to meet with authors, reviewers, editors and others from the OES community during OCEANS 2025 Brest and OCEANS 2025 Great Lakes in Chicago this year and to see the latest research presented there. I look forward to meeting everyone at OCEANS 2026 in Monterey and Sanya. The moose hat above is worn in honor of the upcoming OCEANS 2027 Alaska.

I also look forward to receiving extended conference papers from interested OCEANS authors. One can find instructions for developing short OCEANS conference papers into significantly longer journal articles with the inclusion of additional novel results, and by expanding them to be more comprehensive in the editorial by EiC Emeritus N. Ross Chapman found here: https://doi.org/10.1109/JOE.2014.2313375.

The transition of the JOEs manuscript processing system from eJPress to Papercept is anticipated to be completed in December 2025. We hope authors, reviewers, and editors find the features of the new platform helpful in their work.

Lastly, 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:

- Yiming Zhong, Caoyang Yu, Tianqi Pei, Xianbo Xiang, Lian Lian. Dual Coefficient Passivity-Based Sliding Mode Control for Robust Path Following of Autonomous Marine Vehicles With Simulations and Experiments. https://doi.org/10.1109/JOE.2025.3595255
- Tiantian Guo, Enggee Lim, Miguel Lopez-Benitez, Fei Ma, Limin Yu. Underwater Acoustical Sensing for Target Localization With Rational Orthogonal Wavelet Signaling. https://doi.org/10.1109/JOE.2025.3577516
- Yang Yang, Lu Ma, Songzuo Liu, Gang Qiao, Yang Song, Tong Li. Underwater Acoustic OTFS With Nonuniform Doppler Shifts: Modeling and Off-Grid Block-Sparse Channel Estimation Algorithm. https://doi.org/10.1109/JOE.2025.3599256
- Hongyuan Liu, Feng Jiang, Junqiu Lei, Baohui Han, Jiajin Li, Zaizhu Liu, Ran Liao, Hui Ma. Underwater Particle Classification Detector using Mueller Matrix and Fluorescence Signal. https://doi.org/10.1109/JOE.2025.3596673
- Hong Li, Chenyan Xu, Hengyu Liu. Research on Geomagnetic Perceiving Navigation Method Based on Deep Reinforcement Learning. https://doi.org/10.1109/JOE.2025.3596672
- Kun Hao, Lang Xu, Jinjun Liu, Xiaofang Zhao, Zhishen Li. A Lightweight Real-Time Sidescan Sonar Image Detection Model Based on a Multiscale Fusion Module. https://doi.org/10.1109/JOE.2025.3603271
- Junjie Wen, Guidong Yang, Benyun Zhao, Lei Lei, Zhi Gao, Xi Chen, Ben M. Chen. Joint Image Enhancement for Underwater Object Detection in Various Domains. https://doi.org/10.1109/JOE.2025.3604170
- Hongzhong Zhu, Shigeo Yoshida. Experiment-Based Modeling and Control of a Floating Wind-Wave Hybrid System for Damping Enhancement. https://doi.org/10.1109/JOE.2025.3604181
- William K. Stevens, Martin Siderius. Metrics for Ocean-Acoustic Measurements and Model Predictions With Application to an Acoustic Barrier Search Problem. https://doi.org/10.1109/JOE.2025.3592695
- Adam Bienkowski, Lingyi Zhang, David Sidoti, Krishna R. Pattipati. Intelligent Search and Multiobjective Path Planning With Application to Ship Routing. https://doi.org/10.1109/JOE.2025.3604173
- Huayang Sun, Junqi Gao, Pengfei Zhang, Ying Shen, Ze Feng, Yi Peng. The Suppression for LFM Interferences in Active Electromagnetic Detection System Based on Improved FRFT. https://doi.org/10.1109/JOE.2025.3619315

- Jiahui Liu, Wei Xue, Wenjing Shang, Vladimir M. Olshanskiy, Yidong Xu, Dmitry V. Zlenko. Coordinate-Rotation-Decoupled 3-D Near-Field Localization for Underwater Electric Dipole Sources. https://doi.org/10.1109/JOE.2025.3607030
- Pan Hu, Chen Chao-Yang, Lei He, Yaonan Wang. Underwater Image Enhancement Based on Fusion of Multifeature Lines. https://doi.org/10.1109/JOE.2025.3607041
- Jikun Si, Xiaoyang Yu, Tian Zhou, Chao Xu, Quan Li. Real-Time 3-D Underwater Target Detection With Sparse Labeling Using V-AFDPC and Hybrid Online Learning. https://doi.org/10.1109/JOE.2025.3617734
- Jing Xu, Qingrui Chen, Yinfeng Huang, Yunhai Gao, Yufan Zhang, Renming Wang, Wendong Liao, Shengcang Li. Experimental Demonstration of a Broadband Underwater Magnetic Induction Communication System Enabled by DFT-s-OFDM in Various Underwater Environments. https://doi.org/10.1109/JOE.2025.3612785
- Jianjun Zhu, Guojian Dai, Peihong Wang, Tie Li, Xinbao Meng. Horizon Picking on Subbottom Profiles Using Wavelet Multiresolution Analysis. https://doi.org/10.1109/JOE.2025.3617912
- Mingxin Zhang, Xiaolei Li, Guangbo Sun, Youmei Zhang, Paul L. Rosin, Wei Zhang. SPG-GT: Structural Prior Guided GNN-Transformers for Ship Landmark Detection. https://doi.org/10.1109/JOE.2025.3617916
- Xupeng Wu, Jian Wang, Jing Wang, Shenghui Rong, Bo He. UMono: Physical-Model-Informed Hybrid CNN–Transformer Framework for Underwater Monocular Depth Estimation. https://doi.org/10.1109/JOE.2025.3606045
- ByungGu Cho, Laura Petto. Wide Area Ocean Acoustic Methane Mapping System and Its Feasibility in the Arctic. https://doi.org/10.1109/JOE.2025.3606110

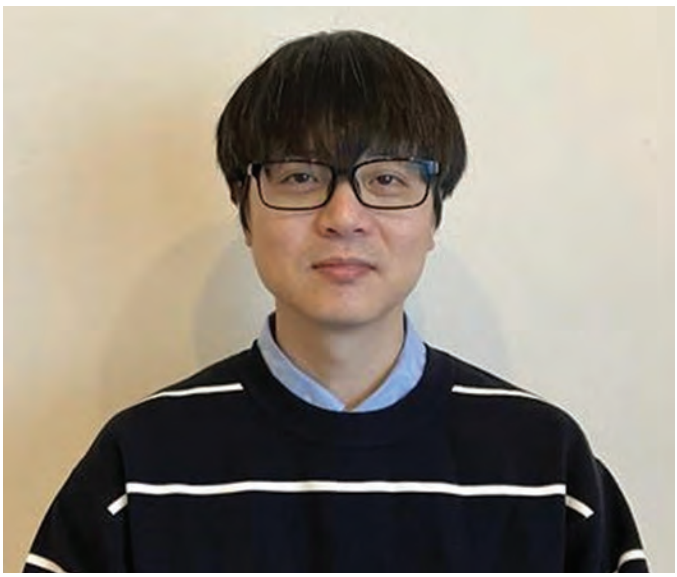
Introduction of a New Beacon Associate Editor

Masahiro Yagi, A new Beacon Associate Editor from 17 July, 2025

We are pleased to introduce you to a new Beacon Associate Editor, Masahiro Yagi. He took over the positions of the Associate Editor and OES Japan Chapter Treasurer from 17 July,2025.

Welcome to the editorial board.

I am Masahiro Yagi, currently employed at NEC corporation as a technology professional specializing in sonar systems. My work focuses on acoustic propagation modeling and developing recommendation technologies to optimize sonar operation strategies. I earned my Ph.D. in Physical Oceanography from the University of Tokyo in 2012, where I conducted research on the physical mechanisms of vertical mixing in seawater using observational data collected aboard oceanographic research vessels. Since joining NEC corporation, I have applied my scientific expertise to engineering challenges, aiming to advance underwater acoustic technologies for practical applications. My goal is to bridge fundamental science and innovative engineering to contribute to the development of next-generation maritime solutions.



Masahiro Yagi

OES Society Awards

Christian De Moustier, OES Past President, Nominations & Appointments Committee Chair

The OES Awards Ceremony was held during the Tuesday Plenary at OCEANS 2025 Great Lakes. We are honored to introduce the following 2025 OES award recipients. Congratulations!

2025 Distinguished Technical Achievement Award: Andrea Trucco

Andrea Trucco is presented the Distinguished Technical Achievement Award (DTAA) for fundamental contributions in signal and array processing to 3D medical and underwater acoustics imaging.

Andrea Trucco receives the Distinguished Technical Achievement Award from OES Past President Christian De Moustier.

2025 Distinguished Service Award: Tamaki Ura

Tamaki Ura is presented the Distinguished Service Award (DSA) for decades of inspired and enduring leadership as founding Chair of the OES Japan Chapter (1995–2000), co-founder OES International Symposium on Underwater Technology (UT) in 1998 and general co-Chair of 8 of the 14 UTs held through 2025, lead organizer of the first OES/MTS OCEANS/Techno-Ocean conference in Kobe, Japan 2004, repeated in 2008 and 2018. Since he was unable to attend the conference, he will receive the plaque at OCEANS 2026 Sanya.

OES Past President Christian De Moustier introducing Tamaki Ura, the Distinguished Service Award recipient.

2025 IEEE-OES Institution Award: The U.S. Office of Naval Research & Office of Naval Research Global (ONRG)

ONRG is presented the Institution Award for steadfast sponsorship of the Student Poster Competition held at each IEEE-OES/MTS OCEANS conference since 1989.

Plaque for the OES Institution Award recipient ONRG.

Request for Nominations for OES Awards 2026

IEEE OES Nominations & Appointments

Nominations for the 2026 OES awards will open 23 February 2026. Although February seems far away, now is the time to start thinking about individuals or companies/institutions who are worthy of receiving these awards. Self-nominations are allowed and letters of support for a nomination are encouraged. The nomination form will be available beginning 23 February 2026, and closing 15 May 2026 https://ieeeoes.org/menu/about-us/recognition/nominations/). The awards and criteria for determining eligibility for each award are below.

The Distinguished Service Award (DSA)

Honors one OES member for outstanding service in furthering the objectives and activities of the Society.

Eligibility

The awardee shall be an OES member in good standing of Senior Member grade or higher. Eligibility and the selection process shall comply with policies and procedures set forth in the governing documents of the Society and IEEE, particularly with IEEE Policy 4.4 on Awards Limitations*.

Criteria in the Call for Nominations

Extent and impact of the nominee's contributions to the objectives and activities of the Society, including dates of significant contributions.

The Distinguished Technical Achievement Award (DTAA)

Honors one IEEE member for an outstanding fundamental or applied technical contribution to oceanic engineering. The award recognizes a single major invention or scientific contribution, or a distinguished series of contributions over a long period of time.

Eligibility

The awardee shall be an IEEE member in good standing of Senior Member grade or higher. Eligibility and the selection process shall comply with policies and procedures set forth in the governing documents of the Society and IEEE, particularly with IEEE Policy 4.4 on Awards Limitations*.

Criteria in the Call for Nominations

Quality, originality, and significance of the nominee's technical contributions as evidenced by publications, patents, products, or other tangible items.

Company/Institution Award

Honors a corporation or institution that has provided significant contributions to the advancement of ocean engineering and/or ocean research.

Eligibility

The awardee shall be an organization actively involved in ocean engineering and/or ocean research. Eligibility and the selection process shall comply with policies and procedures set forth in the governing documents of the Society and IEEE, particularly with IEEE Policy 4.4 on Awards Limitations*.

Criteria in the Call for Nominations

Nature and extent of the contributions to the advancement of ocean engineering and/or research.

* *4.4.H - Eligibility and Process Limitations*: Individuals serving on any board or committee involved at any stage of the recipient selection or approval process for an award shall be ineligible to receive, or act as a nominator or reference for that award. This conflict-of-interest limitation shall apply to all awards given by the IEEE or any of its organizational units.

The OES Nominations and Appointment Committee looks forward to your participation in the OES awards process.

If you have any questions, please contact: past-president@ieeeoes.org

Call for IEEE Fellow Nominations, Class of 2027 Nominations are Now Open and Close on 7 February 2026.

Fellow Evaluation Committee

What is the Fellows Grade?

The grade of Fellow recognizes unusual distinction in the profession and shall be conferred by the IEEE Board of Directors upon a person with an outstanding record of accomplishments in any of the IEEE fields of interest (Bylaw I-104.11). The accomplishments being honored shall have contributed significantly to the advancement or application of engineering, science, and technology, thereby bringing significant value to society.

For more information on the qualifications for the Fellows grade and how to nominate an OES member for elevation to Fellow, go to: https://www.ieee.org/membership/fellows/fellows-nomination.

IEEE OES Chapters' Chairs November 2025 Meetings

Maurizio Migliaccio, OES Chapters Coordinator, Shyam Madhusudhana, VP for Technical Activities

On 13 November 2025, two online Chapters' Chairs meetings were organized to learn about the undergoing activities of IEEE OES Chapters all over the world and to exchange ideas and experiences.

The IEEE OES Chapters are distributed all over the world in the following way: Five Chapters are based in Regions 1-6 (USA), Seven Chapters are based in Region 7 (Canada), Nine Chapters are based in Region 8 (Europe, Middle East & Africa), One Chapter is based in Region 9 (South America), and Fifteen Chapters are based in Region 10 (Asia & Pacific). As a matter of fact, there are 37 IEEE OES Chapters.

The five Regions 1-6 Chapters are: Providence (Region 1), Houston (Region 5), Hawaii, San Diego and Seattle (Region 6). Now the Chair position of the Seattle Chapter is vacant.

The seven Chapters in Region 7 are: Canadian Atlantic, Newfoundland & Labrador, Ottawa, Quebec, Toronto, Vancouver and Victoria, BC.

Figure 1. The IEEE OES Oceanic Engineering logo.

The nine Chapters in Region 8 are: France, Italy, Norway, Poland, Portugal, Russia, Spain, Tunisia, UK&RI.

The Chapter in Region 9 is in Argentina.

The fifteen Chapters in Region 10 are: Australia, Delhi, Guangzhou, Hong Kong, Indonesia, Japan, Kochi, Korea, Madras, Malaysia, New South Wales, Shandong, Shanghai, Singapore and Taipei.

The overall members within areas covered by Chapters are 1,049 with a percentage of 75, 41% male, and 16,02% female, the remaining 18% is undefined. The overall count by technology focus area tells us that the main three are: Robotics and Control Systems, Signal Processing and Analysis and Communication, Networking and Broadcasting. However, a relevant number of members show interest in other focus areas.

The largest Chapters are the ones in Madras, with 106 members, followed by Japan with 87, Italy with 70, Providence

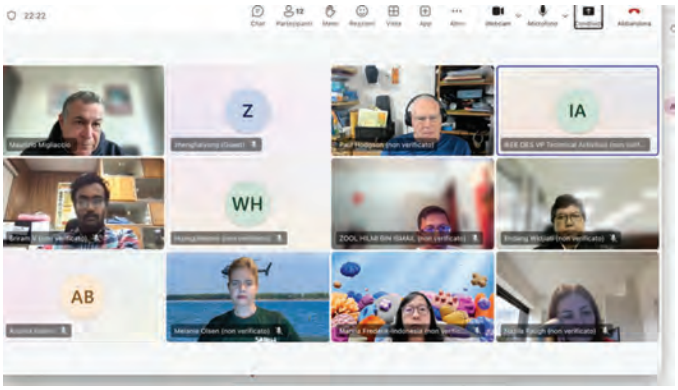


Figure 2. Some of the participants at the Chapters' Chairs meeting (morning session).

with 66, and UK&RI with 61. The composition of the Chapters' members varies depending on the main technological focus interests.

EachChapter Chair present in the morning and afternoon meetings presented some slides regarding the Chapter and theie main technological focus, as well as a summary of the activities undertaken in 2025 and an outlook of the next year's activities.

In many cases, a potential convergence of interests was experienced, motivating joint activities taking benefit, also the online tools that allow to share an in-presence event with other Chapters. Exploitation of the IEEE DL program and Technical Committees is encouraged.

It is also important to take benefit of the forthcoming IEEE OCEANS Conferences in all possible manners, e.g. organizing special sessions, or having an active role to attract more and more members.

All Chapters are invited to submit their 2025 reports on vtools earliest and by the end of December.

Further, it is advisable that all positive experiences are shared by providing short articles for the Beacon newsletter.

Chapter News

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

Malaysia Chapter

Reported by Zainah Md. Zain & Zool Hilmi Ismail

IEEE OES Malaysia Chapter Strengthens Bonds Through Pangkor Island Retreat

On July 27th, the IEEE Oceanic Engineering Society (OES) Malaysia Chapter embarked on a one-day retreat to the scenic Pangkor Island, Perak. The visit served as both a refreshing getaway and an informal networking opportunity among OES members, collaborators, and their families. Led by the Chapter Chair, the group comprised seven OES members, including the Vice Chair, Treasurer, Secretary, and several committee members, along with their families.

The itinerary featured visits to several significant cultural and historical sites on the island. Participants explored Masjid Al-Badr Seribu Selawat, Perak's first floating mosque, admired for its intricate design and spiritual ambiance. They also stopped by Masjid Al-Khairiah, known as the "Chinese-style Mosque," with its elegant botanical and geometric motifs symbolizing cultural harmony. The trip concluded with a visit to the Dutch Fort (Kota Belanda), a historical landmark

Figure 2. Group photo of IEEE OES Malaysia Chapter members at Masjid Al-Badr Seribu Selawat.

Figure 1. Group photo at Pangkor Island jetty, Perak.

Figure 3. Visit Dutch Fort at Pangkor Island.

that offered a glimpse into the island's rich heritage. Beyond sightseeing, the retreat provided a valuable opportunity to strengthen personal and professional ties among members. It fostered camaraderie and open discussions on future collaborative efforts, especially in promoting oceanic engineering awareness and supporting the growth of young professionals and students within the field.

This successful retreat underscored the Chapter's commitment to building a close-knit and vibrant community within the IEEE OES network. The Malaysia Chapter extends heartfelt appreciation to all members, families, and student volunteers who made this trip meaningful and memorable. Together, the chapter looks forward to continuing its mission of advancing innovation and engagement in oceanic engineering.

Inspiring Young Innovators: ROV Workshop 2025 in Conjunction with STEM Week at SK Convent Sitiawan

The IEEE Oceanic Engineering Society (OES) Malaysia Chapter proudly organized the ROV (Remotely Operated Vehicle) Workshop 2025, held on 28 July 2025 in conjunction with STEM Week at SK Convent Sitiawan, Perak. Supported by the Manjung District Education Office (PPD Manjung) and SK Convent Sitiawan, this workshop aimed to spark students' curiosity and interest in marine robotics and oceanic engineering. The event brought together 44 students and 15 teachers from 11 schools across the Manjung district, comprising five primary schools and six secondary schools. Participants had the exciting opportunity to dive into hands-on learning by designing, building, and operating their own small-scale ROVs. Through this engaging activity, students gained a deeper appreciation for underwater technology and its real-world applications in exploration, research, and marine conservation. The workshop was facilitated by IEEE OES Malaysia Chapter members and enthusiastic university student volunteers from Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), who guided participants throughout the ROV building process. Their support and mentorship played a key role in creating an inspiring and interactive learning environment.

Special appreciation is extended to PPD Manjung for their invaluable support, and to all participating schools, teachers, and students for their active involvement. This initiative also served as a prelude to the upcoming Underwater Robot Challenge 2025, scheduled for 11 October 2025, which will once again be organized by the IEEE OES Malaysia Chapter. Through programs like this, IEEE OES Malaysia Chapter continues its commitment to nurturing future generations of innovators, encouraging young minds to explore potential careers in marine engineering, robotics, and ocean technology.

Figure 4. Group photo at Pangkor Island jetty, Perak.

Figure 5. Demonstration session for the VIPs, teachers and students.

Figure 6. Photos during the event.

IEEE OES Malaysia Visits UniKL MIMET's Wave Tank Facility

On 28 July 2025, the IEEE Oceanic Engineering Society (OES) Malaysia Chapter conducted a technical visit to the Wave Tank Facility at Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL MIMET), Lumut. The visit marked another meaningful step in strengthening academic collaboration in marine and oceanic engineering. Led by Assoc. Prof. Ir. Dr. Zool Hilmi Ismail, the OES Malaysia delegation received an insightful briefing from UniKL MIMET representatives on the facility's functions, capabilities, and research applications in the study of hydrodynamics, wave–structure interaction, and marine system performance. The Wave Tank Facility serves as a vital platform for both educational training and applied research in maritime technology and oceanic systems.

The visit also featured several hands-on demonstrations, where participants observed real-time experiments on wave behavior and marine dynamics, providing an engaging and practical learning experience for all involved. These activities underscored the importance of experimental facilities like UniKL MIMET's wave tank in advancing Malaysia's marine research and education ecosystem. Through such collaborations, the IEEE OES Malaysia Chapter continues to promote knowledge exchange, enhance research linkages, and inspire innovation within the academic community in the field of oceanic engineering.

Figure 7. Group photo at UniKL MIMET.

Figure 8. Group photo of IEEE OES Malaysia Chapter members at UniKL MIMET wave tank.

IEEE OES Malaysia Strengthens Academia-Industry Linkages Through Technical Visit to STRIDE

On 29 July 2025, the IEEE Oceanic Engineering Society (OES) Malaysia Chapter successfully conducted a technical visit to Bahagian Teknologi Maritim, STRIDE (Science & Technology Research Institute for Defence), located within the Lumut Naval Base. The visit provided participants with valuable insights into Malaysia's advancements in maritime defense technology and innovation. The delegation was warmly hosted by Dr. Nur Afande Ali Hussain, who shared an overview of STRIDE's ongoing research and development initiatives in maritime systems and defense technologies. Participants had the opportunity

Figure 9. Group photo at STRIDE.

Figure 10. Welcoming session from STRIDE.

Figure 11. Visit STRIDE project facilities.

to engage with domain experts, observe demonstrations of cutting-edge maritime research, and exchange ideas on potential collaborations in oceanic and defense-related engineering.

This visit served as a meaningful platform for academia–industry engagement, fostering dialogue and knowledge exchange between researchers, professionals, and practitioners in the marine technology community. The IEEE OES Malaysia Chapter extends its heartfelt appreciation to STRIDE for the generous hospitality and to all members who contributed to making this visit a success. Through continued collaboration with organizations like STRIDE, the Chapter remains committed to advancing innovation and strengthening Malaysia's expertise in oceanic and maritime engineering.

Social Innovation and Knowledge Transfer Program on Underwater Robotics at INSTAR

On 23 September 2025, the IEEE Oceanic Engineering Society (OES) Malaysia Chapter organized a Social Innovation and Knowledge Transfer Program focused on underwater robotics at INSTAR, Pekan, Pahang. The session introduced students to the fascinating world of underwater robotic systems through a hands-on pilot ROV (Remotely Operated Vehicle) demonstration. Participants learned about the fundamental concepts of underwater vehicle operation, control, and applications in real-world scenarios such as marine exploration, environmental monitoring, and underwater inspection.

This outreach program aimed to inspire curiosity and awareness among young students about oceanic engineering and robotics while promoting STEM education through experiential

Figure 12. Students testing and piloting the ROV during the demonstration session.

Figure 13. Briefing sessions on underwater robotics and ROV operation.

learning. The interactive approach allowed participants to gain firsthand experience in operating an ROV and understanding its relevance in addressing real marine challenges. The IEEE OES Malaysia Chapter continues to champion initiatives that blend social innovation, education, and technology transfer, empowering the next generation to explore careers in marine technology and contribute to sustainable ocean solutions.

Japan Chapter

The 14th Underwater Technology Forum • ZERO HYBRID

Reported by Harumi Sugimatsu

The 14th Underwater Technology Forum • ZERO (https://seasat.iis.u-tokyo.ac.jp/UTforum/UTforumzero14/) was held from 13:00-17:00 on 17 October 2025, on the Atmosphere and Ocean Research Institute (AORI), The University of Tokyo in Kashiwa Campus (https://www.aori.u-tokyo.ac.jp/english/access/index.html). We had 117 in-person attendees and 85 online attendees. For the first time since the pandemic, the forum held in Kashiwa saw more attendees on-site than online! We would like to express our gratitude to everyone who visited the Kashiwa Campus.

This time, four presentations were given on the Autonomous Underwater Vehicles (AUVs), covering development, operation and application deployment. The first presentation on multiple AUV operations and networking in China was delivered online from the ship during the return voyage from an Arctic research exploration by Xu Wen, Chief Researcher at the Chinese Academy of Sciences.

And, Takeshi Nakatani of JAMSTEC presented on Development of the deep-sea cruising AUV "URASHIMA 8000," Hirokazu Yamagata of Nippon Institute of Technology presented on the second Antarctic challenge of AUV "MONACA" that was developed to survey beneath Antarctic ice shelves. Sotaro Takashima of IDEA Consultants Inc. presented initiation of Hovering Type AUV for underwater inspections of floating offshore wind power facilities.

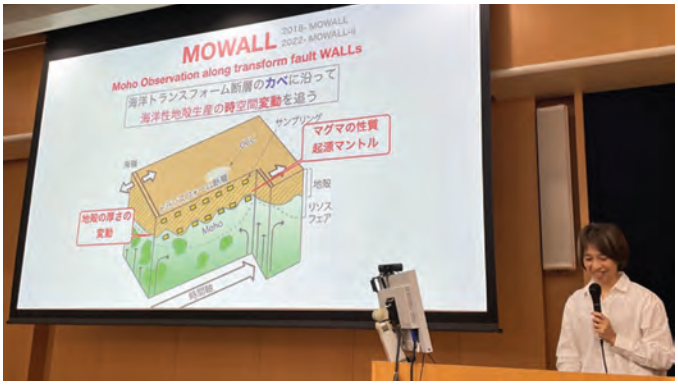
Two science related lectures were also held. Yoshihiko Tamura of JAMSTEC presented on Volcanoes of the Tokara Islands, exploring factors behind the recent active seismic activity in the Tokara Islands through comparisons with other undersea volcanoes. Kyoko Okino of AORI, the University of Tokyo, presented on the time-varying observations of faults along the Mide-Ocean Ridge. These are phenomena on a large time scale.

Additionally, presentations were given on a project exploring "living fossils" inhabiting deep-sea caves, as well as initiatives for new commercial use of deep sea water from Kume-jima Island such as for cooling and ocean thermal energy conversion utilizing the temperature difference with surface water.

As above, a wide variety of topics were presented, making it a very diverse forum.

The next forum will be held on Friday, 17 April, 2026, on the Institute of Industrial Science, The University of Tokyo in Komabe Research Campus. We look forward to your participation.

Xu We introduces upcoming OCEANS 2026 Sanya at the end of the lecture.



Kyoko Okino presenting on "Mide-Ocean Ridge".

Takeshi Nakatani presenting on the AUV "URASHIMA 8000".

Active Q&A sessions from the audience.

Kochi Chapter

Recent Activities

Reported by Dr. Sooraj K. Ambat, Chair, IEEE Kerala Section OES-Kochi Chapter

The IEEE Oceanic Engineering Society (OES) Kochi Chapter has continued to expand its technical outreach and community engagement through a series of expert talks and student-focused events conducted during recent months. The OES Kochi Chapter has initiated two dedicated knowledge-sharing platforms to strengthen technical engagement within the ocean-engineering community: an online talk series titled "**Expert Talk Series**" and a new offline interaction series titled "**Coffee with a Scientist**." The recent events reported here mark the inaugural talks in these respective series, reflecting the Chapter's commitment to fostering sustained learning, outreach, and collaboration. These initiatives have strengthened the Chapter's mission to promote ocean engineering research, innovation, and collaboration within Kerala. The events received active participation from both professional members and the student branches affiliated with the OES Kochi Chapter.

1) **Expert Talk Series – "Passive Acoustic Monitoring for Environmental Sensing: From Tropics to the Poles"**

The first event in this period was an online Expert Talk held on 20 August 2025, delivered by **Hari Vishnu**, Senior Research Fellow at the Acoustic Research Laboratory, National University of Singapore, and Deputy Secretary of IEEE OES. In this session the speaker introduced modern acoustic sensing techniques used for long-term monitoring of marine ecosystems across diverse environments ranging from tropical waters to polar regions. The talk drew excellent participation, with more than 80 attendees, including researchers, students, and professionals from multiple institutions. The interactive discussions highlighted the increasing importance of passive acoustics in marine biodiversity assessment, climate studies, and environmental sensing.

Poster of the Expert Talk Series featuring Dr. Venugopalan Pallyail and Hari Vishnu.

2) **"Coffee with a Scientist" Talk Series – "Distributed Acoustic Sensing (DAS)"**

Expert Talk Series conducted on 11 September 2025 at the Kerala Startup Mission Hall, Kochi, featuring **Dr. Venugopalan Pallyail**, Principal Research Fellow and Deputy Head of the Acoustic Research Laboratory at NUS, and Vice President (OCEANS), IEEE OES. Dr. Pallyail delivered an in-depth lecture on Distributed Acoustic Sensing (DAS), explaining the underlying principles of fibre-optic interrogation, signal processing aspects, and real-world applications in underwater surveillance, subsea structure monitoring, and geophysical exploration. The offline event witnessed over 100 participants, representing academia, research organisations, and industry. The discussions explored potential avenues for integrating DAS technologies within India's maritime security and ocean-observing frameworks. The interactive, in-person format exemplified the intended spirit of the "Coffee with a Scientist" series, facilitating closer engagement and informal technical dialogue.

3) **IEEE YESS 2025 – "Champions of the Deep" Underwater Robotics & Vehicle Expo**

As part of the IEEE Yearly Engineering Students Summit (YESS 2025), the Chapter organised "Champions of the Deep", an Autonomous Underwater Robots and Vehicle Expo, on 20 September 2025 at NIT Calicut. The program showcased state-of-the-art marine robotic platforms, AI-enabled underwater vehicles, and student prototype systems. This event was actively led by Mr. Sunil Paul, Secretary of the IEEE OES Kochi Chapter, whose efforts ensured a well-coordinated and impactful showcase.

The expo created an engaging environment for young engineering students to interact with domain experts, explore research challenges in underwater systems, and gain exposure to the latest developments in ocean robotics. The event significantly enhanced the visibility of OES activities among the student community across Kerala.

Through these initiatives, the IEEE OES Kochi Chapter continues to advance its mission of building a vibrant ocean-engineering community by facilitating expert knowledge sharing, encouraging student innovation, and fostering collaboration across academia, industry, and R&D establishments.

Promotional banner of "Champions of the Deep" and a glimpse of the IEEE OES exhibit stall at YESS 2025.

Poland Joins the Global Network of Oceanic Engineering – The Establishment of the IEEE OES Chapter in Poland

Pawel Prajzendanc, IEEE Poland Section OES Chapter Chair

Transshipment port in Gdańsk

Poland's maritime economy is entering a new era of transformation. Once centered mainly around shipyards and ports, it is now becoming a vibrant hub for marine technology, offshore innovation, and ocean engineering. The creation of the IEEE Oceanic Engineering Society (OES) Poland Chapter marks a significant step forward — connecting the country's strong maritime tradition with a future defined by research, digitalization, and sustainable development.

In recent years, Poland's key ports — Gdańsk, Gdynia, and Szczecin–Świnoujście — have undergone a profound modernization. They have evolved into technologically advanced transport and logistics centers, capable of handling the largest vessels in the Baltic Sea. Alongside expanding container, LNG, and energy terminals, new digital and automation systems are being introduced to optimize cargo flow, energy use, and maritime safety. The Baltic is no longer only a space for shipping and fisheries — it has become a field of science, technology, and international cooperation.

A central role in this transformation belongs to the Maritime University of Szczecin (Politechnika Morska w Szczecinie), which has grown into one of the most modern centers for maritime research and education in Central Europe. The university operates advanced laboratories in vessel' s automation, electric drives, mechatronics, and energy management systems, as well as full-scale bridge simulators replicating real sea operations. Its research projects focus on smart vessel systems, autonomous shipping, and energy efficiency — conducted in partnership with the maritime industry and international institutions.

Another cornerstone of Poland's maritime education is the Gdynia Maritime University, combining a long tradition with a

LNG terminal in Świnoujście.

The main building of the Maritime University of Szczecin.

modern approach to research and innovation. The university develops projects in navigation, maritime logistics, and port operations, supported by extensive laboratory infrastructure and a modern training and research vessel, *Horyzont II*. It trains officers and engineers who will shape the future of Europe's maritime economy.

The Naval Academy in Gdynia contributes unique expertise in marine safety, underwater systems, cybersecurity, and navigation technology. Its modern laboratories and simulation centers provide a strong foundation for research in maritime defense, environmental protection, and the sustainable use of marine resources.

Together, these institutions form a powerful scientific and technological base that supports Poland's growing maritime potential. They work closely with research organizations and the industrial sector to develop technologies for offshore wind, autonomous systems, and marine environmental monitoring — all areas that resonate with the mission of IEEE OES.

The newly established Polish Chapter of IEEE OES aims to unite these efforts under one umbrella. Its mission is to foster collaboration between academia, industry, and research institutions, to support young engineers, and to promote sustainable innovation in the ocean engineering field. The chapter plans to organize technical workshops, joint projects, and educational initiatives focused on automation, underwater robotics, offshore energy, and marine data systems.

The creation of the IEEE Oceanic Engineering Society Poland Chapter is more than an administrative milestone — it is a statement of ambition. It signifies Poland's active participation in the global community of engineers and scientists working to understand, protect, and utilize the world's oceans responsibly. A nation long shaped by the sea is now helping to shape the sea's technological future. Along the Baltic coast, a new wave of ocean engineering is rising.

IEEE OES – Talk on Microwave Radiometry: From Uncertainty to Networking

Weimin Huang, Chair of Oceanography and Meteorology Technology Committee

The renamed Oceanography and Meteorology (OM) Technology Committee (TC) represents an expansion of former Current, Wave and Turbulence Measurement and Applications (CWTM) TC to include more subjects such as climate. The OM TC is also pleased to welcome its Co-Chair, Dr. Lorenzo Luini, who is an Associate Professor at Politecnico di Milano (Italy).

On 8 October, OM TC organized its first webinar after it was reconstructed. The presenter, Dr. Domenico Cimini, is a research manager at the National Research Council of Italy, Institute of Methodologies for the Environmental Monitoring (CNR-IMAA). The invited technical talk on "Microwave Radiometry: From Uncertainty to Networking" (see Fig. 1) attracted more than 20 researchers from different countries.

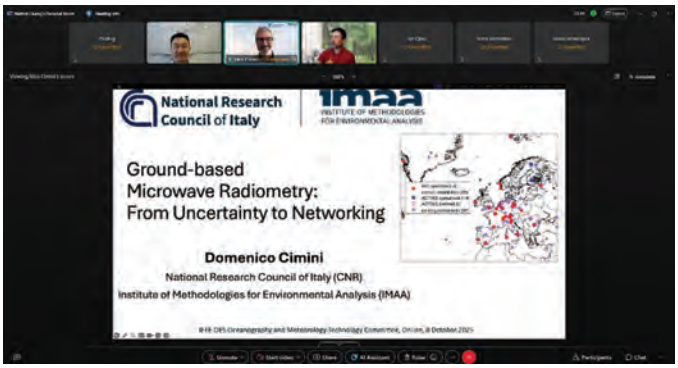


Figure 1. Screenshot of webinar information.

Dr. Cimini first reviewed the development history (see Fig. 2) and background of microwave radiometry (MWR). Due to its various advantages, such as low maintenance, automatic operations, working under all weather conditions, and real-time continuous measurements of temperature and humidity profiles, it has found wide applications in climate research.

Next, Dr. Cimini introduced the importance and uncertainty study (see Fig. 3) of assimilating the MWR observation with numerical weather prediction (NWP) system.

Figure 2. History of MWR.

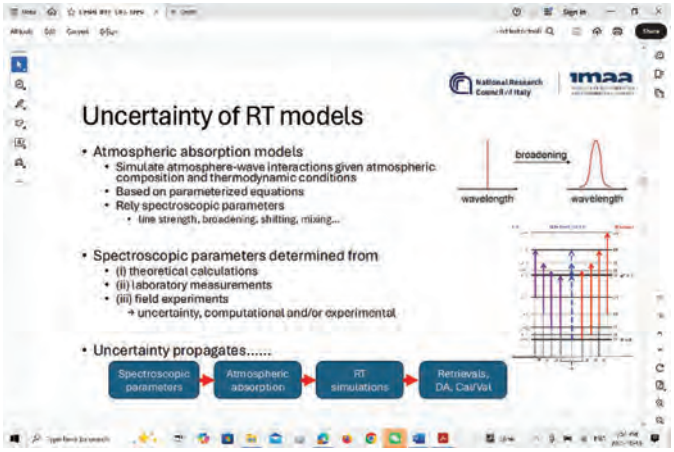


Figure 3. Uncertainty analysis.

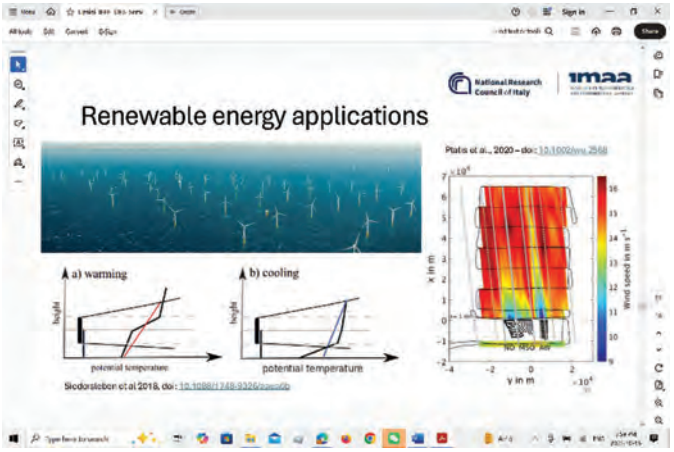


Figure 5. MWR for renewable energy application.

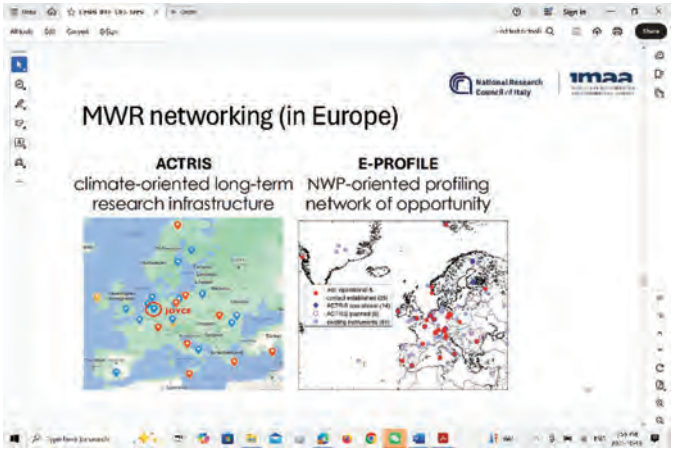


Figure 4. MWR network in Europe.

Then, Dr. Cimini discussed the MWR network in Europe (see Fig. 4) and the application of MWR in renewable energy (see Fig. 5).

Finally, Dr. Cimini summarized recent achievements in ground-based microwave radiometry and outlined some future research directions in this field. The informative presentation was ended successfully with a 25-minute discussion session.

Note: All the figures are screenshots from Dr. Cimini's presentation.

My First-Year Experience as an IEEE OES Distinguished Lecturer

Weimin Huang, IEEE OES Distinguished Lecturer, Memorial University, Canada

Every year the IEEE Oceanic Engineering Society (OES) Distinguished Lecturers Program recruits a certain number of oceanic engineering experts who can make high quality presentations to share their knowledge, expertise, and insights with the Community for a three-year term. Being appointed as an OES Distinguished Lecturer (DL) is deemed as a major Society recognition. I am deeply honored to receive such a title for the term 2025-2027 with a lecture focus on the following topics: 1) sea surface wind, wave and current measurement using X-band marine radar; 2) sea surface wind, wave, current mapping by high-frequency (HF) radar; and 3) sea ice, wave and wind sensing with global navigation satellite system – reflectometry (GNSS-R). As a first-year DL, I delivered two lectures on Topic 2) via two different modes: virtual and in-person.

Upon the invitation of Dr. Ferdinando Nunziata (a Professor at Università degli Studi di Napoli Parthenope Centro Direzionale Isola) and Dr. Maurizio Migliaccio (a Professor at Università di Napoli Parthenope), the first lecture was organized for 7 May, 2025, by the OES Ocean Remote Sensing Technology Committee, the IEEE OES Italy Chapter, and the IEEE Geoscience and Remote Sensing Society (GRSS) South Italy Chapter. The lecture began with an introduction of IEEE and OES constitution and structure, activities as well as their support for science and through to Engineering and benefits to the community. Then, the research on radar ocean remote sensing using HF radar was introduced. It covers the basic principles of HF (see Fig. 1), some HF radar cross section models including those incorporating floating platform motion and ionospheric-ocean mixed path, some representative methods, and most recent results for different ocean remote sensing applications of HF radar, and remaining challenges as well as future directions. The applications are illustrated mainly in terms of sea surface current measurement, wave information extraction, and wind field mapping. Around 30 people, including a group of students

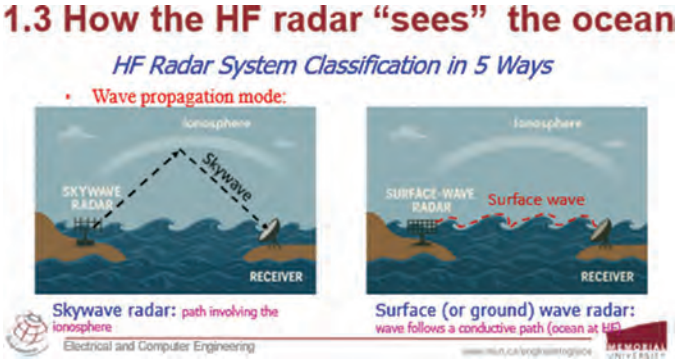


Figure 1. Schematic diagram of skywave radar and surface wave radar.

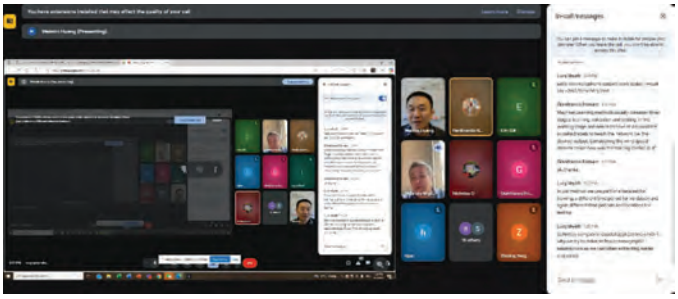


Figure 2. Screenshot of webinar discussion session.

from Sapienza University of Rome, attended the webinar and the one-hour presentation was extended with a 15-minute friendly discussion session.

The second lecture happened on my way to attending the IEEE IGARSS 2025 in Brisbane, Australia. It was held in-person on the campus of Macquarie University (Sydney) on 31 July, as shown in Figs. 3-4. In my personal opinion, arranging a DL talk on your trip for another event (e.g., conference) is efficient and cost-effective. I am very grateful to Melanie Olsen and Dr. Subhas Mukhopadhyay for organizing the event on behalf of the IEEE OES Australia Chapter. Although presenting the same DL topic again, the feeling was different while facing a different group of audiences, most of whom are undergraduate students of Mechatronics Engineering at this time. I was extremely impressed by the thought-provoking questions raised by these young fellows. I really enjoyed the live interaction.

Figure 3. Photo of in-person lecture at Macquarie University.

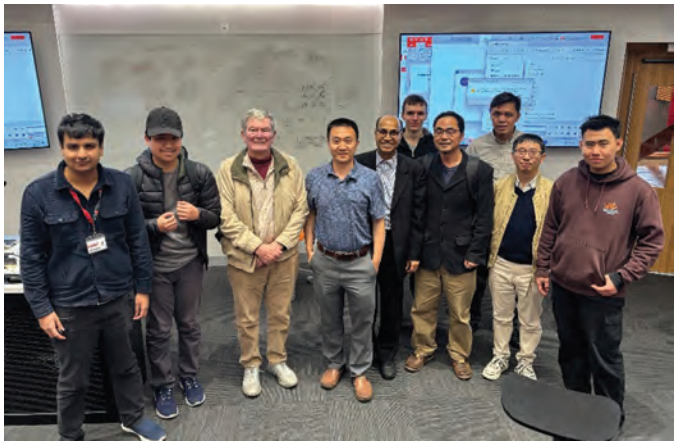


Figure 4. Photo with some lecture attendees.

Although I only had the opportunity to communicate with a limited number of audiences as my first-year term as a DL approaches the end, the experience was very joyful. I look forward to meeting more of you via the DL platform.

Design the Future Ocean Activities 2025

Giulia De Masi, Laura Meyer, Christopher Whitt

Human activity is making our planet sick and, with it, our oceans. The increasing frequency of natural disasters is just the beginning, with global tipping points, such as Greenland's melting ice sheets, raising sea levels and threatening coastal communities. Continuing business as usual by ignoring the planet's signs will be costly to human health, the global economy, and biodiversity at large in the future. Accordingly, everyone should seek to protect the ocean.

The Design the Future Ocean (DtFO) initiative is not confined to the objectives of any one institution or framework—including the UN Ocean Decade. Instead, DtFO is envisioned as a forward-thinking, boundary-pushing platform that brings together engineers, scientists, policymakers, early careers, and industry to explore and co-create innovations for a sustainable ocean future.

To fulfill this mission, DtFO—and by extension, IEEE OES—must be present and visible across a range of global venues, both within and beyond the traditional IEEE OES sphere.

This year DtFO has brought OES experts to several interdisciplinary venues, both in-person and virtually. Those included the UN Ocean Conference in June, the UN High Level Political Forum in July, the IEEE International Geoscience and Remote Sensing Symposium (IGARSS) in August, and the IUCN Congress in October. In each of these events, OES experts spoke on the technologies needed for more sustainable use of ocean resources, and promoted IEEE OES as the place to find deep technical expertise on these technologies.

UN Ocean Conference

In June, leading experts in ocean technology, policy, and environmental law gathered in Nice for the UN Ocean Conference (UNOC) (https://standards.ieee.org/events/intl/2025-un-ocean-conference/). This brought together stakeholders across all areas of ocean activity.

DtFO organized a side event: a thought-provoking panel discussion, Technology and Policy to Inform and Accelerate a Sustainable Ocean. The session examined the intersection of cutting-edge ocean sensing technologies, scientific best practices, and legal frameworks shaping human activity in the ocean—particularly in the emerging field of Marine Carbon Dioxide Removal (MCDR).

Figure 1. Panel Technology and Policy to Inform and Accelerate a Sustainable Ocean, 10 June 2025, Nice, France.

Panelists underscored the urgent need for accessible, reliable ocean data to guide evidence-based policy. Discussions covered the latest innovations in ocean sensing, the development of global standards, and how legal mandates interact with technological limits in monitoring the risks and benefits of MCDR.

A central theme was the evolving role of the precautionary principle. Traditionally seen as a rationale for delaying action amid uncertainty, panelists explored how it can—and should—be applied proactively to address pressing environmental threats.

The panel was part of the ongoing international dialogue on how science, technology, and governance can work in concert to safeguard ocean health while enabling responsible innovation.

UN HLPF Panel: Innovations for Sustainable Oceans

On 22 July 2025, the DtFO, in collaboration with the IEEE Standards Association, co-organized a 60–90 minute webinar on "Innovations for Sustainable Oceans – Importance of Sensing Technology to Understand Conditions in the Ocean" (Sustainable Development Goal (SDG) 14, SDG 17, https://standards.ieee.org/wp-content/uploads/2025/07/un-hlpf-innovations-for-sustainable-oceans-22jul2025.pdf). The session opened with a welcome from IEEE-SA and Christopher Whitt, setting the stage for discussions on transformative ocean technologies. Giulia De Masi showcased advances in AI and robotics for underwater sensing, followed by Patrick Gorringe highlighting accessible ocean technology innovations that expand monitoring capacity while lowering technical and financial barriers. Christoph Waldmann explored the role of standards in building trust and interoperability in environmental data, and the Design the Future Ocean Initiative addressed how policy, technology, and governance can work together to enable science-based decision-making. The webinar concluded with a roundtable discussion and Q&A, allowing participants to engage on themes of data sharing, technological innovation, climate resilience, and cross-sector collaboration, underscoring the critical role of timely, actionable data in protecting ocean health and advancing sustainable development goals.

IEEE International Geoscience and Remote Sensing Symposium

At the 2025 IEEE International Geoscience and Remote Sensing Symposium (IGARSS) in Brisbane, a flagship event of the IEEE Geoscience and Remote Sensing Society (GRSS), participants dove into the future of ocean exploration with the tutorial

"Sensing the Seas: AI and Data-Driven Enhanced Marine Sensing and Exploration in the Science-Policy Interface," sponsored by the IEEE Oceanic Engineering Society (OES) (https://sites.google.com/view/oceansaiigarss2025/home).

This tutorial showcased how remote sensing, machine learning, and AI are reshaping our ability to monitor and understand it—especially when traditional data is limited or incomplete.

Highlights of the session included:

1) Prof. Maurizio Migliaccio presented methods for retrieving information about sea oil slicks from remote sensing data. He outlined the relevance of the problem on a global+ scale and outlined the importance of early and accurate detection
2) Dr. Andrea Buono ran a demonstration on analyzing and visualizing oil slick data. Starting from real images, he assessed the performance of different physical models, showing the performance and limitation, introducing the importance of using AI techniques in situations where physical models suffer limitations
3) Dr. Giulia De Masi explored how AI can unlock insights in data-scarce environments, showing several use cases based on different models of machine learning (ML) and computer vision in marine sensing, from initial ML models, to Deep Learning and more recent Large and Visual Language Models.
4) Mr. Christopher Whitt closed by addressing the legal and ethical dimensions of ocean monitoring, from data transparency to environmental impacts.

With real-world case studies—including pollutant and oil spill detection—the tutorial connected technical advances to pressing marine challenges, highlighting their role in supporting UN Sustainable Development Goal 14: Life Below Water.

The attendees were PhD students, researchers, engineers, from USA, Asia, and Europe. The session offered not just tools and workflows, but also a vision of how AI-powered sensing can help reveal the ocean's hidden patterns—and guide us toward more sustainable stewardship of the seas.

IUCN World Conservation Congress

At the International Union for Conservation of Nature (IUCN) World Conservation Congress on 12 October 2025, Laura Meyer co-organized and moderated together with Giulia De Masi an interactive fishbowl session titled "Exploring

Figure 2. Few moments of the tutorial "Sensing the sea" at IGARSS 2025, on 3 August 2025 in Brisbane.

Figure 3. Few moments of the session "Exploring Nature-based Solutions at the Science–Policy Interface: Can Mangroves Be a Climate Saviour?" at IUCN 2025 in Abu Dhabi on 12 October 2025.

Nature-based Solutions at the Science–Policy Interface: Can Mangroves Be a Climate Saviour?" (https://iucncongress2025.org/programme/exploring-nature-based-solutions-science-policy-interface-can-mangroves-be-climate). The session convened leading experts in ocean governance, blue carbon finance, sustainable bioeconomy, and marine technology, including Minna Epps (IUCN), Beatriz Garcia (Sorbonne University Abu Dhabi), João Sousa (IUCN), and Piergiuseppe Morone (University of Rome).

The dialogue focused on a set of strategic questions highlighting the mobilization of climate finance, the need for robust monitoring, reporting, and verification (MRV) systems, and the role of open data sharing to ensure accountability, transparency, and equitable access to benefits. A strong emphasis was placed on technological innovation, from remote sensing to community-driven monitoring tools, as key enablers to scale mangrove protection and restoration.

The conversation underscored the multiple climate and biodiversity benefits of mangrove ecosystems, while addressing challenges such as governance gaps, valuation methods, and ensuring that local communities remain central to decision-making. The participatory fishbowl format empowered the 40 participants in the audience to actively contribute, collectively identifying pathways and partnerships needed to accelerate science-based and socially just blue carbon action under the UN Ocean Decade and related global frameworks.

OES Conference Calendar

Contact BEACON Editors, OES VPWS and VPTA

OCEANS

OCEANS 2026 Sanya
May 25–28, 2026
Sanya, China
https://sanya26.oceansconference.org

OCEANS 2026 Monterey
September 21–24, 2026
Monterey, USA
https://monterey26.oceansconference.org

OTC

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

OTC 2026
May 4–7, 2026
Houston, USA
https://2026.otcnet.org

OES Sponsored (financial or technical)

Western Indian Ocean Futures (WIO Futures) 2026
May 18–19, 2026
Port Louis, Mauritius
Webpage opens soon.

SAUVC 2026
May 28–31, Sanya, China
https://sauvc.org

RAMI 2026
July, 2026
La Spezia, Italy
More information will be updates soon.

UComms 2026
August/September, 2026
Italy
More information will be updates soon.

AUV 2026
September 1–3, 2026
Southampton, UK
https://www.auv2026-southampton.com

USYS 2026
September/October, 2026
China
More information will be updates soon.

MetroSea 2026
October 5–7, 2026
Sibenik, Croatia
Webpage opens soon.

OES Patronaged

Marine AI and Robotics for Innovation and Sustainability (MARIS-AI)
January 21–22, 2026
Abu Dhabi, Emirate of Abu Dhabi
https://sorbonne.ae/events/symposium-marine-ai-and-robotics-for-innovation-and-sustainability

BtS2026
September/October, 2026
Croatia
More information will be updates soon.

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.

RAMI25: Breeding the New Generation of Marine Roboticists in the Sunny Italian Riviera

Gabriele Ferri[1], Federico Celi[2], Alessandro Faggiani[2]
[1]RAMI 2025 Technical Director, [2]RAMI2025 Deputy Technical Directors

After one year of pause from robotics challenges, NATO-STO Centre for Maritime Research and Experimentation (CMRE) has relaunched its robotics events with RAMI25 competition, held in June-July 2025. With this initiative, CMRE renews its long-standing tradition of organizing robotics challenges, which began in 2010 with the Student AUV Challenge – Europe (SAUC-E), the premier European student competition for underwater vehicles.

Over the years, CMRE has played a key role in advancing autonomy and robotics through several major events, including the euRathlon 2015 Grand Challenge and the European Robotics League Emergency 2017, both focused on multi-domain cooperative robotics for search and rescue scenarios. The euRathlon 2015 Grand Challenge, organised in the framework of the euRathlon EU project, was the world's first multi-domain robotics competition. It brought together land, sea and air robots to tackle disaster-response tasks at a real industrial site, the Tor del Sale power plant in Piombino, Italy. The inspiration came from the Fukushima 2011 accident.

This multi-domain competition format continued within the European Robotics League (ERL), an EU-funded framework for robotics competitions launched in 2016. ERL featured three domains: industrial, services and emergency. The first season culminated with the ERL Emergency 2017, a multi-domain competition again locally organised by CMRE at the Tor del Sale power plant site in Piombino. Subsequent ERL Emergency competitions were held in La Spezia in 2018 and 2019, with further editions planned for 2020 and 2021, which were cancelled due to the COVID-19 pandemic.

Building on this experience, we launched in 2022 a new competition named Robotics for Asset Inspection and Maintenance (RAMI), as part of the ERL Emergency League and organized in the framework of the EU-funded METRICS project (https://metricsproject.eu/). The initiative focused on Inspection & Maintenance (I&M) tasks in risky and/or hostile environments where human intervention is challenging or impossible, direct operator control could not be guaranteed, and autonomous decision-making is essential to ensure safety, repeatability and efficiency. RAMI included events for aerial robots, organized by the Center for Advanced Aerospace Technologies (CATEC) (Spain), and for underwater vehicles organized by CMRE.

RAMI featured both virtual and field competitions. At CMRE, we organized two virtual "cascade" competitions (https://metricsproject.eu/inspection-maintenance/rami-cascade-campaign-marine-2023/), providing teams with underwater image datasets of Objects of Potential Interest (OPIs) to develop software capable of classifying, identifying and localizing images of OPIs in test images. These virtual competitions helped teams prepare for real-world field events and attracted new researchers to the challenges of underwater perception and image processing.

Following the conclusion of the METRICS project, CMRE decided to revive and evolve the RAMI concept through the RAMI25 event. The 2025 edition focuses on the monitoring and inspection of Critical Undersea Infrastructure (CUI), specifically an oil transport system. The competition emphasizes autonomy, advanced perception, interoperability and multi-domain collaboration, marking the first time, for our competitions held at CMRE's La Spezia premises, of the cooperative use of an Unmanned Aerial Vehicle (UAV) with an Autonomous Underwater Vehicle (AUV).

The Competition

CMRE hosted this year the RAMI25 robotics competition from 29 June to 4 July (http://rami2025.tilda.ws/). The competition took place in CMRE seawater basin. The area was prepared to simulate a CUI, specifically transporting oil, proposing Inspection & Maintenance (I&M) tasks.

To foster teams' growth, we proposed tasks similar to those present in RAMI23. We also add some novelties (e.g. a pipe-following new task), and the need of interoperability, by requiring collaboration with one CMRE UAV, which has to be accomplished through exchanging messages following the Collaborative Autonomy Tasking Layer (CATL) protocol (M. Van Riet et al., Experimental Demonstrations of CATL, the Collaborative Autonomy Tasking Layer, IEEE OES/MTS OCEANS 2023, Limerick - Ireland).

The RAMI marine competition tasks are inspired by the following user story:

A critical undersea infrastructure, used for oil transportation, has to be investigated since suspicious activities have been spotted by a drone and have caused a malfunction, as reported by the plant safety systems. From what is known, a pipeline has started leaking and an explosion may occur soon. A robotics team composed of Autonomous Underwater Vehicles (AUVs) and their human operators is ready to intervene.

It is now time for the emergency team to act. The goals of the emergency team are to: (i) reach the area of the accident, while assessing and quantifying the entity of the leak; (ii) locate the pipe assembly area, quantify the damage to the plant, and identify which pipe has been damaged and is responsible for the leak; (iii) intervene on the plant by closing a valve to stop the leak to prevent the explosion and further damages to the environment.

Missions started with an UAV, piloted by CMRE pilots, which began a monitoring mission over a sea area 300 m far from the competition arena. A suspicious AUV, again operated

by CMRE, started to navigate on the surface and was detected by the UAV. The UAV, then, informed the teams' via CATL messages using a radio link, starting their mission. Once the CMRE AUV submerged, the UAV communicated to the teams a waypoint to reach, the first goal to be achieved.

Underwater robots first were required to reach the received waypoint, then, according the different proposed tasks, to follow a pipeline and identify colored markers (black or red), to inspect a pipe structure with a colored number to identify, and pass through a validation gate. In addition, several buoys of four possible colors had to be detected, localized and their color recognized. A different action was requested to the teams depending on the buoy color: for instance, turning around the buoy in a clock-wise circle or stopping for 30 seconds increasing the depth. The objective is to force teams to integrate perception with adaptive mission planning in a realistic environment such as CMRE water basin. Finally, three manipulation tasks were proposed, including staying into contact with the pipe, closing a cross-shaped valve and picking a pole, finally bringing that to the surface in a controlled way. Manipulation tasks were the only ones that allowed teleoperation (ROV mode), while all other tasks had to be performed autonomously. The challenges were held at the CMRE waterfront sea basin, which is a sheltered harbor, providing participants with the opportunity to grapple with real-life sea conditions, including limited visibility and salty water, but within a safe, controlled environment. The limited visibility added severe difficulties to object recognition by AUVs, even if the targets were bright orange or red in color.

We are glad to notice that RAMI25 showed a renewed and increased attention of the community for our events, with several new teams showing interest and participating in the challenge. In general, we have also seen a progress of performance in the team's more senior in terms of participations in our events. This follows the trend of recent years, demonstrating how participation in multiple editions supported the team's performance growth. New entries, for instance, UNIPI and UniGE teams, showed good results as well in manipulation and autonomous navigation. Considering the most senior teams based on their participation in our events, the UNIFI Robotics Team (Italy) accomplished several tasks, and showed a good maturity in navigation, survey, buoy localization and manipulation. The team also demonstrated appreciable real-time performance: some buoys correctly classified and identified, with the correct autonomous behavior triggered upon the localization of a buoy (the AUV completed a circle around the buoy position in a controlled way). The other buoys were also localized, classified and identified in post-processing with good accuracy. The University of Girona returned to our events after their triumph in ERL17 and euRathlon 2015 Grand Challenge. They brought a very young team, mostly composed of master students, and a completely new robot, the mini-Girona AUV, equipped with an arm for manipulation. Despite this, they were able to test their robot at sea for all the week and achieve good results, especially in manipulation and in number detection. This is extremely encouraging showing how competitions can be a training ground for teams to grow and to start using novel


NATO STO CMRE

Figure 1. (Left) The ERGO Team's robot during the deployment. (Right) mini Girona AUV going in the water.

instruments and concepts. Finally, the Robosub team from Utrecht, another rookie team, exploited the time during RAMI25 to learn from the other teams and to proceed in the development and test of their AUV, which will be ready for the next year edition.

Further work has to be done to improve the performance of teams in real-time perception and related adaptive mission planning. Results are encouraging. Also considered are the multi-domain operations and the use of CATL message format to integrate teams with other assets to accomplish complex multi-asset missions.

Finally, we also organized a student poster competition to allow students to showcase their research and to further increase contacts and involvement between teams and the international experts present at the event.

The Participant Teams

After the confirmation of 6 teams, 5 teams finally attended the event. One team, the ITU AUV Team, had a very last time problem and could not attend the event.

After the COVID-19 interruption and the absence of an event in 2024, some teams lost continuity as students graduate and there was little overlap between older generations and younger ones. This is why it was important to relaunch our event and to organize annual competitions, at the same time supporting team participation also through sponsorship (e.g. IEEE OES). This facilitates the succession with the required handover of experience. To relaunch our event, we therefore think it is pivotal to involve people with the aim to strengthen the community, and to contact and involve as much as possible participants and potential sponsors. This year, we had the participation of three teams at their first participation in our competitions, and the other two had attended many of our past events. This good mixture of new and veteran teams shows how RAMI today is a fixed appointment for several European research groups, and continues to attract new entries.

The Participant Teams Were:

1) UniGE ISME from the University of Genova, Italy, consisted of nine people with a BlueROV2 ROV from Blue Robotics, adapted to work as an AUV. They were at their first participation in one of our competitions.
2) Team ERGO from the University of Pisa, Italy. Their robot, a Zeno vehicle manufactured by MDM Team company. The team leveraged the experience collected in 2023 to develop

strategies for area survey and autonomous navigation. They are at their official participation.

3) HU Robosub from the HU University of Applied Sciences of Utrecht, The Netherlands, came with their HU Azura AUV modular robot. They were at their first participation.
4) UNIFI Robotics Team, from the University of Florence, Italy. A veteran of our competitions (first participation in 2012). They were the last winner of RAMI23 and participated in the RAMI25 with an improved version of their FeelHippo AUV.
5) Mini Girona Team, from the University of Girona, Spain. This team had participated and won in euRathlon 2015 and ERL Emergency 2017. They took part in RAMI25 with a newly developed robot, the mini Girona AUV. The team had a strong presence of master students.
6) ITU AUV Team from the Istanbul Technical University in Turkey was the winner of the Singapore SAUVC 22, a competition held in a swimming pool. They participated in RAMI23. Unfortunately, due to a last-time unexpected event, they could not take part in RAMI25.

The Winners

RAMI 2025 proposed one Task Benchmark (TBM) in a different competition day: Pipeline area inspection on Wednesday, Intervention on the pipeline structure on Thursday, and, finally, the complete mission at the plant on Friday. TBMs are oriented to task fulfillment and are judged by judges in real-time, or scrutinizing the data produced by teams within one hour from the end of their time-slot.

The competition was very tough throughout the three days. UNIFI Robotics Team won the TBM-1, while UniGE resulted first in rank for the TBM-2, focused mainly on manipulation. In the TBM-3, finally, UNIFI was able to result first in rank, with UniGE second just for one achievement point. In this way, at the very last time, UNIFI Robotics Team was able to stand out and be awarded with the SAUC-E 2025 award, which honors the best team over all the proposed TBMs.

Other prizes awarded were:

- "Best team SAUC-E award" (best team of the rankings over the three TBMs): UNIFI Robotics Team – two thrusters from our sponsor Blue Robotics.
- "Best presentation" (teams were asked to give a presentation on their robot and team): Mini Girona Team.
- Innovation Award – Robosub team – two coupons from our sponsor Nortek for two people to visit their company premises.
- "Best organized team": ERGO Team.
- "Best rookie team": UniGE ISME.
- "Best student poster" – Cristiano Caissutti from ERGO Team and Taqi Hamoda from Mini Girona Team – two vouchers to participate in Breaking the Surface conference – from the Marble CoE (Croatia) sponsor.

NATO STO CMRE AND UNIFI TEAM

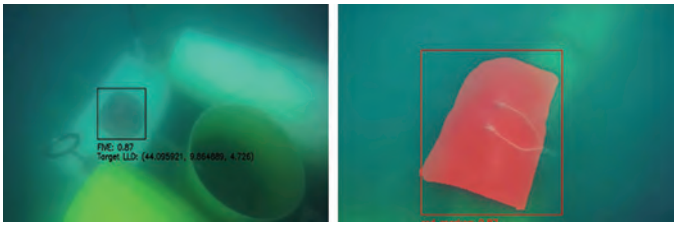


Figure 2. (Left) Identification of the black number over red background (the number was "5") on the manipulation console. The valve and the pole are visible, together with the number (Right) One red marker identified during the pipe following task.

Feedback

The feedback from both the participants and the judges was very positive. Relaunching RAMI has encouraged a sharp rise of interest in several research groups, with the participation of new teams and that of an historical team for our events such as Girona. We have also noticed that the positive trend in performance continues. Robots were at sea for testing and competing for all the week, demonstrating a good technical maturity for the teams. Rookie teams like UniGE and ERGO Team were also able to achieve good results at sea in manipulation, perception and navigation. The most veteran teams, such as UNIFI, had good results in tasks involving the combination of real-time perception with autonomous behaviors. UNIFI Team was capable to detect some buoys in real-time, to determine their color and to react with the required behavior. This confirms the importance of proposing the same tasks over different editions in order to support the gradual growth of participant teams. At the same time, it is felt the need to keep or create some simple

Figure 3. Teams and the Organizing Committee during the award ceremony at CMRE.

tasks for the newcomers (we had three rookie teams this year). We will try to achieve this trade-off between more complex and more basic tasks in the future, to be more and more attractive for both new entries, and for more experienced teams, which require to be pushed by more challenging missions. The realistic scenario, which attracts participants, is also central to involve end-users and companies. This year, for instance, we had judges from Rosenxt group, Leonardo, Atlas Elektronik, Saipem and Nortek and many judges from Europe and the U.S., interested in our realistic set-up. Results of RAMI25 showed, for most of the teams, good performance in autonomous navigation, mapping and imaging. However, in general, more work and support are needed for real-time perception and autonomy. This will be addressed in the future events. Furthermore, we will stress the interoperability and multi-domain aspects of the challenge, since we believe that robots can be effective in the real world applications if they collaborate to create complex networked, heterogeneous systems.

The Judges

We had more than 30 judges and observers from Europe and U.S., from companies, academia and research institutions. We had engineers and scientists from key-players in the Oil&Gas field, including from Rosenxt group (Germany) and Saipem (Italy), and experts in marine robotics, from Nortek (Norway), Atlas Elektronik (Germany) and Leonardo (Italy). From the U.S., we had the strong presence and support of the Office of Naval Research (ONR). Other judges came from John Hopkins APL and RoboNation. Finally, we had representatives of European universities and research institutions expert in marine science and engineering: the National Oceanographic Centre (NOC) (UK), University of Zagreb (Croatia) and some representatives of the Italian and German Navy.

Figure 4. The RAMI25 international guests, judges and sponsors attending the award ceremony.

As in previous competitions, CMRE provided the full engineering and logistical support during the event execution. Teams were supported by CMRE logistics, having access to a good support, since engineers and technicians helped the teams with suggestions and supply parts. This was appreciated by teams and is crucial in helping teams to solve the unavoidable technical issues. Teams' general feedback was very positive regarding the marine trial area and the way the scenario was setup.

The local community was also engaged. Local schools from the La Spezia area were also involved in the framework of Giona's Project. This allowed around 20 students close to high school graduation to come and interact with the teams.

Sponsors

Also this year, IEEE OES played a fundamental role as the Main Sponsor. IEEE OES supported team travel and participation. This is essential to attract teams and allow them to take part in such complex events. One of the RAMI goals is to educate future multi-disciplinary engineers. Therefore, the sponsorship of 'Breaking the Surface' 2025, the 17th Interdisciplinary Field Workshop of Marine Robotics and Applications, is well aligned with our mission. The Marble CoE (Croatia) provided two tickets for two students to participate in 'Breaking the Surface.'

As in the past, we again had the marine robotics commercial sector involved. Nortek Group, a Norway multinational company developing advanced instruments for oceanographic and marine applications, sponsored RAMI events for the first time. Nortek has granted the possibility to visit their premises and attend some courses to two participant students.

Blue Robotics offered three thrusters to the "Best Rookie" team and to the team awarded with the SAUC-E prize.

Our aim is to continue to develop RAMI as a unique event that challenges teams with realistic conditions, with an emphasis on precise metrological evaluation and real-world applications. The new dimensions added in the 2025 edition were multi-domain operations and interoperability, and a new focus on CUI protection, which is today of the utmost importance in the international community. We will continue in this direction fostering more and more multi-domain, cooperative autonomy, strengthen the network between research, academia, industry and end-users. RAMI25 and related achievements were made possible thanks to the fundamental support of IEEE OES and all our other sponsors. We thank all the teams, judges, presenters, visitors, staff and everyone involved, who made RAMI2025 such a successful event.

ICOE 2025: A Journey of Connection and Collaboration

Vijaya Lakshmi Thiagarajan, Chair, IEEE Student Branch IIT Madras and Co-chair, IEEE OES IIT Madras

The 7th International Conference on Ocean Engineering (ICOE 2025), jointly sponsored by IEEE OES, held from 15–18 September, 2025, at IIT Madras, became more than just a conference – it became a platform where 220 passionate individuals from 16 countries gathered under the theme "Blue Economy and Sustainability," and IEEE OES was right at the heart of it all. As Chair of the IEEE Student Branch, IIT Madras, and Co-chair of the IEEE OES, IIT Madras, I had the unique privilege of witnessing how IEEE OES's presence transformed this event into a vibrant community gathering.

The morning of 15 September arrived with excitement and nervous energy. When IEEE OES was acknowledged as a proud sponsor during the inauguration ceremony, graced by Dr. Manu Korulla, Director General of the Defence Research and Development Organisation (DRDO), India, and other distinguished guests, I felt immense pride. But the real story began at our exhibition booth. From Day 1, it transformed into an informal meeting point where all 220 attendees – 33 faculty members, 16 industry representatives, international visitors from 16 foreign universities, and especially the 135 enthusiastic students – found their way at some point over the three days.

What made the booth special wasn't just the information we shared about IEEE OES publications, technical committees, and student benefits – it was the connections we forged. I watched a student's eyes light up upon discovering IEEE OES travel grants. Industry representatives explored partnership opportunities with researchers they met on the spot. International visitors learned about IEEE OES chapters in their home countries. The booth became a crossroads where careers were shaped and collaborations were born. Day 2 brought its own memorable moments with continued networking at our booth between the technical sessions. IEEE OES sponsorship was

Figure 1. Inauguration, Felicitation of Chief Guest, Guest of Honours and Plenary Speakers.

Figure 2. Visitors engaging at the IEEE OES exhibition booth.

Figure 3. Networking and Gala Dinner at Holiday Inn, Chennai.

Figure 4. Delivering the IEEE OES special session with K. Sridhar sharing the YPN experiences.

felicitated during the day, acknowledging our society's vital support to the conference. The evening's gala dinner at Holiday Inn Chennai OMR became an extension of the conference spirit, where conversations over dinner with international visitors, faculty, and industry representatives led to discussions about potential collaborations and the future of ocean engineering – all while IEEE OES remained a common thread connecting everyone present.

Then came Day 3, and my biggest moment. On 17 September, I stood in the TTJ Auditorium, IIT Madras, the main venue to deliver the IEEE OES special session: "IEEE OES: A Platform for Growth, Collaboration, and Innovation." Looking at the filled auditorium with faces I'd connected with over the past days, my nerves transformed into excitement. I spoke about IEEE OES not as an abstract organisation, but as a living, breathing community that fosters interdisciplinary research, provides networking opportunities transcending boundaries, and nurtures the next generation of ocean engineers.

Adding a powerful dimension to the session, K. Sridhar, IEEE Young Professional Laureate and IEEE OES Chair of IIT Madras, shared his inspiring journey and experiences as part of the Young Professionals Network (YPN). His insights on how IEEE OES and YPN shaped his career resonated deeply with the audience, particularly the students who could see themselves in his story. The combination of institutional perspective and personal journey created a compelling narrative about what IEEE OES membership truly means.

The Q&A session that followed was electric. Questions about technical committees, publication processes, career pathways, and international collaboration flew from all corners. A young researcher asked about underwater robotics research through IEEE OES. An industry professional wanted to explore partnership opportunities. Each question affirmed that our message was resonating.

Throughout the conference, 32 technical sessions showcased over 150 papers covering marine renewable energy, autonomous underwater vehicles, AI applications, and climate change studies – all of which are perfectly aligned with IEEE OES's mission. We heard 14 keynote lectures from international experts spanning Germany, Netherlands, Portugal, Taiwan, Japan, Tunisia, and Denmark. Between sessions, conversations at our booth would pick up where technical presentations left off, creating beautiful continuity.

If I had to pick the most fulfilling aspect, it would be the student engagement. By the conference's end, numerous students inquired about becoming members, accessing IEEE Xplore, submitting to the Journal of Oceanic Engineering, and applying for travel grants. One group even inquired about

Figure 5. Recognition and Appreciation for the IEEE OES special session.
(Left-Prof. Atmanand, Top center-Vijaya Lakshmi T, Bottom center-K Sridhar, Right- Prof. Abdus Samad).

Figure 6. Prize Distribution and Valediction Ceremony.

establishing an IEEE OES student chapter at their institution. The gala dinner on 16 September and industrial visits to IIT Madras Discovery Campus and NIOT on Day 4 further strengthened these connections.

As the valedictory ceremony concluded on 17 September, I reflected on what we'd achieved. IEEE OES hadn't just been a sponsor name – we'd been present, engaged, and impactful. Selected papers will be considered for IEEE-affiliated journals,

Figure 7. Industrial Visits- IIT M Discovery Campus & NIOT.

Figure 8. IEEE OES SBC IIT Madras- Executive Team (From left to right: Vallabh, Rishikesh, Vijaya Lakshmi, Prof. M A. Atmanand, Prof. Abdus Samad, Prof. V. Sriram, Sridhar, Sree Nandhini, Sangeetha, Srimathi, Harini)

plans are underway for joint workshops, and institutions have expressed interest in establishing IEEE OES student chapters. Most importantly, we strengthened IEEE OES's visibility in India and demonstrated our commitment to advancing ocean engineering globally.

ICOE 2025 reinforced my belief that IEEE OES is more than a professional society – it's a community united by curiosity about our oceans and commitment to engineering excellence. Special thanks to the organising committee led by Prof. Abdus Samad, Head of Ocean Engineering Department, IIT Madras, along with Prof. M A. Atmanand, Dr. Poguluri Sunny Kumar, Dr. Bithin Ghorai, and Dr. K.G. Vijay for their exceptional leadership. To everyone who made this unforgettable – the organisers, faculty, industry representatives, international visitors, distinguished guests, our dedicated core volunteer team who worked tirelessly behind the scenes, and especially the 135 students who brought such energy – thank you.

That's all from me for this edition. I'd love to hear your thoughts and experiences. Send your feedback to the OES newsletter. Together, we can continue making IEEE OES a platform for growth, collaboration, and innovation.

Until next time,
Vijaya Lakshmi Thiagarajan

IEEE-OES Supports INORE's 2025 EU Symposium in Denmark

Jonathan Glasspool (INORE DEI Coordinator) & Vivien Maertens (INORE EU Events Coordinator)

Overview

The towns of Løkken and Aalborg, in Denmark's North-West, hosted this year's European Symposium of the International Network on Offshore Renewable Energy (INORE) from the 15th to 20th of September, 2025. The event brought together early-career researchers and professionals working across offshore renewable energy (ORE) for a week of presentations, posters, workshops, networking and site visits.

INORE is a non-profit organisation run entirely by volunteers. Founded in 2006 in Norway as a forum for postgraduate students and early-career professionals in ORE, the network now connects members from a wide range of disciplines including engineering, environmental science and policy. Its aim is to support collaboration and knowledge exchange among those at the beginning of their careers.

Whilst INORE hosts small local events throughout the year, the flagship events are our two annual symposia: One based in North America and the other in Europe. Each of these symposia brings together researchers from around the world for a week of academic and cultural exchange, often including the traditional elements you might find at a conference - technical posters and presentations - alongside a range of social events and site visits that reflect the industry and culture of the communities hosting the symposia.

The Offshore Renewable Energy (ORE) Sector

The ORE sector is expanding rapidly as countries seek to meet net-zero targets and decarbonise their power systems. The ORE sector includes electricity generation from wind (including floating wind structures), wave, tidal, floating solar and salinity gradient. Though some of these sectors are well established, others are yet to reach technical convergence and are at the prototype stage. A common theme of all is the need for innovation and research to reduce costs, improve reliability and minimize environmental impact whilst overcoming the harsh offshore environment. INORE includes members from all these sectors to ensure knowledge and experience are shared across disciplines, fostering collaboration that helps accelerate the sustainable development of ORE worldwide.

Support of IEEE-OES

The 2025 symposium was supported and made possible by several international and local organisations, with the IEEE Oceanic Engineering Society (IEEE-OES) and the Ocean Energy Systems Technology Collaboration Programme (IEA-OES) being the main sponsors. IEEE-OES's contribution helped INORE maintain one of its core principles: Free attendance, including accommodation and meals, for all participants. This approach allows students and early-career researchers

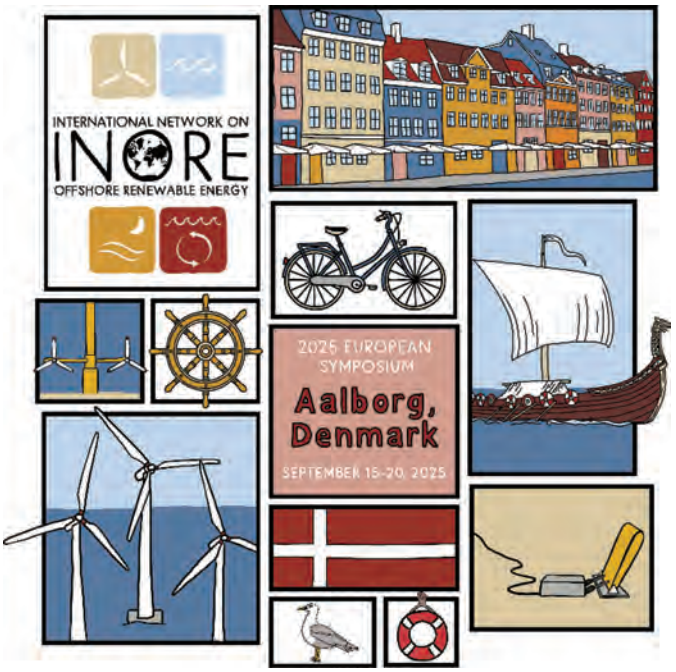


Figure 1. The 2025 INORE EU Symposium Flyer.

Figure 2. Shyam at the Løkken accommodation, presenting the IEEE-OES goodies which he shipped over for INORE participants.

from many different backgrounds to take part, regardless of financial circumstance, not just those from well-funded institutions able to cover conference costs. Diversity, equity and inclusion are central to INORE's ethos, and ensuring access for the widest possible mix of participants enriches discussion and strengthens the community that underpins the ORE field.

The symposium further provided the opportunity for IEEE-OES's own representative, Shyam Kumar Madhusudhana, to introduce the society to the INORE community. Shyam presented an overview of the IEEE-OES's structure, its technical committees and regional presence, and highlighted OES publications and opportunities for early-career involvement.

2025 EU Symposium Highlights

The programme opened with a presentation from Poul Rask Nielsen, Senior Project Manager at the Municipality of Hjørring, who outlined several circular economy initiatives in the region. Throughout the week, participants visited Aalborg University's ORE laboratories, the Østerild Wind Turbine Test Field and the Port of Aalborg where they also met a representative from Siemens Energy. Other sessions included a presentation from Crestwing, which is developing a wave-energy-based offshore charging station, and a beach discussion with Signe Simonsen, CEO of Race for Oceans Technology, on local plastic pollution and the use of AI-enabled monitoring robots.

The symposium also featured poster sessions, technical talks and informal discussions among participants from Algeria, Canada, Chile, Denmark, Italy, Norway, Portugal, Spain, the United Kingdom and the United States.

The event concluded with an evening at Kaosfabrikken in Løkken, bringing together organisers and participants in a relaxed setting to close the week. Once someone has attended an INORE symposium, they remain part of the INORE community for life – a global network of ORE researchers that continues to grow and support one another long after each event ends. A highlight of the week was a short talk by Morten, a former INORE participant from Aalborg, who returned to share his experience of moving from doctoral research into industry. His reflections on career development and maintaining perspective resonated with many current attendees.

Alongside the formal programme, participants also took part in informal networking dinners and evening discussions around Løkken, where conversations often turned to shared research challenges and ideas for future collaboration. Many INOREANs remarked that the relaxed and inclusive atmosphere, fostered by INORE's focus on early-career researchers, is what makes the network unique among professional organisations.

Figure 4. INOREANs enjoying some relaxed time in a local café in Lokken.

Looking Ahead

As INORE approaches its twentieth anniversary in 2026, the network continues to evolve while holding fast to its mission of bringing together early-stage researchers from around the world and with a variety of backgrounds to share what they know, and learn from others. The enthusiasm of this year's participants shows that this mission stays as relevant as ever.

INORE's activities continue to depend on the time and effort of its volunteers and the generosity of sponsors such as IEEE-OES. Events like this year's symposium provide opportunities for early-career professionals to exchange ideas, learn from industry and community partners, and strengthen the global ORE community.

Plans for the 2026 symposia are already underway, with several promising locations being explored in both North America and Europe. Keep an eye out for announcements and if you are an early-stage researcher, be sure to submit an application to attend and get involved. INORE is an organisation that welcomes everyone with an interest in offshore renewable energy, and the team would love to hear from you.

More information: www.inorean.org

Figure 3. The INORE group at their site visit to the Port of Aalborg.

Figure 5. (left) INORE group at the University of Aalborg (right) INOREANs at the Østerild wind turbine test field.

IEEE OES MetroSea 2025 in Genoa, Italy

Authors Giovanni Battista Rossi, Pasquale Daponte, Maurizio Migliaccio, Francesco Crenna

The IEEE OES MetroSea conference is a well-established international conference that covers all aspects of marine science and technology. In addition to Italian editions, the Congress was held in Malta (2023), in Slovenia (2024) and next edition (2026) is planned in Croatia. Since 2023 the conference was also sponsored by the IEEE Oceanic Engineering Society (OES). Moreover, it is a recognized activity in the United Nations Decade of Ocean Science for Sustainable Development (2021–2030).

This year's edition of the IEEE MetroSea was held at Hotel NH Collection – Genoa, Italy, on 8-10 October, 2025.

Several important patronages helped for the best success of the IEEE MetroSea 2025 conference. Academic patronages come from the University of Genoa, the University of Napoli Parthenope, the University of Cassino and Lazio Meridionale, the University of Zilina, the Karkhiv Polythetic Institute, the Technical University of Sofia, the University of Sannio, the Maritime University Gdynia, the Institut Superior d'Etudes Maritimes, the Batumi State Maritime Academy. Other patronages came from the Italian Navy, the Italian National Council of Research (CNR), the OGS, the INGV, ISPRA and the RAISE project.

Sponsorship from DEWESoft, Codevintec, OnAir, SubseaPulse, and Setelgroup supported the conference.

The general Chairs were Francesco Crenna (University of Genoa), Pasquale Daponte (University of Sannio), and Giovanni Battista Rossi (University of Genoa).

Figure 1. A geographical sketch of Italy and Genoa.

Genoa is an historical city in Northern Italy that faces over the Thyrrhenian Sea and most of its past and present life is strictly connected to the sea.

The morphology of the city of Genoa is very peculiar, see Fig.2. Genoa's topography is characterized by a stark contrast between the sea and the mountains, with the city extending in a narrow strip between the coast and the Apennine hills. This conformation has led to the development of numerous valleys descending towards the sea, separated by ridges with elevations that can reach between 400 and 1,200 meters, located a short distance from the coast. The city is built on hilly terrain, and its growth has led to the terraced slopes to create arable land.

The venue of the conference was in the old harbour close to the old part of Genoa and several cultural places, see Figs. 3 and 4.

Genoa was the capital of the Republic of the same name for about eight centuries, which included almost all of Liguria and Corsica (later ceded to France in 1768). For about five

Figure 2. An aerial view of Genoa by the sea perspective with mountains on the back.The conference venue was located at NH Hotel just at the center of the picture on the seaside.

Figure 3. The old harbor of Genoa, the aquarium on the left (see the with roof building).

Figure 4. The Genoa Aquarium just close to the conference venue.

centuries, Genoese possessions flourished throughout the Mediterranean basin, sometimes as emporiums or commercial bases, sometimes as true colonies, directly dependent on the Republic.

In 1580, the Republic was declared "Serenissima" by the Emperor, at the same level of Venice. The period across the sixteenth and the seventeenth century, is called "El Siglo de los Genoveses" since Genoa was the main centre of high finance, and it was especially related to Spain. Important palaces were built and famous artists were attracted, such as Van Dyck and Rubens. It was during this period that construction also began of the Doge's Palace, which remains an important monument in the city today.

For the Opera lover it must be mentioned the opera by Giuseppe Verdi named *Simon Boccanegra*, whose plot follows the election as Doge of the commoner Simone Boccanegra, who twenty-five years earlier had a daughter, Amelia, by Maria, who was being held prisoner by her father, Fiesco. It is based in 1339 in Genoa, when the city was powerful all over the Mediterranean Sea.

After the opening of the Suez Canal in 1869, Genoa became the centre of several foreign communities, including a large number from the United Kingdom. The British community's typical pastimes were cricket and football, the latter traditionally played by the lower classes or young people. In fact, in 1893 the first Italian football (soccer) team was founded, which was named Genoa in honour of his English founder.

The importance of the Port of Genoa lies in its position as the largest Italian port and among the busiest in Europe, serving as a hub for the national and international economy through trade, container shipping, and its role as the main source of direct and indirect employment for the city and the surrounding region. Its historical importance is linked to its strategic location, which has made Genoa a crucial trading hub for centuries, and today it continues to be a key economic driver for the entire region.

The city of Genoa is also the place of several research institutions that include the University of Genoa, several Institutes of the National Council of Research, the Italian Technology Institute, IIT and the Hydrographic Institute of the Navy, among several private Companies whose focus is about marine technologies.

Genoa is also famous for its typical food, which includes the "*Pesto alla Genovese*": Genoa's iconic sauce, made with basil, pine nuts, garlic, oil, and Parmigiano Reggiano cheese, used to season pasta, soups, and other dishes, see Fig. 5.

The accepted conference papers were 122 with a number of international registered attendees summing to 128 from 16 countries. All articles submitted to IEEE MetroSea 2025, that have been accepted in a peer-reviewed process, have been published on IEEE Xplore Digital Library. This year a dedicated IEEE Journal of Oceanic Engineering (JOE) Special Issue has been planned. All presenters are invited to submit their full journal papers to IEEE JOE if adhering to the journal scopes. The submission time goes from 10 October, 2025 to 31 January, 2026.

The opening session was Chaired by the General Chairpersons, see Fig. 6. In Fig. 7 another moment of the opening ceremony is presented where the representatives of the Municipality of Genoa (Emilio Robotti), the University of Genoa (Nicoletta Dacrema) and the Hydrographic Institute of the Navy (Captain Erik Biscotti) are shown.

As a technical visit, a tour of the Historical Instrument Collection of the Hydrographic Institute of the Navy was organized, see Fig. 8. The Conference included 28 oral sessions. Further, the conference schedule incorporates 3 keynote talks,

Figure 5. The iconic Genoa "Pasta alla Genovese"

1 tutorial and 1 technical visit (Fig. 8). The keynotes were held by Marco Giovine (University of Genova) and Marco Saccone (Italian Navy), René Garello (IMT Atlantique), and María de los Reyes Poo Argüelles (University of Oviedo). All three keynotes were of special interest.

The first keynote (Fig. 9), by Marco Giovine and Marco Saccone was held during the first day and was about "*The University of Genoa's Sea Center and the Collaboration with the Italian Navy. The Joint Project Aboard the Amerigo Vespucci During its 2023-2025 World Tour*" while René Garello lectured on 9 Oct. on "*Ocean Observations and Climate Change*" (Figs. 10 and 11).

During the last day María de los Reyes Poo Argüelles lectured on "*NAOS: Maneuvering Support System for the Prevention of Ship Collisions*" (Fig. 12).

The tutorial was held in the afternoon of 9 Oct. by Mariusz Specht (Gdynia Maritime University) and was about "*Bathymetric monitoring system for shallow waterbodies using autonomous unmanned flying and floating measurement platforms,*" see Fig. 13.

Figure 6. The General Chairmen at the Opening Session.

Figure 7. About the opening ceremony: the representant of the Municipality of Genoa (left), the representant of the University of Genoa (center) and the Hydrographic Institute of the Navy representant (right).

Figure 8. About the technical visit.

Figure 9. The first keynote by Marco Giovine and Marco Saccone.

Figure 10. Renè Garello, IMT Atlantique introduced by Maurizio Migliaccio.

Figure 11. Renè Garello having his keynote.

The most important benefit of IEEE OES MetroSea is to foster old and new personal networks crossing the different expertises and countries. In the following pictures you can appreciate the value of the conference even in these respects.

In Fig. 14 a group picture of the PHD students attending the conference with the University of Genova special funding. along with Prof. Ilaria Ferrando in charge of the fellowship assignment and the General Chairmen, close to the Neptune ship.

Figure 12. María de los Reyes Poo Argüelles, University of Oviedo having her keynote.

Figure 13. Mariusz Specht and Oktawia Specht.

Figure 14. PHD students selected for the fellowship offered by the University of Genoa with Prof. Ilaria Ferrando in charge of the assignment and Prof Francesco Crenna.

Neptune is a ship replica of a fictional 17th-century galleon designed by naval architect David Cannell. The ship was built in 1985 for Roman Polanski's film Pirates, where she portrayed the Spanish ship of the same name. The Neptune is docked in Genoa being a tourist attraction in the old port area.

In the following pictures some conference moments are shown. In Fig. 15 Maria Angelucci presenting her contribute during the "*Military Metrology for the Sea*" session is shown.

In Fig. 16 a moment of the session "Detection and monitoring of water contamination phenomena" is shown. In Fig. 17 Mozhan Zahriban Hesari presenting her scientific contribute within the "*Modeling. Measurements and products for satellite remote sensing of inland water bodies and coastal regions*" session.

In Fig. 18, a happy session moment has been photographed. In Fig. 19 Giuseppe Grieco (CNR ISMAR) is shown while presenting his paper.

Many young people attended the conference. Authors and participants came from 15 countries including Italy, Denmark, Poland, Slovenia, United Kingdom, Spain, Croatia, Portugal, Israel, Japan, United Arab Emirates, France, Netherlands, China and USA.

Figure 15. Maria Angelucci presenting her contribute.

Figure 16. Yuan Guo and Anna Verlanti chairing the "Detection and monitoring of water contamination phenomena" session.

Figure 17. Mozhan Zahriban Hesari presenting.

Figure 18. A session moment.

Figure 19. A session moment.

All social events were excellent and organized with great care and professionality. The gala dinner was held on 9 October at Restaurant Giotto - Hotel Bristol Palace, an historical location founded 120 years ago.

In Fig. 20 Angela Pomaro (CNR ISMAR) at a session is shown.

During the closing ceremony Pasquale Daponte and Francesco Crenna announced the awards winners (Fig. 21).

The best paper award, sponsored by ISPRA, the Italian Institute for Environmental Protection and Research, with a photographic book with images from the depth of the sea. The award was assigned to the paper "Vision-Language Models for Underwater Ecological Monitoring" by Rim ElTobgui, Saverio

Figure 20. A session moment.

Figure 21. Pasquale Daponte and Francesco Crenna announcing the awards winners during the closing ceremony.

Iacoponi, Sajid Javed and Federico Renda (Khalifa University, United Arab Emirates); Giulia De Masi (Sorbonne University-Abu Dhabi, United Arab Emirates); Jorge Dias (Khalifa University, United Arab Emirates).

The best paper presented by a woman award was sponsored by the Hydrographic Institute of the Navy with a nice lithography representing San Giorgio fort, the historical location where the institute was funded in 1872. The award was assigned to Giulia Buttazzoni (Fig. 22), who presented the paper "Retrieving the Radiation Properties of Maritime Antenna Arrays in the Presence of Faulty Elements" by Giulia Buttazzoni, Fulvio Babich, Francesca Vatta and Massimiliano Comisso (University of Trieste, Italy).

The best paper presented by a young researcher, sponsored again by ISPRA, was assigned in *ex-equo* to Filippo Ponzini (Fig. 23) from the University of Genova, who presented the paper: "Marine Obstacles Multi-Modal Detection, Classification and Tracking via Camera-LiDAR Late Fusion," by Filippo Ponzini, Michele Martelli (University of Genova, Italy), and to Giorgio Riccobene (INFN, Italy); Alessia Rita Tricomi (University of Catania, Italy); Salvatore Viola and Didac Diego-Tortosa (INFN-LNS, Italy); Elena Geraci (University of Catania, Italy); Clara Gomez-Garcia (CSFNSM, Italy); Riccardo Lo

Figure 22. The best paper presented by a woman award winner, Giulia Buttazzoni with the Hydrographic Institute representative, Captain Daniele Ditrè and one of the conference general chairs.

Figure 23. One of the ex-equo winners of the best paper presented by a young researcher award, Filippo Ponzini, with Marco Picone representative of ISPRA and Francesco Crenna.

Nero, Giorgia D'Amico, Flavia Grenga (Centro Siciliano di Fisica Nucleare e Struttura della Materia, Italy) for the paper: "The VONGOLA (Visual and nOise-eNhanced AI Analysis for Marine Biodiversity MonitorinG, Observation and LeArning) Project: Design and Achievements of CSFNSM."

During the closing ceremony Fausto Ferreira, University of Zagreb, addressed the participants as local organizer of IEEE OES MetroSea in 2026, see Fig. 24.

IEEE MetroSea 2026 will be hosted in Sibenik, Croatia, (Fig. 25) 5–7 October, 2026. The IEEE Oceanic Engineering community is warmly invited to enjoy the Conference.

Figure 24. Fausto Ferreira presenting the next edition of IEEE MetroSea.

Figure 25. Sibenik, Croatia, will be the hosting city of IEEE MetroSea in 2026.

IEEE Region 10 Conference 2025 (TENCON2025) at Kota Kinabalu, Malaysia

Melanie Olsen, Chair Australia Chapter & Mal Heron, OES Executive VP

The Australia OES Chapter led the Region 10 OES Chapters to present a special Oceans session at the R10 flagship conference TENCON2025 held October 27-30. The promotion by OES was to encourage collaboration among the 13 OES Chapters in R10, to run the special technical session, to run a booth in the Exhibition Hall, and to host a networking session for OES members. The activity was led by the Australia OES Chapter with financial support from OES, Region 10, TENCON, and notable help from the Malaysia Chapter and the TENCON2025 committee.

The technical session started with a keynote address by OES Distinguished Lecturer Mohd Rizal Arshad who gave a captivating view of ocean technologies with a focus on intelligent underwater robotics. His reference to the coral reef triangle in the Indonesia-Malaysia-Philippines area gave a nice local geographical aspect.

The contributed papers were general submissions to TENCON2025, and with the generous help of the organising committee we corralled the ocean-related papers into one session and called it the Oceans Track. For TENCON2026 OES will make a special Call for Ocean-Related Papers. The paper topics ranged from flood vulnerability mapping to tidal energy potential. The Best Paper Award for the session went to a student from National University Philippines, John Michael P Dellova, for his paper titled "Evaluation of Water Hyacinth-Polypropylene Hybrid Adsorbents for Oil Spill Remediation in the San Cristobal River Station of Laguna de Bay."

OES@TENCON2025 booth with Mal Heron, Melanie Olsen, Rosmiwati Mohd Mokhtar, Zainah Binti Mohd Zakhin, and Zool H Ismail.

Distinguished Lecturer Rizal Arshad's keynote address was titled "Intelligent Robotic Technologies for Sustainable Coastal Futures."

John Michael P Dellova delivering the "Best Paper."

This activity is funded to be repeated in TENCON2026 in Bali, Indonesia, 10-13 October, and our aim is (a) to encourage the OES Chapters in Region 10 to collaborate, and (b) to enhance the impact of OES in Region 10. The Call for Papers for TENCON2026 is out (see advertisement in this issue) and submissions are due by 17 March 2026. Please consider submitting your paper to TENCON2026, especially if you hail from Region 10.

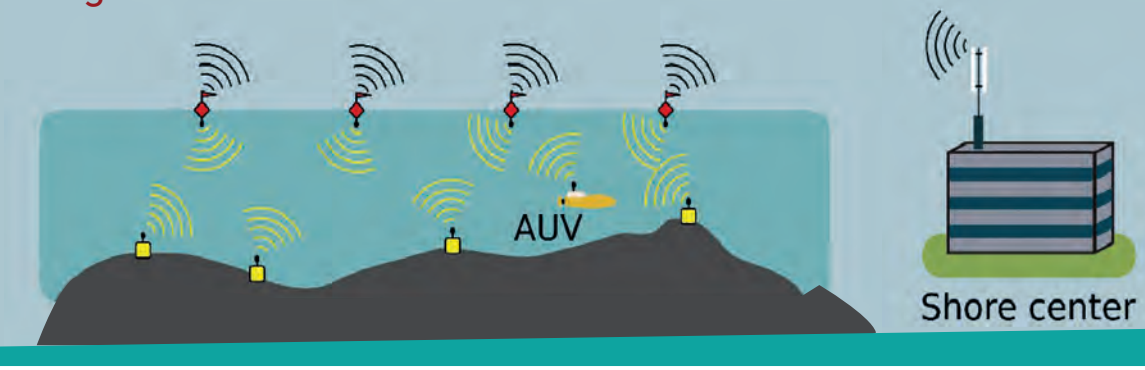
TENCON2025
KOTA KINABALU, MALAYSIA

UNWiS

Winter School on Underwater Network Simulation

PADOVA / ITALY | 2nd of February – 6th of February 2026

Registration deadline: 31st December 2025

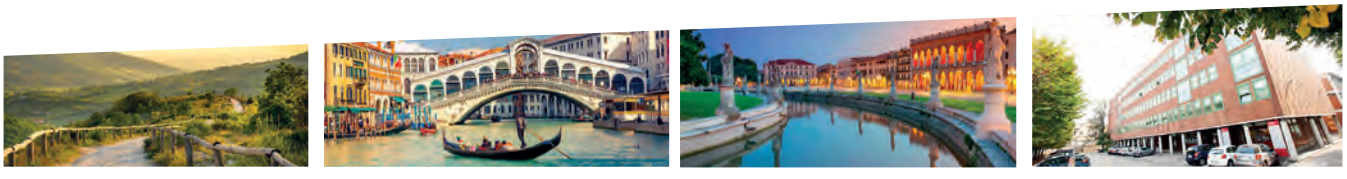


Focused on the **DESERT Underwater network simulation and experimentation framework**, the fourth edition of **UNWiS** will be split into two parts:

- **Theoretical**: lectures that will allow students to learn the concepts and procedures to perform network simulations and develop software modules
- **Experimental:** To implement the code, run simulation experiments and analyze the results

https://desert-underwater.dei.unipd.it

Required equipment: laptop with Linux OS (recommended Ubuntu LTS), a Linux virtual machine.
Required knowledge: basic C/C++ and Linux OS knowledge.
Used tool: DESERT Underwater is a complete set of public C++ libraries that extend the NS-MIRACLE simulator to support the design and implementation of underwater network protocols.
Registration page: https://www.subseapulse.com/unwis/
Registration deadline: 31st December 2025



organized by:

SIGNET signet.dei.unipd.it

W&M

SUBSEAPULSE

Università degli Studi di Padova

Dipartimento di Ingegneria dell'Informazione

sponsored by:

OES IEEE Oceanic Engineering Society

supported by:

OES IEEE Oceanic Engineering Society ITALY CHAPTER

AUV 2026, Southampton, UK
1-3, September 2026
Call for Abstracts – standard track

CALL FOR ABSTRACTS - OPEN, deadline 1 February 2026

IEEE OES AUV Symposium brings the marine robotics community together to share the ideas, exchange lessons and future research and collaboration. Our focus is on the technologies and applications of autonomous underwater vehicles (AUV) , autonomous surface vessels, underwater gliders and Lagrangian floats, with most papers centered on field robotics or data collected from real-world deployment.

Key dates

1 September 2025 - Call for abstracts opens
1 February 2026 - Abstract submission deadline
1 March 2026 - Notification of acceptance
1 July 2026 - Final paper submission
1 - 3 September 2026 - Symposium Dates

Prepare your abstract

See the IEEE conference template
A4, English language
No more than 2 pages of content (title, author and affiliation, figures and tables) You may use an additional page for references only
Convert your abstract to a PDF when ready to submit

Submit your abstract

Upload your 2 page + references pdf to the SUBMISSION PORTAL before 1 February 2026
Please enter name and details of the presenting author
Please indicate which topics the paper best fits:

- Vehicle design
- Planning & control
- Navigation & sensing
- Operations communication & data management
- Science & industrial applications

Please indicate your preferred presentation format:

- Oral (you'll be asked if a poster is OK if no oral slots are available)
- Poster

Upload your pdf. You should receive a confirmation email, if not contact auv2026@soton.ac.uk

IEEE Oceanic Engineering Society
University of Southampton
National Oceanography Centre

TENCON 2026

Call For Papers

2026 IEEE Region 10 Conference (TENCON)

10 - 13 October | Bali, Indonesia

About

IEEE TENCON is the premier flagship conference of IEEE Region 10 (R10), encompassing 63 Sections, 41 Sub-sections, 918 Chapters, and 115 Affinity Groups across the Asia–Pacific region. The theme for TENCON 2026 is

"Intelligent Systems for a Resilient and Sustainable Society"

This theme underscores the pivotal role of advanced intelligent systems—such as artificial intelligence, the Internet of Things (IoT), and cyber-physical systems—in creating adaptive, efficient, and sustainable infrastructures that support all sectors of society, from urban development to environmental protection and social inclusion.

Full Paper Submission	17 March 2026
Notification of Acceptance	27 June 2026
Final Manuscript Submission	27 July 2026
Early Bird Registration	27 July 2026
Normal Registration	31 August 2026

OES welcomes Ocean-Related Papers for a Special Area on Ocean Technologies in TENCON2026.

ORGANISED BY
THE OES CHAPTERS OF REGION 10

Official Web: https://tencon2026.ieee.id

Organized by: IEEE Indonesia Section | IEEE Region 10

Contact Us tencon2026@ieee.id | tencon2026@gmail.com

A Blast From the Past! . . . China, here we come . . . Again!

Bob Wernli – Beacon Co-Editor-in-Chief and Photographer Stan Chamberlain

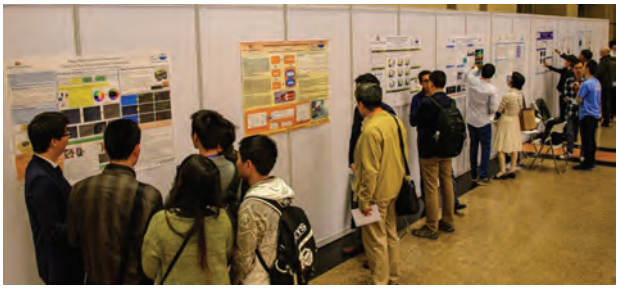
OCEANS 2016 was successfully held in Shanghai, China. And…it has been approved to return to Sanya, China, a decade later for OCEANS 2026. Here's a Blast from the Past with some photos of the Shanghai 2016 OCEANS.

Podung Shanghai Skyline.

OES Exhibit Booth.

OCEANS 2016 Shanghai Exhibits.

Well Attended Technical Presentation.



Student Poster Competition.

Icebreaker Reception.

Instrumentalists at the Gala.

Acrobatic Performance at the Gala.

Hats – OES People at OCEANS 2025 Great Lakes

Harumi Sugimatsu, BEACON Editor-in-Chief

Enjoy your time with OES people with hats!

OCEANS Great Lakes 2025

Steve Ruberg, OCEANS co-host, Observing Systems PI at NOAA's Great Lakes Environmental Research Lab
Liesl Hotaling, MTS Director of Program Development
Katie Skinner, Robotics Assistant Professor at the University of Michigan

Photo from NOAA/GLERL Webcam located offshore on the Chicago meteorological station

OCEANS Chicago 2025 marked the first time the conference has been held in the Great Lakes. The conference took place on Chicago's historic Navy Pier surrounded on three sides by the waters of Lake Michigan making access to on-water demos very easy for attendees. The plenaries underscored the importance of the Great Lakes to North American commerce, a source of drinking water for 40 million regional residents, and collaborative management of this vast freshwater resource through a binational US/Canadian agreement.

Thank you OES and MTS Volunteers

Thanks to our local organizing committee: Tim Havens (Michigan Tech) and Steve Ruberg (NOAA) co-hosts, Ed Baily (Northwestern Michigan College) finance; Katie Skinner (University of Michigan), Jessica Daignault (Kongsberg), and Ed Verhamme (Freeboard Technology/Limnotech) technical program co-chairs; John Lutchko (Northwestern Michigan College) in water demos chair, Katie Rousseau (Great Lakes Observing System) patronage, and Jeff Dusek volunteers chair.

A special thanks to our session chairs: Aaron Marburg, Katie Rousseau, Steve Ruberg, Onur Bagorun, Christopher Thierauf, D. Bonneval, Itzik Klein, Jon Derek Loftis, Thomas Coulon, Ashwani Koul, Mathew Schwartzman, Michelle Barnett, Sophie Scopazzi, Masanao Shinohara, Christian Sarason, Mehdi Rahmati, Phillipe Wernette, Luis Altamirano Perez, Ed Verhamme, Iffat Ara Ebu, Matthew Schinault, Min Gyu Kim, Liesl Hotaling, Luke Bagan, Jingyu Song, Keisuke Ariyoshi, and Isaac Gerg.

A special thanks to Liesl Hotaling and her MTS and MCI teams for pulling together the details to make this OCEANS conference a success.

Left to right: Oscar Schofield, Steve Ruberg, Liesl Hotaling, Ed Verhamme, Katie Skinner, Hans Vansumeren, Katie Rousseau, Tim Havens, and Jessica Daignault.

Plenaries

Tuesday's conference kickoff plenary included Col. Kenneth P. Rockwell, Commander of the Chicago District US Army Corps of Engineers (USACE) informing attendees about regional waterway infrastructure and the role that federal agencies such as USACE, NOAA and EPA play in maintaining the safety and health of the Great Lakes. Col Rockwell was followed by Oscar Schofield, a biological oceanographer at Rutgers University's Center for Ocean Observing Leadership. Oscar presented polar research obtained from a wide range of ocean sensors and observing systems used to track these rapidly changing ecosystems.

The Wednesday State of the Great Lakes plenary panel consisted of members Dr. R. Michael McKay, director of the Great Lakes Institute for Environmental Research in Windsor Canada, Heather Stirratt, retired director of the International Joint Commission's Great Lakes Regional Office, Todd Nettesheim,

Col. Kenneth P. Rockwell.

Dr. Oscar Schofield

deputy director of the EPA's Great Lakes National Program Office, and Kalindi Parikh, strategy director at water technology innovator Current. The session was facilitated by Caitlin Looby of the Milwaukee Sentinel Journal. The panel addressed the urgent need for autonomous vehicle and observing system technologies required to monitor ecosystem condition and emergency response during winter when ice cover prevents access by research vessels. The panel addressed a wide range of questions from the audience including the continued need for collaboration under the US/Canada Great Lakes Water Quality Agreement. The Great Lakes region's economy generates a gross domestic product (GDP) of approximately $6 trillion supported by its manufacturing, trade, tourism, and service industries.

Left to right: Todd Nettesheim, Kalindi Parikh, Mike McKay, Heather Storratt, and Caitlin Looby.

The panel on Thursday featured Aeon Bashir. Aeon talked about how his curiosity about the interconnectedness of life on Earth led to establishing the non-profit Aeon for Ocean. Aeon communicated to the audience about how the ocean impacts people who don't live near it and how those people impact the ocean in return

In Water Demos

The easy access to water at Chicago's Navy Pier made on water demonstrations convenient for conference attendees. R2Sonic, Echo81, Teledyne, Unique Group, DEEP Trekker, Norbit, Maritime Robotics, and Hybrid Robotics provided hands on access to technology such as autonomous vehicles and multibeam mapping systems.

Echo81 rounds Navy Pier during their hands on demonstration.

Technical Program

There were 40 technical sessions with 214 papers accepted and presented. There were 12 town halls covering topics such as innovation for the ocean, emerging technology, AI standards, how observations drive decision-making, Great Lakes Mapping and Lakebed 2030, workforce development in ocean technology and many more.

Technical program presenter.

Student Poster Competition

The OCEANS Student Poster Competition is an annual event funded by the Office of Naval Research. The competition affords students a spotlight to share their research with the community. You can read the detailed SPC report in this issue, too.

This year's participants included:

Derek Benham, Brigham Young University: One-Way Acoustic Signal Localization using Received Signal Strength.

Christopher Bohm, Lake Superior State University: A USV-Based Platform for Bathymetric Mapping and Underwater Sound Source Localization.

Thomas Davies, Florida Atlantic University: Development of a Towed Sensor Tow-fish for AUV-Based Mapping of Subsea Electromagnetic Field.

Joseph DiDomenico, Rutgers University: BIVALVE: An imagery-based validation framework for benthic habitat classification from side-scan sonar data.

Nelson Durrant, Brigham Young University: Low-cost Multi-agent Fleet for Acoustic Cooperative Localization Research.

Leah Hopson, Rutgers University: Autonomous Underwater Glider Observations during Hurricane Beryl (2024).

Zachary Kassuba, Louisiana State University: Design and Development of an Autonomous Surface Vehicle (ASV) for Zooplankton Net Sampling.

Noah Lawler, Grove City College: Adaptive Enhancement of Underwater 3D Imagery using an RGB-ToF Camera.

Jessica Leonard, Rutgers University: Using Slocum Gliders with Nontraditional Flight Behaviors to Accommodate Unique Sampling Requirements.

Braden Meyers, Brigham Young University: Testing and Evaluation of Underwater Vehicle Using Hardware-In-The-Loop Simulation with HoloOcean.

Jason Seiple, Rutgers University: Tracking Hydrothermal Diffuse Flow With Multibeam Sonar: Insights from COVIS (2019-2023).

Nate Sjullie, Portland State University: Riverine Background Acoustic Analysis.

Xavier Vicent, Florida Atlantic University: Fuzzy Logic-Assisted PID Control for Improved Station-Keeping of a Catamaran-Style USV.

After deliberation by the judges, prizes were awarded to:

3rd – Nelson Durrant

2nd – Leah Hopson

1st – Braden Myers

The Exhibition

As usual the conference exhibition was a focal point. Marine technology industry partners and users were together in one location to talk about the hardware and software required for operational and developmental applications across our oceans and coastal areas. We were able to wander the floor to get ideas for current projects as well as get a glimpse of what the future will bring.

OCEANS 2025 Great Lakes exhibition.


Student poster participants flanked by OES and MTS presidents.

The Student Poster Competition at OCEANS 2025 Great Lakes

Dr. Shyam Madhusudhana, OES Student Poster Competition Chair
Photo credits: Manu Ignatius

Since its debut at the 1989 OCEANS conference in Seattle, the Student Poster Competition (SPC) has grown into one of the hallmark programs of the MTS/OES partnership. Its mission is clear: to provide a stage where promising undergraduate and graduate students can present innovative ideas, exchange knowledge with experts, and forge connections that will help shape their careers. More than just a competition, the SPC is a celebration of fresh perspectives in ocean science and engineering — and a tangible investment in the future of the profession.

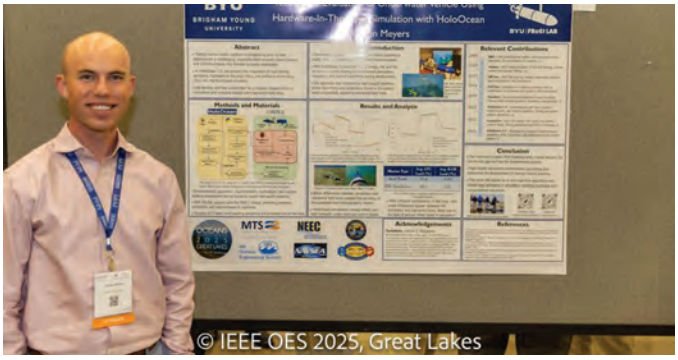
Deviating from the convention of having about 20 candidates participate at the event, the Great Lakes SPC was, unfortunately, limited to 13 participants. This reduction was a consequence of the prevailing geopolitical scenario and funding limitations. The conference's local organizing committee SPC Chair, Liesl Hotaling, did a stellar job of ensuring the arrangements were not lacking in any way. The poster sessions were very well attended, and the students seemed to have enjoyed their time at the conference. We had a panel of 9 judges that generously offered their time, speaking to each participant and scoring their posters. We are grateful for their support. The awards ceremony was held prior to the exhibitors' luncheon on the final day of the conference. Participation certificates and winning prizes were handed out by the sponsoring societies' leadership – Susan Hunt (President, MTS) and Christian de Moustier (Past President, OES).

We extend our sincere thanks to the sponsoring societies, OES and MTS, whose continued commitment keeps the SPC thriving year after year. Our gratitude also goes to the Office of Naval Research (ONR) for their steadfast financial support, and to our dedicated judges who generously offered their time and expertise. With such strong community engagement, the SPC remains a vibrant platform for nurturing emerging talent, and we look forward to welcoming the next cohort of bright young minds at future OCEANS conferences.

The list of participants (including the prize winners) together with their affiliation, poster title and an abstract of their poster are given below.

The awards ceremony was well attended.

First prize (Norman Miller Award) (Certificate and $3,000)
Braden Meyers, Brigham Young University, USA
Testing and Evaluation of Underwater Vehicle Using Hardware-In-The-Loop Simulation with HoloOcean

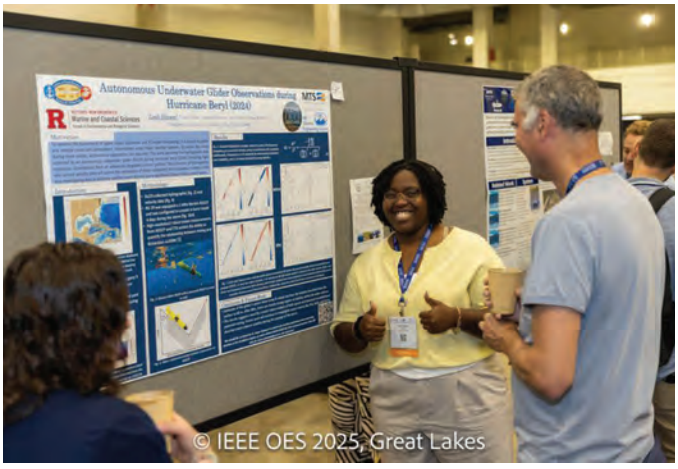


Abstract—Testing marine robotics systems in controlled environments before field tests is challenging, especially when acoustic-based sensors and control surfaces only function properly underwater. Deploying robots in indoor tanks and pools often faces space constraints that complicate testing of control, navigation, and perception algorithms at scale. Recent developments of high-fidelity underwater simulation tools have the potential to address these problems. We demonstrate the utility of the recently released HoloOcean 2.0 simulator with improved dynamics for

Student participants, SPC Chairs, and the sponsoring societies' leadership.

torpedo AUV vehicles and a new ROS 2 interface. We have successfully demonstrated a Hardware-in-the-Loop (HIL) and Software-in-the-Loop (SIL) setup for testing and evaluating a CougUV torpedo autonomous underwater vehicle (AUV) that was built and developed in our lab. With this HIL and SIL setup, simulations are run in HoloOcean using a ROS 2 bridge such that simulated sensor data is sent to the CougUV (mimicking sensor drivers) and control surface commands are sent back to the simulation, where vehicle dynamics and sensor data are calculated. We compare our simulated results to real-world field trial results.

Second Prize (Certificate and $2,000)
Leah Hopson, Rutgers University, USA
Autonomous Underwater Glider Observations during Hurricane Beryl (2024)

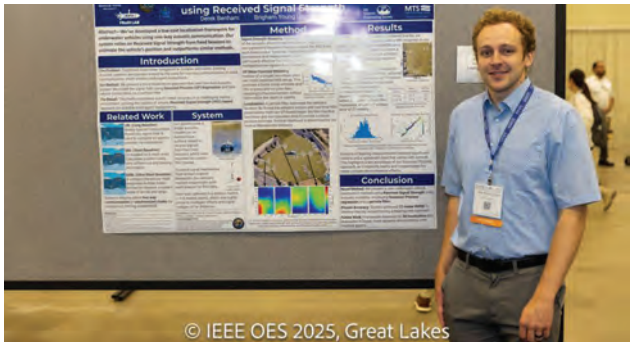


Abstract—Tropical Cyclones (TCs) are one of nature's most powerful, deadly, and costliest disasters. A critical research need is to understand the processes governing their lifecycle and intensity, which can occur through upper ocean mixing. To advance the assessment of upper ocean responses and TC model forecasting, it is crucial to gather and analyze ocean and atmospheric observations under these major weather systems. To survey the ocean during these events, autonomous approaches are required. New novel sensor integrations and analyses into and of these autonomous systems are in development and being used to improve model predictions, necessary for better preparedness. This work examines the hydrographic data collected during Hurricane Beryl (2024), including ocean observations from an advanced integrated current profiler in an autonomous underwater glider. A Rutgers University glider (RU29) began station keeping 24 hours before Beryl's eye-passage with programmed 500-meter dives to enable the collection of hourly profiles of temperature, salinity, velocity, and dissolved oxygen concentration. The glider was able to be positioned within 17 nautical miles of the storm eye, placing it in a prime position to capture air-sea dynamics. RU29 was equipped with a Nortek acoustic doppler current profiler (AD2CP), which was configured to capture high-resolution burst velocity data during the event. This sensor enabled us to observe higher frequency variability in mixing processes from small-scale internal waves to sub-mesoscale features. The high-resolution calculations of vertical velocity gradients measured by the AD2CP burst mode data permits the estimation of shear instabilities and Richardson number (Ri) during Hurricane Beryl. Lastly, the estimates of the glider's upcast, before, during, and after storm passage, show Ri values less than the stability threshold of 1 from the surface to around 50 meters. After 50 meters, there are strong regions of stability within the water column.

Third Prize (Certificate and $1,000)
Nelson Durrant, Brigham Young University, USA
Low-cost Multi-agent Fleet for Acoustic Cooperative Localization Research

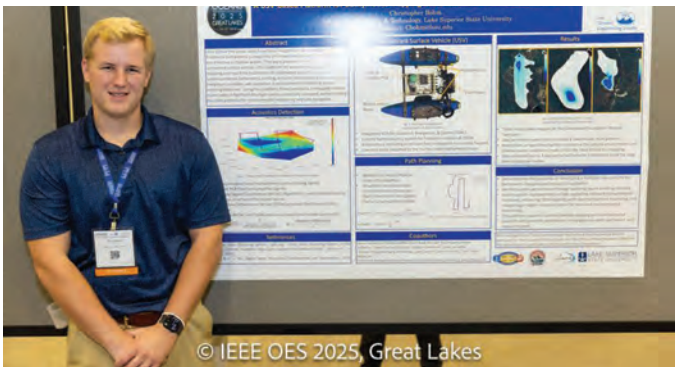
Abstract—Real-world underwater testing for multi-agent autonomy presents substantial financial and engineering challenges. In this work, we introduce the Configurable Underwater Group of Autonomous Robots (CoUGARs) as a low-cost, configurable autonomous-underwater-vehicle (AUV) platform for multi-agent autonomy research. The base design costs less than $3,000 USD (as of May 2025) and is based on commercially-available and 3D-printed parts, enabling quick customization for various sensor payloads and configurations. Our current expanded model is equipped with a doppler velocity log (DVL) and ultra-short-baseline (USBL) acoustic array/transducer to support research on acoustic-based cooperative localization. State estimation, navigation, and acoustic communications software has been developed and deployed using a containerized software stack and is tightly integrated with the HoloOcean simulator. The system was tested both in simulation and via in-situ field trials in Utah lakes and reservoirs.

Derek Benham, Brigham Young University, USA
One-Way Acoustic Signal Localization using Received Signal Strength



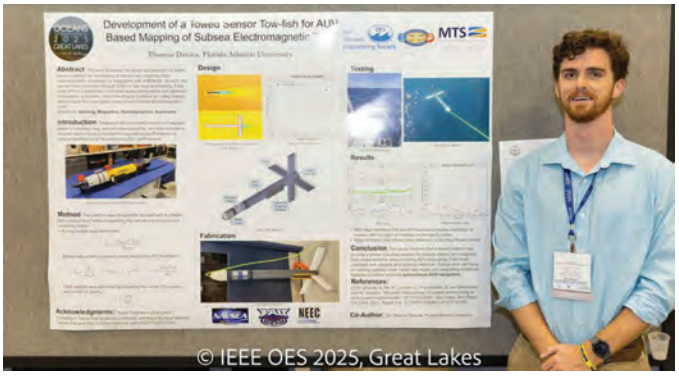
Abstract—This paper presents a low-cost and scalable localization framework for autonomous underwater vehicles using one-way acoustic communication in shallow water environments. The system relies solely on received signal strength (RSS) from four fixed acoustic beacons and a heading measurement to estimate the vehicle's position. The signal field of each beacon is modeled independently using Gaussian Process regression, enabling a spatially-smooth data-driven representation of the signal landscape, even in environments prone to severe multi-path effects. Motion is sampled probabilistically based on commanded velocity and heading measurements, then fused with RSS observations using a particle filter. Unlike conventional acoustic positioning systems that require synchronized two-way communication, our approach leverages one-way broadcasts and passive localization of the agent, reducing system complexity and enabling scalable multi-agent deployments without added infrastructure cost. Experimental results demonstrate sub-20 meter localization accuracy, outperforming a bearing only localization approach and highlighting the viability of RSS-based acoustic localization in shallow, cluttered, GPS-denied marine environments.

Christopher Bohm, Lake Superior State University, USA
A USV-Based Platform for Bathymetric Mapping and Underwater Sound Source Localization



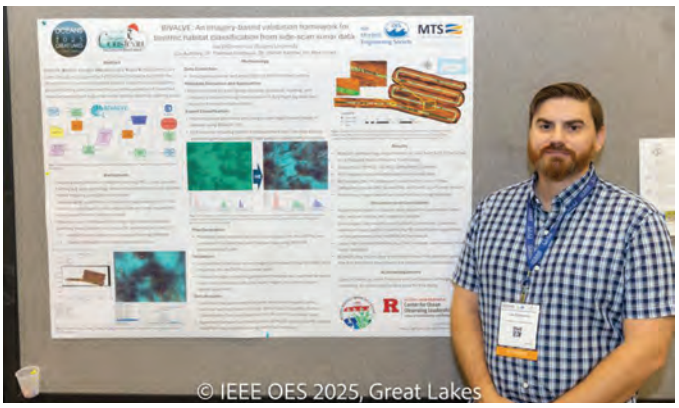
Abstract—Autonomous lakebed mapping is often constrained by the high cost and limited adaptability of traditional marine survey platforms. This paper presents a modular, low-cost unmanned surface vehicle (USV) platform for autonomous bathymetric mapping and real-time localization of underwater acoustic sources. The system combines bathymetric sensing, acoustic localization, and autonomous navigation to enable safe operation in environments containing sound-emitting obstacles. A custom hydroacoustic system enables the detection and localization of underwater sources using techniques such as frequency analysis and time-difference-of-arrival (TDOA) estimation. Obstacle avoidance and dynamic path planning are implemented to ensure robust autonomous behavior in the presence of acoustic hazards. Field trials validate the system's capability to reroute or suspend operations in response to detected acoustic signals, demonstrating its potential for scalable lakebed mapping and environmental monitoring applications.

Thomas Davies, Florida Atlantic University, USA
Development of a Towed Sensor Tow-fish for AUV-Based Mapping of Subsea Electromagnetic Field



Abstract—This work presents the design, fabrication, and initial testing of a towed sensor platform to simultaneously measure the electric and magnetic fields within the water column. The platform is intended to be used with a Remus 100 AUV to utilize the onboard sonar capabilities to enhance detection of anomalies in underwater electromagnetic fields. Using Reynolds-averaged Navier-Stokes simulations, overall dimensions of the tow fish were chosen based on the requirements for endurance and for maximizing the sensitivity of the electric field measurement. Overall stability was achieved through choice of internal buoyancy elements and external ballast. For preliminary testing, the tow fish was towed off a surface ship, the R/V McAllister, off the coast of Fort Lauderdale. During these trials, the Inertial Measurement Unit (IMU) data and the magnetic field data were collected and analyzed. The tests suggest that the platform is stable and is suitable for the measurement of electric and magnetic fields in the water column.

Joseph DiDomenico, Rutgers University, USA
BIVALVE: An imagery-based validation framework for benthic habitat classification from side-scan sonar data



Abstract—Understanding the properties, spatial distribution, and diversity of benthic habitats in a region is a primary goal of many coastal environmental monitoring programs. This information is often represented through classified maps, which depict the seafloor divided into discrete regions of similar biotic and abiotic properties, such as dominant macrofauna, geologic features, and surficial sediment characteristics. Due to advancements in underwater sonar survey technology and machine learning algorithms, machine learning-based classification of side-scan sonar imagery has emerged as a widely used tool for the development of classified benthic maps. These algorithms use textural analysis techniques combined with

user-provided training datasets to distinguish between different surficial compositions and arrangements.

For these processes to be effective, reliable ground truthing must be employed to verify the validity of classified maps produced. Historically, benthic classification initiatives have combined sonar imagery analysis with in situ ground-truthing techniques, such as grab sampling and ROV or diver observations, to categorize sonar imagery on a local scale. As technologies continue to advance, however, high-confidence benthic classification from sonar imagery without in situ ground truthing has the potential to become a reality. This presents opportunities to develop classified benthic maps on shorter timescales and with a smaller financial commitment.

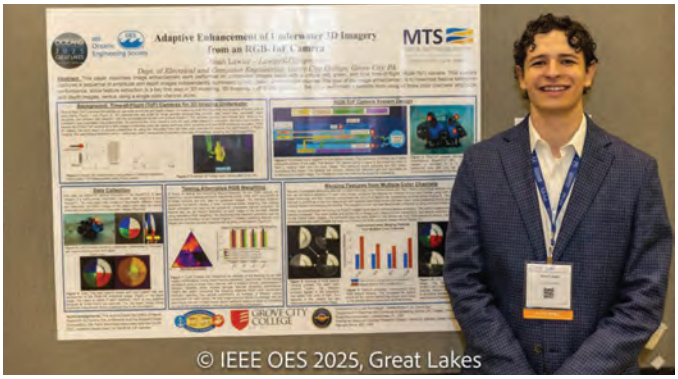
BIVALVE (Benthic Imagery VALidation and Visual Enhancement) is a practical and reliable methodology and supporting Python-based software toolkit for the development of verified classified maps from photographic ground-truthing data intended for use in the validation of classified maps generated from side-scan sonar data by machine-learning algorithms, with the long-term goal of reducing or potentially eliminating the need for in situ ground truthing. Classified maps produced by machine-learning processes can subsequently be overlain on this verified map using GIS software for comparative analysis, allowing for multiple avenues for the quantification of algorithm performance. The methodology herein is comprised of four stages: 1. Data acquisition and preprocessing, 2. derivation and correlation of geospatial metadata with images, 3. classification of images by a human analyst, and 4. map generation using GIS software. Images are collected in tandem with side-scan sonar data by an autonomous underwater vehicle (AUV) – mounted, nadir-oriented camera set to time-lapse mode.

The methodology outlined was implemented for a dataset captured in La Parguera Nature Reserve, Puerto Rico in April 2024 using a GoPro Hero 7 camera mounted on a REMUS 100 AUV. Of the 911 images captured within the side-scan survey area, 857 could be classified into one of three categories (Dense SAV, Sparse SAV, and Sand) with a confidence level of 75% or above by a human analyst, representing 94.1% of the total dataset. The remaining images we left unclassified due to high localized turbidity or other uncertainty.

Zachary Kssuba, Louisiana State University, USA
Design and Development of an Autonomous Surface Vehicle (ASV) for Zooplankton Net Sampling

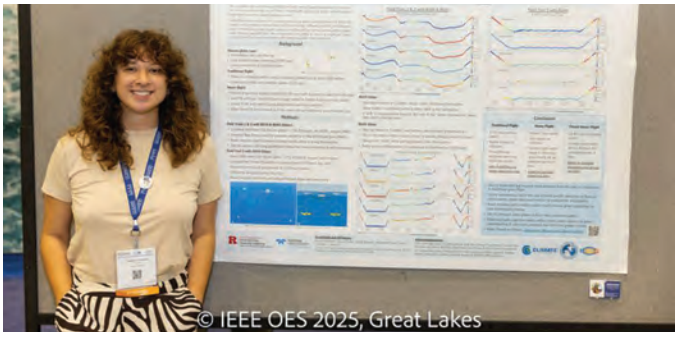
Abstract—This study presents the field deployment and evaluation of a low-cost autonomous surface vehicle (ASV) built for standardized horizontal zooplankton net tows in shallow freshwater systems. The ASV completed thirty-six tows across three lakes in a northern Michigan conservation sanctuary, sampling during both day and night across muck and vegetated substrates. Guided by Global Navigation Satellite System (GNSS) and stabilized using a proportional-integral-derivative (PID) controller, the vehicle maintained consistent speeds and navigation along predefined transects. Observed zooplankton densities showed diel differences, with the strongest variation occurring in MacAndrews Lake and muck substrate. The ASV's performance demonstrates its utility for conducting repeatable, minimally invasive surveys in areas where traditional methods are often limited by access or logistics.

Noah Lawler, Grove City College, USA
Adaptive Enhancement of Underwater 3D Imagery using an RGB-ToF Camera



Abstract—This paper describes image enhancement work performed on underwater images taken with a unique red, green, and blue time-of-flight (RGB-ToF) camera. This camera captures a sequence of amplitude and depth images independently illuminated by red, green, and blue light sources. The goal of the image enhancement is to maximize feature extraction performance, since feature extraction is a key first step in 3D modeling, 3D mapping, and SLAM processes. We show performance benefits from using all three color channels' amplitude and depth images, versus using a single channel alone.

Jessica Leonard, Rutgers University, USA
Using Slocum Gliders with Nontraditional Flight Behaviors to Accommodate Unique Sampling Requirements

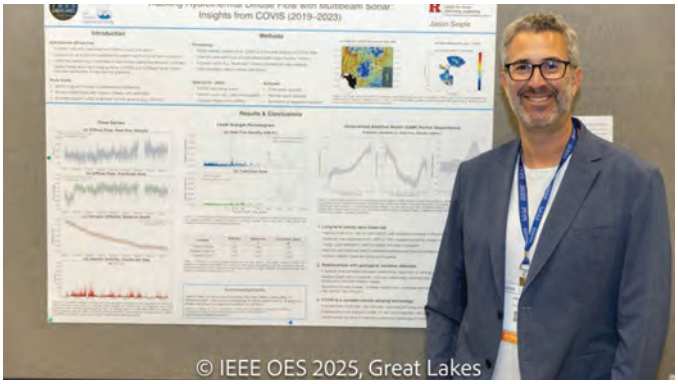


Abstract—Slocum gliders are autonomous, cost-effective, long-duration systems that are now a core technology for modern

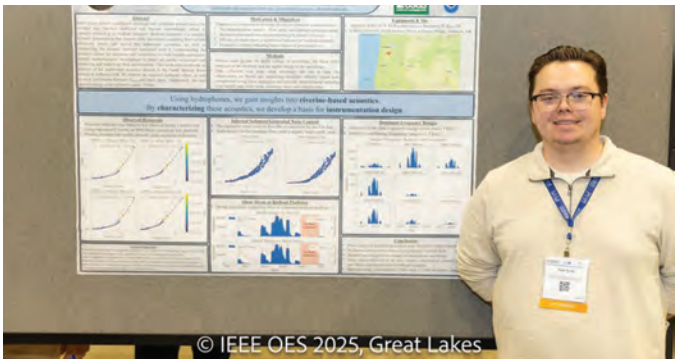
global ocean observing systems. While the Slocum glider can carry many science sensors, there is a persistent challenge integrating complex sensors that have complex operating requirements such as slow equilibration and settlement times. Another technical challenge is the buoyancy engine has historically limited the ability to conduct non-traditional flight patterns (fixed depth flight) that might enable a range of options for optimizing glider applications. Alternative flight behaviors may make it easier for gliders to better accommodate sensors with unique requirements and additionally allow for operations in urbanized waters with complex subsurface obstructions.

In this work, we present the use of "hover" missions to sample fixed depth events within the water column using software controls within the Slocum glider software (v 10.08). Our goal was to demonstrate hover behavior at a specified depth using autonomous ballast adjustments to provide a detailed picture of various physical, chemical, and biological properties in the water column. This behavior allows for controlled movements around obstacles often found in urbanized waters as well as sampling within tight thermoclines at depth. We present a series of field trials within a deep-water floating seaweed farm as well as in near-coastal waters in the Mid-Atlantic Bight demonstrating the ability to hover at fixed depths and detect localized events not easy to document with traditional glider flight behaviors.

Jason Seiple, Rutgers University, USA
Tracking Hydrothermal Diffuse Flow With Multibeam Sonar: Insights from COVIS (2019-2023)

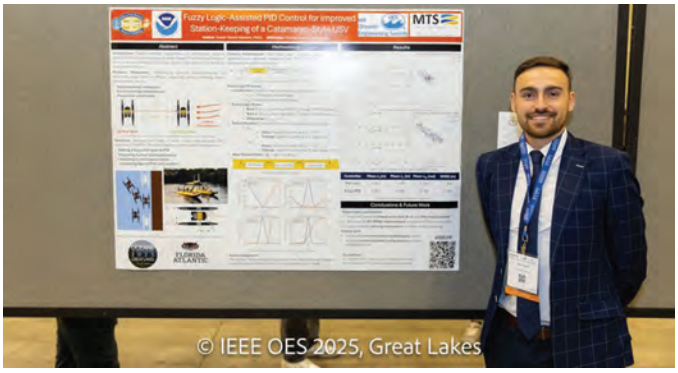


Nate Sjullie, Portland State University, USA
Riverine Background Acoustic Analysis



Abstract—When rivers achieve a sufficient discharge rate, sediment present along the riverbed may become mobilized and traverse downstream, which is typically referred to as bedload transport. Bedload transport is a complex dynamic phenomenon that features both uncertainty regarding how to both effectively detect and record the underwater acoustics, as well as categorizing the acoustic behavior associated with it. Understanding the acoustics allows for engineers and researchers to work towards application specific instrumentation development to better aid parties concerned with preserving and improving these environments. This work aims to provide an analysis of the underwater acoustics present in the North Santiam River located in Jefferson, OR. We observe an expected hysteretic effect, as well as close correlations between VRM S and shear stress. Additionally, the total spectral energy exists primarily under 5 kHz.

Xavier Vincent, Florida Atlantic University, USA
Fuzzy Logic-Assisted PID Control for Improved Station-Keeping of a Catamaran-Style USV



Abstract—A novel fuzzy logic-assisted PID control architecture for station-keeping of a 16-ft Wave-Adaptive Modular Vehicle (WAM-V) Unmanned Surface Vehicle (USV) is considered, its performance evaluated through a series of field experiments conducted along the U.S. Intracoastal Waterway in the presence of lateral disturbances. The proposed architecture combines a classical PID controller with a mid-layer fuzzy logic controller that dynamically adjusts the desired pose in response to real-time position errors. The controller emulates human-like "parking" maneuvers to counteract the effects of lateral forces produced by wind and tidal currents. Two field trials in station-keeping were conducted: one using a standard PID controller, and another employing a fuzzy-aided PID controller. In both cases, the USV was oriented perpendicular to the direction of the prevailing wind or tidal current flow so that these environmental forces would induce lateral drift. Results demonstrate that the fuzzy logic-assisted controller reduced mean lateral position error by 0.422 m over the standard PID control, with the position RMSE decreasing from 1.30 m to 1.20 m. These findings confirm the effectiveness of the proposed method in improving the accuracy of station keeping without requiring feedforward inputs from environmental sensors, enabling robust station-keeping performance under real-world dynamic conditions.

Many Small Contributions Make Big Impacts – My Experience at OCEANS 2025 SPC

Braden Meyers, Brigham Young University – OCEANS 2025 Great Lakes SPC First Prize Winner

My recent experience at the IEEE/MTS OCEANS 2025 Great Lakes conference in Chicago, and participation in the Student Poster Competition (SPC), was inspirational and exciting. It was particularly special for me because I was able to attend with four lab members and my advisor and three of us were able to participate in the student poster competition.

My paper, titled "Testing and Evaluation of Underwater Vehicle Using Hardware-In-The-Loop Simulation with HoloOcean," centered on addressing the challenges of validating marine robotics systems before costly and high-risk field deployments. We presented a major upgrade to the open-source HoloOcean 2.0 simulator, integrating high-fidelity Fossen dynamics for torpedo AUVs and a native ROS 2 interface. The core of the research demonstrated a successful Hardware-in-the-Loop (HIL) setup for our lab's CougUV torpedo AUV, using the simulation environment to test its software and hardware. The most compelling technical aspect of our work, and what sparked the most discussion, was the ability to achieve comparable controller performance results in simulation to those measured in real-world field trials. This validation of the HoloOcean platform's fidelity generated significant interest among attendees, allowing me to highlight my work and the foundational work done by the previous HoloOcean development team throughout the past several years.

Beyond the technical program, the experience was profoundly enriching on a personal and professional level. The conference provided broad exposure to the cutting-edge array of ocean technologies, from advanced acoustic localization to edge computing and marine systems. What I truly took away, however, was the incredible kindness and openness of the professional community. I was grateful to meet so many professionals from all over the world, and I valued their willingness to talk to me, engage in genuine discussion, and offer encouragement regarding my work. It was fascinating to gain a perspective on the many other types of ocean technology projects people are working on and to see how everyone was so willing to share their insights. The on-water demos from various companies were also a spectacular way to see products and hardware in action, further engaging the attendees. The Town Hall talks were particularly interesting, highlighting the "big challenges" facing the industry and the creative solutions being developed.

Receiving First Place among a strong international field served as a deeply meaningful validation of the hard work invested by our team. I was inspired to see all the hard wark by other students that are working hard to contribute to this field of study as well. The connections I gained will help me continue to make bigger impacts together.

I want to express my sincere gratitude to the Office of Naval Research (ONR) for their generous support, and to the organizing societies, IEEE OES and MTS, for hosting such an exceptional event. Finally, thank you to my lab mates and my supervisor, Dr. Josh Mangelson, whose continuous guidance and support at the BYU Field Robotics Systems (FRoSt) Lab made this entire journey possible. This experience connected me with an inspiring network of peers and mentors and solidified my passion for ocean engineering.

Members of the BYU FroSt lab conducting field trials off the coast of Oahu, Hawaii

Fellow students in the poster competition at the OCEANS Great Lakes conference

From Utah Deserts to the Great Lakes: Experiences With Accessible Autonomy at the OCEANS 2025 SPC

Nelson Durrant, Brigham Young University – OCEANS 2025 Great Lakes SPC Third Prize Winner

Even after the excitement of a third-place finish, my recent experience at OCEANS 2025 Great Lakes was a transformative milestone in my research career.

I recently started my master's degree at Brigham Young University in Provo, UT, not two hours from the home I grew up in next to the Rocky Mountains. Not a whole lot of exposure to ocean-centric careers there, but lots of fly fishing and hiking near canyon streams—a fair amount in which 'wading' was a generous term and 'swimming' was nearly impossible. I remember distinctly in elementary school that 'marine biologist' carried some of the most exotic clout of all the 'what do you want to be when you grow up?' careers, up there with 'astronaut' and 'T-rex.' A lot has changed in how I see the world since then (although marine biologists are still cool), but OCEANS 2025 Great Lakes still tapped into some of that childhood awe.

Members of the BYU FRoSt Lab during a CoUGARs field test at Spanish Oaks reservoir.

During my undergraduate degree in Computer Engineering at BYU, I had the opportunity to get involved in the Field Robotic Systems Lab under Professor Joshua G. Mangelson. I was brought onto a new undergraduate team tasked with building low-cost, 3D-printed AUVs for cooperative multi-agent autonomy research. That project became the Configurable Underwater Group of Autonomous Robots (CoUGARs), and it's what brought me to the Student Poster Competition (SPC) in Chicago.

It was a surreal experience to present a robotics platform home-grown in our small Utah lakes and reservoirs to a room full of world-class ocean experts. The poster session itself was a fantastic experience. Beyond giving pitches to judges and discussing details with other interested students working on similar types of research, it seemed like many attendees were drawn to the 'accessibility' aspect of our research. A capable research AUV for less than $3,000 using 3D-printed parts brought a fair amount of interest, especially with the high cost of commercial options. I had great conversations with researchers who work with systems costing 100 times that, and we shared many of the same challenges in multi-agent coordination and acoustic localization.

Beyond the poster, I was incredibly grateful for the whirlwind of new ideas the conference brought. The student mixer was a perfect opportunity to connect with peers, and I met students working on everything from state estimation to advanced sonar. Even the exhibitor booths (although I didn't have much cash to throw around as a college student) really helped with solidifying some ideas on where the future impact areas in marine robotics will be and provided valuable guidance on what was possible with current technologies.

After all of that, receiving third place was an incredible honor. For me, it was a validation of the core message that our research proposed—you don't need a massive budget to make impactful marine robotics contributions.

I am immensely grateful to the IEEE Oceanic Engineering Society and the conference organizers for this opportunity and want to extend a special thanks to the Office of Naval Research (ONR) for their generous support of the SPC program. Finally, thank you to my advisor, Dr. Joshua Mangelson, and my co-authors and lab members at the BYU FRoSt Lab. This award belongs to the whole CoUGARs team.

Winning Poster Paper

Testing and Evaluation of Underwater Vehicle Using Hardware-In-The-Loop Simulation with HoloOcean

Braden Meyers and Joshua G. Mangelson

***Abstract*— Testing marine robotics systems in controlled environments before field tests is challenging, especially when acoustic-based sensors and control surfaces only function properly underwater. Deploying robots in indoor tanks and pools often faces space constraints that complicate testing of control, navigation, and perception algorithms at scale. Recent developments of high-fidelity underwater simulation tools have the potential to address these problems. We demonstrate the utility of the recently released HoloOcean 2.0 simulator with improved dynamics for torpedo AUV vehicles and a new ROS 2 interface. We have successfully demonstrated a Hardware-in-the-Loop (HIL) and Software-in-the-Loop (SIL) setup for testing and evaluating a CougUV torpedo autonomous underwater vehicle (AUV) that was built and developed in our lab. With this HIL and SIL setup, simulations are run in HoloOcean using a ROS 2 bridge such that simulated sensor data is sent to the CougUV (mimicking sensor drivers) and control surface commands are sent back to the simulation, where vehicle dynamics and sensor data are calculated. We compare our simulated results to real-world field trial results.**

I. Introduction

Developing and deploying underwater robotic systems presents unique challenges, including high operational costs, safety risks, and extremely limited communication. During the development phase of hardware and software, these challenges make field testing particularly risky, especially when monitoring underwater autonomous behavior in real-time is not feasible. Many autonomy and control algorithms rely on feedback from onboard sensors, yet testing these systems before deployment is difficult without access to realistic simulation environments. As a result, high-fidelity simulation tools are essential for validating software and hardware in closed-loop scenarios prior to field trials.

In the Field Robotics Systems (FRoSt) Lab at BYU, we leverage the open-source HoloOcean simulator to develop and evaluate the behavior of controllers, navigation, and localization algorithms prior to real-world deployment. As the fidelity of simulation environments improves, tools for testing and evaluating software and hardware become more valuable. HoloOcean supports a variety of sensors, vehicles, and features that significantly simplify underwater robotic perception, localization, and autonomy development [1]–[3]. In this paper, we present several upgrades to the HoloOcean system that enable Hardware-in-the-Loop (HIL) and Software-in-the-Loop (SIL) testing of real-world vehicles.

This work was funded under Department of Navy awards N00014-24-1-2301 and N00014-24-1-2503 issued by the Office of Naval Research. Parts of this work were also funded by Naval Sea Systems Command (NAVSEA), Naval Surface Warfare Center - Panama City Division (NSWC-PCD) and Naval Undersea Warfare Center - Keyport Division (NUWC-KPT) under the Naval Engineering Education Consortium (NEEC) Grant Program under award numbers N00174-23-1-0005 and N00178-23-1-0006.

B. Meyers and J. Mangelson are at Brigham Young University. They can be reached at: {bjm255, mangelson}@byu.edu.

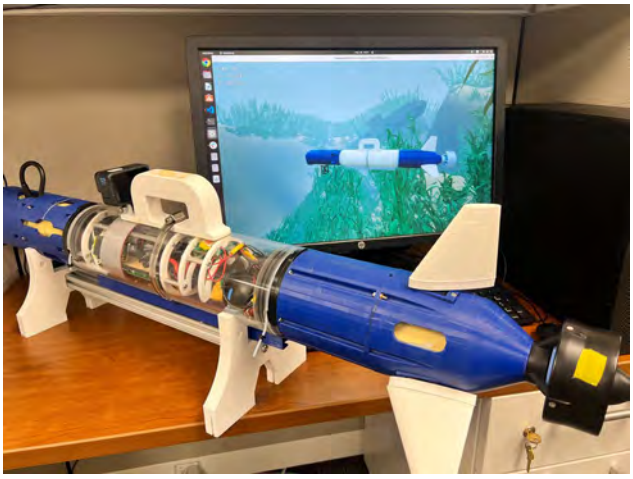


Fig. 1. A CougUV robot is tested in the lab prior to field trials with a HIL setup with the HoloOcean simulator. Where simulated sensor data is sent to the CougUV and processed onboard. Control surfaces are actuated and commands are sent back to the simulator, where the vehicle's motion is calculated.

The specific contributions of this paper include:

1) Integration of high-fidelity dynamics for torpedo autonomous underwater vehicles (AUVs) into the HoloOcean simulator;
2) Development of a ROS 2 interface for HoloOcean; and
3) Demonstration and validation of HIL and SIL testing of a custom real-world AUV using these tools.

Each of these new features has been made publicly available as part of the release of HoloOcean 2.0. Additional features released in HoloOcean 2.0 (and documented elsewhere) include an upgrade to Unreal Engine 5.3, additional vehicles, improved rendering, environment modifications, and various other improvements and bug fixes.

The rest of this paper is outlined as follows. In Sec. II, we summarize related work. In Sec. III-B, we provide an overview of the implementation of high-fidelity torpedo AUV dynamics that have been integrated into HoloOcean 2.0. In Sec. IV, we describe the HoloOcean ROS 2 bridge. In Sec. V, we present and analyze several experiments that demonstrate the ability to utilize HoloOcean for HIL and SIL testing. Finally, we conclude in Sec. VI.

II. Related Work

Robotics simulators have advanced significantly in recent years, particularly in efforts to bridge the sim-to-real gap. Simulators that closely replicate real-world environments, vehicle dynamics, and sensor behavior provide a valuable platform for testing robotic systems before real-world deployment. In underwater robotics, several simulators have emerged that reduce the sim-to-real gap in different ways.

A. HoloOcean

HoloOcean [3] (originally released in 2022 [1]) leverages the Unreal tool chain to enable high-fidelity marine robotic perception and autonomy simulation with advanced sonar simulation support [2]. In its initial form, HoloOcean relied upon the built-in medium-fidelity physics engine of Unreal Engine for dynamics simulation, which is typically optimized for real-time performance in gaming applications. Despite this, HoloOcean supports realistic sensor placement and configuration to closely replicate real-world systems and supports multi-agent setups within complex underwater environments. However, HoloOcean is often cited for lacking ROS support and high-fidelity underwater dynamics.

B. Marine Dynamics Simulation

The Marine Systems Simulator (MSS) [4], originally released in 2004, is a MATLAB/Simulink toolbox for modeling and controlling marine craft, based on the equations from Fossen's *Handbook of Marine Craft Hydrodynamics and Motion Control* [5]. The Python Vehicle Simulator [6] reimplements many of these models in Python, supporting underwater and surface vehicles, as well as ships. While Fossen's models are widely accepted as the standard for AUV and ASV dynamics, the simulators cited above are typically used as standalone packages for simulating vehicle dynamics and controls, but lack visualization and sensor simulation features. In this paper, we present an effort to integrate these capabilities with HoloOcean.

C. HIL and SIL Testing and ROS Integration

The Robot Operating System (ROS) [7] has enabled modular software architectures for robotics, and its integration with simulators has facilitated HIL and SIL testing. Gazebo [8], one of the most widely used simulators in robotics research, supports ROS out-of-the-box and is commonly used for HIL and SIL testing. However, Gazebo is limited in the realism of its simulation environments and in its perceptual sensing rendering capabilities. In this paper, we also present on an effort to develop a bridge connecting HoloOcean with ROS 2.

A recent review of underwater simulators for digital twinning and HIL/SIL simulation [9] identified UWSim [10], Stonefish [11], and UUV Simulator [12] as the top tools for these applications. These simulators provide interfaces for integrating real-time control systems and hardware with simulated environments. OceanSim [13] is a recently released underwater simulator focused on underwater vision-based sensing also supports ROS integration, but, as far as we know, has yet to be used for SIL/HIL testing.

Category	Parameters
Environmental	Water Density, Gravity, Currents
Physical	Mass, Length, Diameter, Inertia
Hydrodynamic	Low-speed Linear Damping
Hydrostatic	Center of Bouyancy and Mass locations
Control Surfaces	Time Constants, Lift/Thrust Coefficients, Fin Positions, Fin Area
Autopilot	Pitch-Depth PID Gains, Heading SMC Gains

TABLE I
List of configurable parameters for HoloOcean's torpedo vehicle dynamics.

III. High-Fidelity Dynamics in HoloOcean

With the release of HoloOcean 2.0.1, the interface for leveraging high-fidelity custom dynamics within HoloOcean has been given a significant upgrade. HoloOcean provides multiple control schemes for managing the dynamics of an agent or multiple agents. The custom dynamics control scheme exposes implementation of the dynamics to the user, thus enabling full configurability. In this paper, we present an effort to integrate these tools with the Fossen dynamics models [5] for an underwater torpedo-like AUV with arbitrary fin placement.

In the following subsections, we first provide an overview of the new architecture used to implement custom dynamics in HoloOcean 2.0.1. We then outline the high-level equations of motion used to simulate torpedo vehicle dynamics. Finally, we outline the dynamics equations that enable the application of these models to AUVs with arbitrary fin configurations.

A. Hydrodynamics Implementation Architecture

The new custom dynamics implementation architecture for HoloOcean consists of two main components: (1) a vehicle dynamics model that implements the hydrodynamic equations of motion for each agent, and (2) a simulation interface manager that connects the dynamics model to the HoloOcean environment. This structure allows different types of vehicles and control modes to be supported consistently across simulation scenarios.

The vehicle controller for each agent can be configured with custom parameters during scenario configuration to match a specific vehicle and is equipped with built-in depth and heading control or manual control of the control surfaces. The default model parameters are for the REMUS 100 [14]. A summary of the configurable parameters for each vehicle is given in Table I. All parameters are presented and explained in the Fossen's Handbook [5].

Currently, only the torpedo AUV vehicle dynamics are available out-of-the-box in HoloOcean 2.0.1 for users, but vehicle dynamic models could be added to this framework easily using the same code structure as provided in Fossen's Python Vehicle Simulator [6].

B. Torpedo Vehicle Dynamics

High-fidelity dynamics models based on Thor Fossen's equations of motion for underwater vehicles [5] are available open-source with the Python Vehicle Simulator [6].

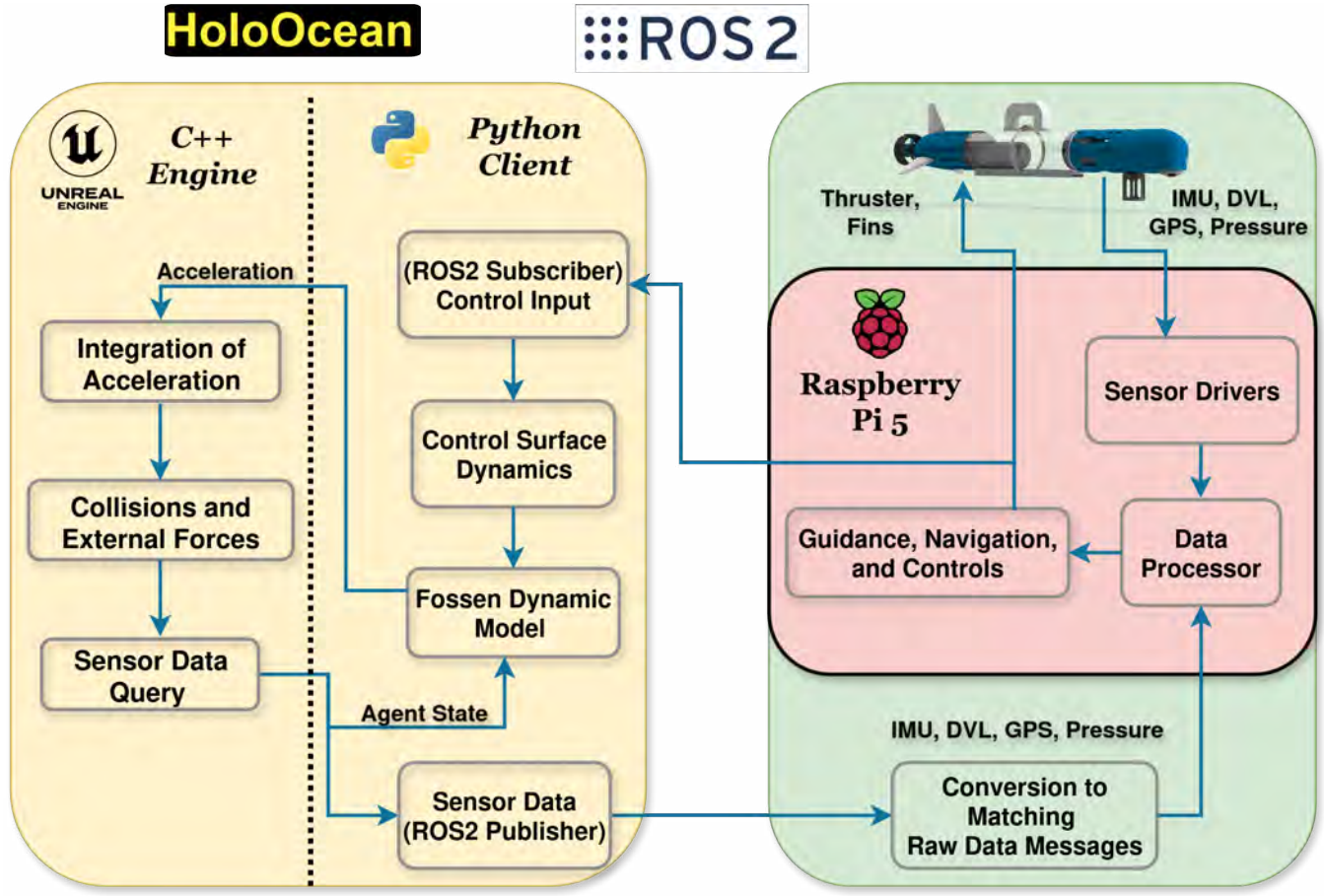


Fig. 2. Software HIL and SIL flow diagram demonstrating the steps of vehicle dynamics calculations and implementation in the simulator. Sensor data output and control surface inputs are shown using the HoloOcean ROS 2 bridge in HoloOcean 2.0. Simulated sensor data can replace and mimic sensor driver output and control surface commands are transmitted to the vehicle actuators and to the simulation.

These models represent the current state-of-the-art for marine vehicle simulation, with accurate modeling of hydrostatic forces, dissipative forces, system inertia, and control surface dynamics and effects.

The equation of motion in the body frame, originally presented by Fossen [5], is as follows:

$$M\dot{\nu_r} + C(\nu_r)\nu_r + D(\nu_r)\nu_r + g(\eta) = \tau. \tag{1}$$

$$M = M_{RB} + M_A \tag{2}$$

$$C(\nu_r) = C_{RB}(\nu_r) + C_A(\nu_r) \tag{3}$$

Here, M_{RB} represents the system inertia matrix for the rigid body and M_A accounts for the added mass effects. The body-frame velocity of the vehicle is denoted by ν, and ν_r represents the vehicle's velocity relative to the surrounding flow, also expressed in the body frame. The Coriolis and centripetal forces caused by the rigid body are represented by $C_{RB}(\nu_r)$, while $C_A(\nu_r)$ corresponds to the Coriolis forces arising from the added mass. The damping effects, both linear and quadratic, are encapsulated by $D(\nu_r)\nu_r$. The term $g(\eta)$ represents the hydrostatic forces, which originate from gravity and buoyancy, along with their associated moments and torques. Finally, τ denotes the external forces, such as those generated by the fins and thruster.

The vehicle pose, denoted by $\eta = [x, y, z, \phi, \theta, \psi]^T$, is a six-dimensional column vector. The orientation in terms of roll, pitch, and yaw angles is given by ϕ, θ, and ψ, respectively, and the linear and angular velocity vector in the body-fixed frame is $\nu = [u, v, w, p, q, r]^T$.

HoloOcean uses the equations of motion of the vehicle models to generate accelerations for each vehicle based on the state and control input at each simulation step. These accelerations are passed to the Unreal Engine 5 physics engine to handle collisions and other external forces. This flow is shown in the yellow box on the left side of Figure 2.

C. Torpedo Fin Dynamics

Torpedo AUVs in HoloOcean are characterized by a single thruster and N fins that can be actuated to induce pitch, roll, or yaw when the vehicle is in motion. In an effort to support AUVs with an arbitrary number of fins, we have modified the dynamics models presented by Fossen as outlined in this section.

The location of each fin is represented by the Center of Pressure (COP) with respect to the body frame of the vehicle, which we place at the Center of Mass (COM) for

simplicity. The body-fixed frame defines the $\mathbf{x_b}$ axis along the longitudinal direction (forward), the $\mathbf{z_b}$ axis downwards, and the $\mathbf{y_b}$ axis to the starboard (right).

The offset of the COP of the fin from the COM is represented by three coordinates: $\mathbf{x_{off}}$, $\mathbf{r}$, and θ.

- $\mathbf{x_{off}}$ represents the longitudinal distance from the COM to the COP along the $\mathbf{x_b}$ axis. This is depicted in the side view of the torpedo (Figure 3), where the $\mathbf{x_{off}}$ dimension extends from the COM to the COP of the fin.
- The radial distance $\mathbf{r}$ defines how far the COP is from the $\mathbf{x_b}$ axis in the $\mathbf{y_b} - \mathbf{z_b}$ plane. As shown in Figure 4, $\mathbf{r}$ is the perpendicular distance from the center (along the $\mathbf{x_b}$ axis) to the COP.
- The angle θ specifies the angular position of the COP around the $\mathbf{x_b}$ axis in the $\mathbf{y_b} - \mathbf{z_b}$ plane. As shown in Figure 4, θ is measured counter-clockwise from the positive $\mathbf{y_b}$ axis to the projection of the COP onto the $\mathbf{y_b} - \mathbf{z_b}$ plane.

These three coordinates ($\mathbf{x_{off}}$, $\mathbf{r}$, θ) precisely locate the COP of each fin with respect to the COM, allowing for a flexible representation of various fin configurations. This system enables users to accurately match the number of fins and their specific locations to real-world torpedo AUV designs. The term $\mathbf{A}$ in Figure 3 denotes the fin area outlined in red. Furthermore, the angle δ, shown in Figure 3, represents a positive deflection angle of the control surface, which is used to calculate the forces and moments on the vehicle. A positive deflection is represented as the positive rotation around an axis $\mathbf{A_{f,i}}$, shown in figure 4 that starts at the $\mathbf{x_b}$ axis and increases along the $\mathbf{y_b} - \mathbf{z_b}$ plane through the point of rotation of the fin.

To precisely model the hydrodynamic forces and moments exerted by each control fin on the vehicle, we define a force vector $\boldsymbol{\tau}_i$ for each individual fin $i \in \{1, \ldots, N\}$. This vector $\boldsymbol{\tau}_i = [F_{x,i}, F_{y,i}, F_{z,i}, M_{x,i}, M_{y,i}, M_{z,i}]^T$ represents the forces (F_x, F_y, F_z) and moments (M_x, M_y, M_z) acting on the body frame of the vehicle due to fin i. These forces and moments are calculated through the following sequence of steps:

1) Relative Velocity Calculation: The relative velocity $\mathbf{v_{r,i}}$ for fin i is defined as the component of the linear velocity of the vehicle relative to the fluid, specifically projected onto the plane of the fin. If v_x, v_y, and v_z are the components of the vehicle linear velocity with respect to the body-fixed frame relative to the fluid, and θ_i is the angular position of fin i around the $\mathbf{x_b}$ axis, then the effective relative velocity in the plane of the fin is given by:

$$\mathbf{v_{r,i}} = \sqrt{v_x^2 + (v_y \sin\theta_i)^2 + (v_z \cos\theta_i)^2} \tag{4}$$

This formulation accounts for the component of the flow velocity perpendicular to the span of the fin.

2) Fin Hydrodynamic Force: The force $\mathbf{f_i}$ generated by fin i is primarily a lift-like force perpendicular to the incident flow for small angle deflections of the fin. In particular,

$$\mathbf{f_i} = \frac{1}{2}\rho v_{r,i}^2 A_i C_{L,i} \delta_i, \tag{5}$$

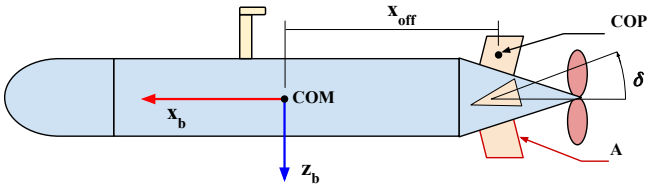


Fig. 3. Side view of a Torpedo AUV fin diagram.

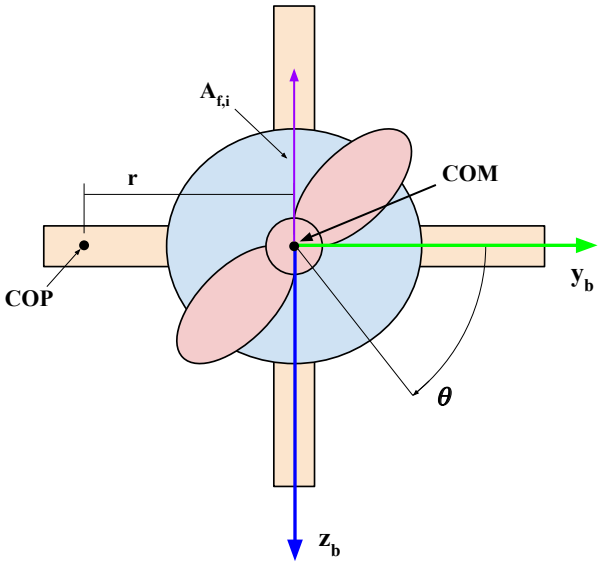


Fig. 4. Back view of a Torpedo AUV fin diagram.

where ρ is the water density, A_i is the area of the fin i, $C_{L,i}$ is the lift coefficient, and $\delta_\mathbf{i}$ is the deflection of fin i.

3) Fin Force Vector in Body Frame: Assuming the fin force $\mathbf{f_i}$ acts primarily in the $\mathbf{y_b} - \mathbf{z_b}$ plane, orthogonal to the longitudinal $\mathbf{x_b}$ axis, its components in the body frame are:

$$\vec{F}_i = [0, \mathbf{f_i} \sin\theta_i, -\mathbf{f_i} \cos\theta_i]^T. \tag{6}$$

This decomposition aligns $\mathbf{f_i}$ with the angular position of the fin, θ_i. The $\mathbf{x_b}$ component of the fin force is typically considered negligible for control surfaces primarily generating lift.

4) Fin Center of Pressure Location: The location of the COP for fin i, $\vec{R}_i$, relative to the vehicle COM in body-fixed coordinates, is determined by its longitudinal offset $\mathbf{x_{off,i}}$, radial distance $\mathbf{r_i}$, and angular position θ_i as:

$$\vec{R}_i = [\mathbf{x_{off,i}}, \mathbf{r_i} \cos\theta_i, \mathbf{r_i} \sin\theta_i]^T \tag{7}$$

5) Moment Calculation: The moment $\vec{M}_i$ generated by fin i about the vehicle COM is calculated as the cross product of the COP position vector and the force vector:

$$\vec{M}_i = \vec{R}_i \times \vec{F}_i \tag{8}$$

6) Individual Fin Total Force and Moment: The complete force and moment vector $\boldsymbol{\tau}_i$ for fin i in the body frame is then assembled:

$$\boldsymbol{\tau}_i = [0, F_{y,i}, F_{z,i}, M_{x,i}, M_{y,i}, M_{z,i}]^T \tag{9}$$

Here, $F_{y,i}$ and $F_{z,i}$ are the y and z components of $\vec{F}_i$, and $M_{x,i}$, $M_{y,i}$, $M_{z,i}$ are the x, y, and z components of $\vec{M}_i$.

7) Total Control Force and Moment: The total force and moment acting on the vehicle due to all N fins, $\boldsymbol{\tau}$, is the vector sum of the individual fin contributions:

$$\boldsymbol{\tau} = \sum_{i=1}^{N} \boldsymbol{\tau}_i$$

IV. ROS 2 Interface

ROS 2 is a common middleware for robotic systems that allows for a distributed and modular software architecture [7]. Nodes and groups of nodes can be tested independently, which allows for simple switching between simulation and real-world deployment.

With the release of HoloOcean 2.0, we added an interface for ROS 2, which offers access to more features and other robotics tools from the large active user base. HoloOcean users can now use the ROS 2 bridge to publish sensor data and send commands to and from the simulator using standard ROS 2 topics, enabling integration with a wide range of tools, GUIs, and robotic systems built on the ROS 2 infrastructure.

The ROS 2 bridge has been configured to work with the new implementation of high-fidelity dynamics as described above. Vehicle commands (actuator positions, controller set-points for speed, depth, and heading, etc.) can be sent to a torpedo agent through the Fossen dynamics interface. During simulation, sensor data from the agent is received by the HoloOcean Python client and translated into standard ROS 2 message types.

Several example nodes are provided that send commands and subscribe to sensor data to interface with the main HoloOcean node that runs the Unreal Engine Simulation. Multiple control modes are supported from these topics, including forces on the agent; control surface command; or desired depth, heading, and speed.

Figure 2 shows an example of a connection between the simulation stack (left) and the robot software stack (right), established through ROS 2. In this example, the software stack for a CougUV (a custom AUV developed by the FRoStLab at BYU) sends control surface commands to the simulator and the hardware. Simulated sensor data flows into the software stack with the same topics and message types used by the sensor drivers.

To simplify the setup and installation for users, we provide Docker images that have been built with all necessary dependencies to run the simulation and ROS 2 interface.

V. HIL and SIL Simulation with CougUV

These simulation improvements with HoloOcean enable a HIL and SIL simulation workflow using the ROS 2 architecture.

We validated our approach using a CougUV, a torpedo AUV robot developed as a low-cost, modular sensor platform for multi-agent autonomy research. The system is made from commercial-off-the-shelf components. The CougUV software stack is built on the ROS 2 architecture with

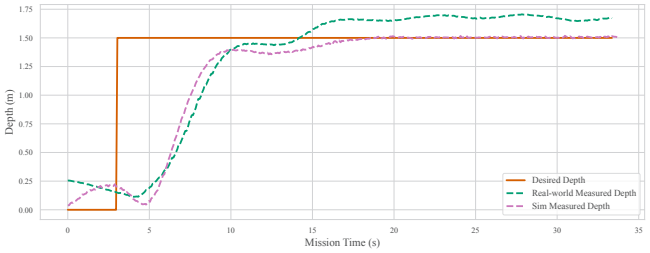


Fig. 5. Comparison of depth controller response for the torpedo AUV in simulation and real world tests at a local reservoir.

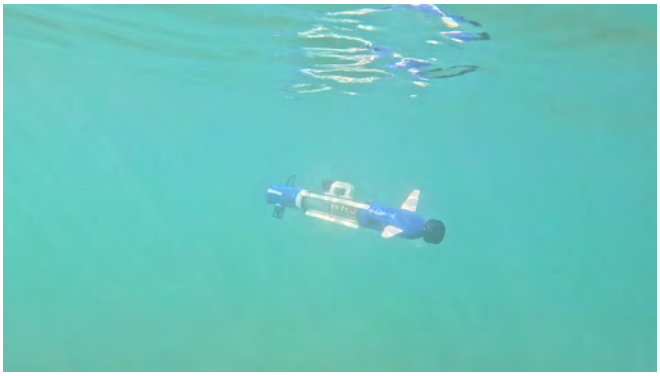


Fig. 6. CougUV running a mission to hold a constant depth below the surface of the water. Field test performed at Bear Lake, UT in July 2025.

algorithms running in ROS 2 nodes. ROS 2 sensor drivers publish the data from the sensors on ROS 2 topics as seen in the top right side of Figure 2. By matching sensor data, message types, and sensor locations between the real and virtual systems, we are able to test the full CougUV software stack using the HoloOcean simulator, excluding only the real-world sensors and drivers.

With the closed-loop feedback of the simulator, we can analyze and evaluate our software stack on the robot computer for controls, localization, and other algorithms. Sensor update rates match the real sensor update rates, which can help determine proper update rates for the other algorithms using sensor data.

With HoloOcean we configured the parameters listed in Table I, the center of mass and buoyancy, and all time constants/actuator parameters based on the 3D model of the robot, relevant data sheets, and calculations with approximated vehicle geometry.

External disturbances in simulation were not applied, and limited external disturbances affected the real-world tests. In future work, we hope to simulate and test in conditions with currents and waves.

A. Depth From Surface

Maintaining a commanded depth from surface is a common autonomous behavior for AUV systems. We developed a nested pitch-depth controller that takes in desired depths and actuates the fins to pitch the vehicle and minimize the error between the desired and actual depth. Relative depth is calculated on the real system using a calibrated Blue Robotics pressure sensor and an estimate of the specific

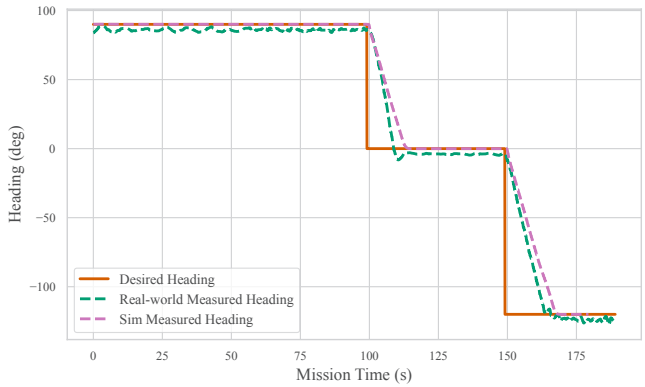


Fig. 7. Comparison of heading controller response for the Torpedo AUV in simulation and the real world. Control parameters tuned in simulation transferred fairly well to real-world testing.

weight of the water. The depth sensor has a relative accuracy of ± 2 mbar (2 cm in fresh water). Pitch and pitch rate were measured with an onboard Inertial Measurement Unit (IMU).

After collecting data from the pressure sensor, we configured the simulated depth sensor in HoloOcean to publish at the same frequency (10 Hz) as our CougUV system, and a standard deviation of 0.01 m (1 cm). We performed over 50 simulation runs in HoloOcean to test and tune different proportional and derivative gains that achieved the desired rise time and damping for our system. During the simulation runs, we were able to verify that the fins responded with the correct rotation to perform the desired maneuvers. We then conducted real-world testing both in a pool and in a nearby reservoir with promising preliminary results. A comparison of the depth controller response in both sim and real-world for the same commanded mission is shown in Figure 5. An image of the vehicle conducting these real-world tests is shown in Figure 6.

B. Heading

Commanded heading for the CougUV can either be provided manually or via a high-level waypoint manager. Similar to previous tests, we ran simulations with heading step inputs to tune the controller. Heading of the vehicle is calculated with an onboard magnetometer that provides global heading when calibrated.

Fig. 8. View from camera mounted on CougUV maintaining a constant altitude following the contours of the underwater terrain. Field test performed at Bear Lake, UT in July 2025.

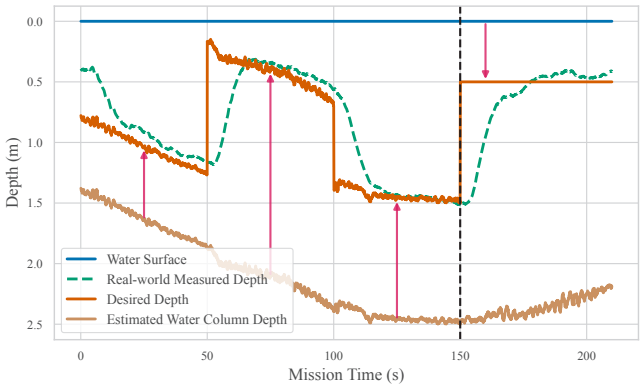


Fig. 9. Depth Control real-world field test where modes of operation transitioned from a fixed altitude from the bottom for three different altitudes in succession to maintaining a depth-from-surface at 150 seconds from the start of the mission, where all depths are plotted relative to the water surface. The control parameters tuned in simulation directly translated to real-world use.

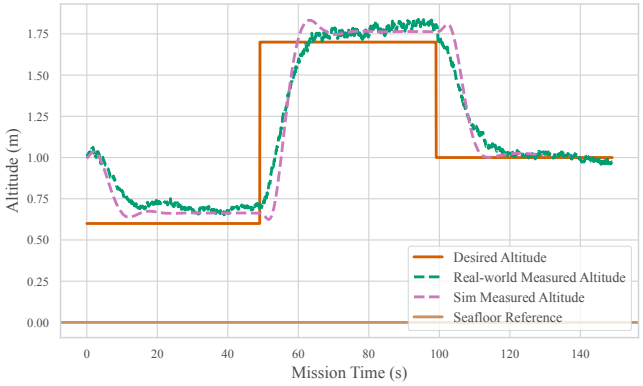


Fig. 10. Altitude controller response for the Torpedo AUV in simulation compared to the actual real-world depth from Figure 9 for the mission duration from 0 to 150 seconds, where altitude is plotted relative to the seafloor.

Real-world results shown in Figure 7 for the heading controller were less comparable to the simulated results especially for control when the vehicle was on the surface of the water. This is primarily because the top fin that controls the heading of the vehicle is not always completely submerged with the small waves in the water. These surface dynamics are not modeled in the simulation, but the response when the vehicle was completely underwater was more comparable to the simulated results. Future improvements to the simulator will account for water surface dynamics.

C. Altitude From Bottom

Maintaining a fixed altitude is another common behavior for torpedo AUV systems. In this context, a vehicle follows the contours of underwater terrain, often to enable imaging of the seabed. This behavior is especially challenging to test and refine, as the vehicle often dives beyond the operator's line of sight, and a poorly-tuned controller can quickly lead to collisions with the bottom.

Following successful results in the depth-from-surface missions, we applied the same control parameters in both SIL

and HIL simulations to evaluate altitude-hold behavior. These simulations included models for vehicle dynamics, collisions, and altitude sensing to provide early-stage validation of the approach. We tested on two different terrain types in simulation, a flat bottom and a more aggressive terrain with bumps over 4 meters tall. Because the vehicle is not equipped with a forward-facing sensor, a higher altitude was required to prevent collisions with the bottom.

Altitude was measured using a Doppler Velocity Log (DVL), model A50 from Waterlinked, which provides both altitude and navigation information. Pitch and pitch rate were monitored using the vehicle's onboard IMU.

To validate and compare the controller in a real environment, we deployed the CougUV in a nearby reservoir where the seabed gradually sloped down away from shore, as shown in Figure 8. The vehicle responded properly to step inputs in altitude and followed the terrain as shown in Figure 9. This demonstrates a strong correlation with the simulation results of the same mission on a flat terrain as shown in Figure 10.

In most advanced applications, simulation tools could be used to estimate the minimum allowable altitude based on prior knowledge of the contours of the underwater terrain. Additionally, more sophisticated sensor models could evaluate performance in challenging conditions, such as DVL dropout or outlier altitude readings.

D. Computational Load

Running all the mission processes on a small, low-cost vehicle computer can strain system resources and potentially lead to unexpected behavior or mission failure. To monitor this, we track the Central Processing Unit (CPU) load and Random Access Memory (RAM) usage of the computer at 1 Hz during operation.

To evaluate this, we performed both HIL and SIL simulations where the full mission software stack was run on the CougUV onboard computer and vehicle motion and sensor data were simulated in HoloOcean. The same methods for measuring CPU and RAM usage were used in simulation and in field trials.

The data shown in table II were taken from the same mission run in a HIL and SIL simulation and then in the nearby reservoir. Over the course of the mission CPU and RAM usages were approximately constant and very comparable. The CPU and RAM usage were consistently lower when compared in 5 different missions. This is likely due to the fact that fewer processes are running on the CougUV computer when running a simulated mission because the sensor drivers are run in simulation instead of onboard the vehicle computer. Depending on the sensors and sensor drivers, the effect of this discrepancy will vary. However, the SIL and HIL testing can be used to detect cases where the onboard processing requirement is certainly too high for real-time operation.

Mission Type	**Avg. CPU Load (%)**	**Avg. RAM Usage (%)**
Real World	27.4	8.29
HIL Simulation	26.5	8.21

TABLE II

CPU AND RAM USAGE COMPARISON BETWEEN REAL WORLD AND SIMULATED MISSIONS AS A PERCENTAGE OF MAX CPU AND RAM USAGE.

VI. CONCLUSION

In this paper, we document and present multiple improvements that form part of the HoloOcean 2.0 release. In particular, we describe the integration of high-fidelity dynamics for torpedo AUV vehicles and a ROS 2 interface that provide the tools necessary for HIL and SIL simulations. These capabilities aid the development of underwater robotic platforms and improve success rates in costly and high risk field trials.

We demonstrate that real-time simulations can be used to ensure control surfaces and computational hardware are performing properly prior to field tests. We also show that software algorithms and autonomous behaviors can have comparable results in simulation and real-world tests when vehicle dynamics and sensor models are configured to match a real-world system.

We also demonstrate that torpedo AUV hydrodynamics can be modeled simply with parameters from 3D models, simple measurements, and data sheets. In future work, we plan to use system identification tools from ground truth measurements to estimate more accurate system parameters for the CougUV and compare real-world trajectories to the simulated trajectories. This work can be easily extended to other vehicles with dynamic models that follow the same structure from Fossen's Python Vehicle Simulator [6].

Additional work is in progress on the HoloOcean simulator to improve the sim-to-real gap in marine environments. We continue to test more advanced autonomous behaviors and responses to environmental effects like currents and waves for both underwater and surface vessels. With HoloOcean, additional work can be done to develop and test real-time perception algorithms using the high-fidelity sonar sensors and ensure onboard vehicle computation can support the data processing.

As robotic simulators continue to develop new tools, comparisons to real-world data are important to ensure the sim-to-real gap is decreasing. Validating underwater robotic simulators with real-world field trials is essential to simulation development.

The code, Docker environment, and documentation used for this work are open source and can be found at https://github.com/byu-holoocean/holoocean-ros. Documentation for the HoloOcean simulator can be found at https://byu-holoocean.github.io/holoocean-docs.

REFERENCES

[1] E. Potokar, S. Ashford, M. Kaess, and J. Mangelson, "HoloOcean: An underwater robotics simulator," in *IEEE International Conference on Robotics and Automation*, Philadelphia, PA, USA, May 2022.

[2] E. Potokar, K. Lay, K. Norman, D. Benham, T. B. Neilsen, M. Kaess, and J. G. Mangelson, "HoloOcean: Realistic Sonar Simulation," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyoto, Japan, May 2022.
[3] E. Potokar, K. Lay, K. Norman, D. Benham, S. Ashford, R. Peirce, T. B. Neilsen, M. Kaess, and J. G. Mangelson, "HoloOcean: A full-featured marine robotics simulator for perception and autonomy," *IEEE Journal of Oceanic Engineering*, vol. 49, no. 4, pp. 1322–1336, 2024.
[4] T. Perez, Øyvind N. Smogeli, T. I. Fossen, and A. J. Sørensen, "An Overview of the Marine Systems Simulator (MSS): A Simulink Toolbox for Marine Control Systems," *Modeling, Identification and Control*, vol. 27, no. 4, pp. 259–275, 2006.
[5] T. I. Fossen, *Handbook of Marine Craft Hydrodynamics and Motion Control*. John Wiley & Sons, Ltd, 2011.
[6] ——, "Python Vehicle Simulator [software]," Available: https://github.com/cybergalactic/PythonVehicleSimulator, 2021.
[7] S. Macenski, T. Foote, B. Gerkey, C. Lalancette, and W. Woodall, "Robot Operating System 2: Design, architecture, and uses in the wild," *Science Robotics*, vol. 7, no. 66, 2022.
[8] N. Koenig and A. Howard, "Design and use paradigms for gazebo, an open-source multi-robot simulator," in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Sendai, Japan, Sep 2004, pp. 2149–2154.
[9] N. Ciuccoli, L. Screpanti, and D. Scaradozzi, "Underwater simulators analysis for digital twinning," *IEEE Access*, vol. 12, pp. 34 306–34 324, 2024.
[10] M. Prats, J. Perez, J. J. Fernandez, and P. J. Sanz, "An open source tool for simulation and supervision of underwater intervention missions," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct 2012, pp. 2577–2582.
[11] P. Cieślak, "Stonefish: An Advanced Open-Source Simulation Tool Designed for Marine Robotics, With a ROS Interface," in *IEEE OCEANS Conference Proceedings*, France, Jun. 2019.
[12] M. M. M. Manhães, S. A. Scherer, M. Voss, L. R. Douat, and T. Rauschenbach, "UUV simulator: A gazebo-based package for underwater intervention and multi-robot simulation," in *IEEE OCEANS Conference Proceedings*, Monterey, CA, USA, Sep 2016.
[13] J. Song, H. Ma, O. Bagoren, A. V. Sethuraman, Y. Zhang, and K. A. Skinner, "OceanSim: A GPU-accelerated underwater robot perception simulation framework," *arXiv:2503.01074*, 2025.
[14] B. Allen, R. Stokey, T. Austin, N. Forrester, R. Goldsborough, M. Purcell, and C. von Alt, "REMUS: a small, low cost AUV; system description, field trials and performance results," in *IEEE OCEANS Conference Proceedings*, 1997.

OCEANS 2026 Sanya
Call for Abstracts

"To the Sea, to the Deep"

IEEE Oceanic Engineering Society

May 25-28, 2026 Sanya China

We seek cutting-edge technical presentations with an emphasis on Deep-sea Technology, Marine Energy, and Ocean AI for our conference in May 2026.

Submissions related to OCEANS 2026 Sanya Special and IEEE OES Standard Topics will be considered. The special topics include:

- Deep sea exploration and archaeology
- Deep sea mining and environmental evaluation
- Artificial intelligence in ocean science and technology
- Mobile underwater sensor networks: Coordinated communication, localization, and observation
- Underwater soundscapes: Methodologies and applications
- Polar and under ice observing systems
- Offshore wind power technology
- Technologies for monitoring extreme weather events
- Biologically inspired technology for marine applications
- Interactive development of marine science and technology
- Ocean remote sensing

The attendees can take advantage of:

- Professionally reviewed technical papers, including sessions focused on local themes
- Plenary sessions with world-wide leaders from industry, academia and government
- Tutorials, workshops, demonstrations, and social/networking opportunities
- Professional field trips to newest HOV and icebreaker vessel...and much more

Abstracts may be submitted in one of the following categories:

- Regular Technical Program: Technical papers are the core of the OCEANS technical programme. For a selected abstract, it is required to write a paper per instructions for publication in IEEE Xplore.
- Student Poster Competition: Students may submit abstracts to the Student Poster Competition. If an abstract is chosen, the student will then submit a full paper and poster which will be presented in the student poster section and published in IEEE Xplore. This competition is open to any full-time student in an accredited programme. The student must be listed as the lead and corresponding author. Selected students, based on abstract reviews, will have travel and registration expenses subsidised. Those abstracts not selected for the SPC may still be accepted into the regular technical programme.
- Commercial Papers: May only be submitted by conference exhibitors and if accepted, they will be presented in a designated session. They may include commercial content and will not be published as part of IEEE Xplore.
- General Poster Session: During the submission process of technical papers, authors will have the option to request their preference: oral presentation or poster presentation. The final decision on how the paper will be presented will be made by the Technical Programme Committee based on author preference, reviewers' feedback and other factors. Participants in the General Poster session are still required to upload a final paper for publication in IEEE Xplore. Additionally, General Poster participants must prepare and print the poster according to the IEEE poster template. Authors participating in the poster session will present the poster on-site during a dedicated live session at the conference.

We strongly encourage you to be creative in your participation. Please contact us, via email or conference website, with your proposals if you are considering one or more of the following activities:

- Organising a Technical Session or Track. Authors are invited to consider 'championing' a particular topic of interest to you and your colleagues, and coordinating multiple submissions into a Special Session or Track. Sessions are approximately 90 minutes, consisting of presentations of submitted, peer-reviewed abstracts (and submitted papers). However, you are welcome to work with the Technical Program Committee to have a format that might include longer featured talks, paper submissions (meeting same deadlines as regular technical programme) or shorter presentations with a panel discussion, and the option of no paper. Common sessions may be organized into an announced Technical Track with a sub-theme to reflect specialized topics.
- Organising a Tutorial.
- Organising a Workshop.
- Organising a Technical Demonstration.

Looking forward to receiving your abstracts and proposals.

IMPORTANT DATES:

- Abstract Submission opens: October 01, 2025
- Deadline for Abstract submission: December 22, 2025
- Call for Tutorials: October 01, 2025
- Tutorials Close: December 15, 2025
- Notification for Authors: February 15, 2026
- Final Paper Submission: March 22, 2026

For further information please contact the OCEANS 2026 Sanya Technical Program Committee at **TechnicalChair@sanya26.oceansconference.org .**

Social Time
Meet and Make Friends

Special Topics
and Sessions

In Water Demos

Exhibits

New for 2026 – Larger Poster Sessions and Special Sessions for those who want Peer Review

Oceans: Where Research and Development Make a Difference

KEYNOTE SPEAKERS

Dr. Antje Boetius
President and CEO of the Monterey Bay Aquarium Research Institute

Dr. Marcia McNutt
President of the National Academy of Sciences

Dr. Dana Yoerger
Senior Scientist and Researcher in Marine Robotics

Program Topics Outline

1. AI, Machine Learning, and Data-Driven Ocean Science
2. Low-Cost Scalable Sensors and Platforms, and Citizen Science
3. Ocean Soundscapes
4. The Blue Horizon: Policy, Industry, and Sustainability
5. Marine Security
6. Polar and Cryospheric Sciences – UN Decade of Action
7. Environmental Omics – Molecular Components of Life
8. Midwater Ecology
9. Humans and the Ocean - Fostering an Appreciation

Who's Who in the IEEE OES

Weimin Huang, OES Treasurer

I was born in a small town, Linchuan, in China. Linchuan is well known because it is the hometown of many renowned people in the history. My father is a high school physics teacher and my mother is a tailor. I had a very joyful childhood. At that time no electronic entertainment products were available to us, so I spent most of my extracurricular time outdoor enjoying some simple, playful and sweating sport games. My grandparents lived in a small village, my parents always brought me back to the village during the summer and winter vacations. Thus, I had great opportunities to experience the life in the farm. A carefree childhood always passes by so quickly. I was admitted to Wuhan University (see Fig. 1), studying Space Physics, maybe partially due to my father's major. After my four-year undergraduate studies, I began my Master and PhD programs directly with a research direction in ocean remote sensing using high frequency radar. I often joked that it is "remote sensing the ocean" in the true sense, since Wuhan is far from the ocean. In 1999, I had the great chance to join the field test on East coast of China. We were so excited to see the ocean and played soccer on the beach. From then on, my bond with the ocean has never been separated.

Wuhan is my second hometown since I spent 10 years there. After I obtained my PhD degree from Wuhan University, I went to Memorial University, St. John's, Canada, where I completed my second Master's degree and Postdoctoral research, both on high frequency radar cross sections of ocean surface. During my second Master study period, I attended the IEEE/MTS OCEANS conference in person for the first time (in San Diego, 2003). I was very happy to meet so many experts, in particular those in my research area. The OCEANS conference provides a premier forum for academia and industry people to explore cutting-edge research and foster innovation in the ocean related fields. Nowadays, I often encourage and support my students to attend OCEANS. Figure 2 shows our gathering at OCEANS in Brest, France, in this year.

Figure 1. In front of the gate arch of Wuhan University at the 30th anniversary of undergraduate graduation.

From 2008 to 2010, I was with Rutter Inc. (St. John's, Canada) who acquired the OceanWaveS gmbH later. The industry experience helped expand my research area to include ocean observation using X-band marine radar, which is usually utilized for navigation. In 2010, I joined Memorial University as a faculty member. Since then, I further broadened my research to ocean remote sensing using Global Navigation Satellite System Reflectometry and synthetic aperture radar. I love my university job since it offers the freedom to explore any interesting research topics and the joy of training next generation of engineers.

My journey with IEEE started 15 years ago. Since then, I became a volunteer by taking various IEEE positions and had the chance to learn and gain experience about how to serve the community better. This year, I feel very honored to be included in the OES AdCom and later appointed as the OES Treasurer. Although the Treasurer position takes a significant amount of my spare time, I begin feeling the responsibility and joy within it. By this December, I will also conclude my first-year term as an OES Distinguished Lecturer (DL). I really enjoyed the trip to share my knowledge, expertise, and insights with the Community through either in-person or

Figure 2. With graduate students at OCEANS Brest, France.

Figure 3. Photo taken during my DL trip in Sydney.

Figure 4. Aurora in St. John's.

Figure 5. Fishing on the coast.

Figure 6. Photo at terraced rice fields.

virtual presentations. Figure 3 is a photo I took during my DL trip in Australia.

By this year, I have resided in St. John's, my third hometown, for almost 24 years. St. John's is Canada's most easterly city, which is well known for its weather, culture and scenery. Occasionally, Aurora will appear to decorate the city in colors at nighttime (see Fig. 4). Aside from work, I love to spend time outdoors with my family or friends. Newfoundland is surrounded by the Atlantic Ocean and is one of the world's richest fishing grounds. In the summer, the most comfortable and fun season here, my favorite outdoor entertainment is fishing (see Fig. 5). To me, fishing can not only fill up my freezer with cod, but also give me 2-3 hours good excises. It is also a great time to meet and chat with friends. There are many excellent trails here, I also often spend a couple of hours hiking in the jungles. While in the winter, the thick snow makes Newfoundland an ideal place for skiing. Of course, I will bring my family to join the activities.

I also enjoy travelling and photography. I will record the beautiful memories of wherever I visit. Figure 6 is a photo taken in the beautiful rice field in Guilin during my sabbatical leave. Another hobby of mine is basketball. Every Sunday night, a fixed group of friends will gather together in the gym of Memorial University to play the game for 2-3 hours. The weekly social networking and sweating in the basketball court makes everyone feel very relaxed and fully recharged for the coming week.

As a dedicated researcher, teacher, mentor, and volunteer in the engineering society, I will continue to pursue the fun brought by these roles.

AdCom Election Results

Christian De Moustier, OES Past President, Nominations & Appointments Committee Chair

Newly elected six members of the IEEE OES Administrative Committee for the 3-year term (01/01/2026-12/31/2028) are introduced as below. Congratulations!

M. A. ATMANAND
FILIPPO CAMPAGNARO
ANDREAS MAROUCHOS
GAULTIER REAL
KAREN RENNINGER-ROJAS
CHRISTOPHER WHITT

In the election, out of 1,676 ballots sent out by IEEE to all voting members of IEEE-OES, a total of 337 ballots (20.11%) were returned to IEEE. By far the largest response came from IEEE Region 10 (Asia and Pacific) with 130 votes out of 335 IEEE-OES members in that region (40%).

Welcome New and Reinstated Members

From 8 August through 6 November 2025
Total: 120 (incl 77 student:38 graduate & 39 student)

Australia
Daniel Scott Birt

Canada
Matko Barisic
Michael Hilt
Steven FT Porretta

China
Muhammad Adil
Weiling Chen
Yuanbo Cheng
Xinwei Cuan
Bohan Du
Zhao Hua
Yi Huang
Chaicheng Jiang
Liyinguang Li
Chongyi Li
Huiying Lin
Yingying Liu
Yifan Liu
Zongyang Liu
Bashar Oderah
Nigui Qian
Wazir Ur Rahman
Roohullah Roohullah
Ruoyang Shen
Shenzhaochen Zhaochen Shen
Lingnan Shen
Guoyuan Tang
Abdul Waheed
Andong Wang
Haotian Wang
Yan Wang
Gong Xiang
Zhiping Xu
Duan Yu
Zheng Zeng
Jialei Zhang
Qin Zhang
Yi Zhu
Yanji Zhu

Colombia
Jairo Altamar
Sebastian Castiblanco
Helmut Chaparro Sandoval
Hassem Jabib
David Santiago Rojas

Croatia
Nur Assani

Cyprus
Neofytos Dimitriou

France
Hugo Zakaria Jose Hawkins

Gibraltar
Awantha Dissanayake

Hong Kong
Lok Tim Pang

India
Harish B
B.Vijayashree B.Vijayashree Balamurugan
Srivarshini D
Pranav J
Sandeep Joshi
Rajeshwari K
Rupaharini M
Vandhana M
Harini P
Paramasivam P
Pavithra P R
Swetha R
Janani S
Mukesh S
Sam Christiyaan S
Sasirithika S
Mukesh Kumar S R
Bhavatarikha Lakshmanan Saravanan
Prabavathi Selvakumar
Harish Subramanian
Ashwin Suren
Gokul Udayakumar
Arnav Upadhyay
Baranidharan V
Jayasri V
Arunachalam V S
S Varalakshmi Varalakshmi Varu
Rakesh R Warier

Ireland
Tom Dorian
Luke Griffin

Israel
Ofir Kruzel

Italy
Cristiano Caissutti
Vincenzo Cimino
Davide Costa
Fausto Fedi
Matin Ghalkhani
Gherardo Liverani

Francesco Maione
Paolo Marinelli
Marco Minarelli
Nicola Secciani
Diego Spinosa

Japan
Masaki Kuriyama
Tomoharu Nakagawa
Takeshi Nakatani
Masahiro Yagi

Korea, Republic of
Taeho Kim
Jaehoon Lee

Mexico
Alejandra Ramirez Meneses

Pakistan
Syeda Iqra Hassan
Amber Israr
Umar Muhammad Khan

Russian Federation
Alexey Gromov

Singapore
Pengkun Hou

Turkiye
Gulsevin Kodaloglu
Evren Samur

USA
Jeffrey Allanach
Ethan K Brodsky
Christopher Dryhurst
Adam Anthony Dumstorf
David Harland Heimke
Mathew Henson
Umi Joshi
Robert Joy
Chaitanya Kumar Mankala
Alexander Merchen
Sebastian Naranjo
Lester Harry Oakes
Scott Raymond Sideleau
Thomas M Siderius
William E Terry
Brian Woodward

How to Receive Paper Copies of Each Beacon

Although digital versions of the Beacon newsletter are available on the OES website (https://ieeeoes.org/publications/oes-beacon/) and IEEE Resource Center, only OES members can receive printed copies of each Beacon.

Here is how to get your paper copies of the OES Beacon in the future. Introduction is also on the above OES website.

1) OES members need to contact the IEEE Contact Center at 1-800-678-4333 or 1-732-562-6785- Monday thru Friday- 8:00 AM- 4:30 PM EST (https://www.ieee.org/about/contact)
2) Or . . . send the IEEE Contact Center an email at contactcenter@ieee.org with your name, IEEE member number and your request to receive your paper copy of the OES Beacon. Please enjoy the BEACON newsletter.

Visit BEACON Newsletter website

IEEE OES AqUaVision (AUV) Challenge 2025 India's first vision-based Autonomous Underwater Vehicle (AUV) challenge, under the IEEE Oceanic Engineering Society Ocean Decade Initiative (ODI)

Sangeetha Sankar, Vallabh Deogaonkar, and Sridhar Krishnamoorthy, IEEE OES SBC IIT Madras, Chennai, India.

On 1 March 2025, IEEE OES Madras Chapter, along with IEEE OES Student Branch Chapter IIT Madras, launched the Aquavision 2025 competition, a flagship initiative by IEEE Oceanic Engineering Society (OES). The event was hosted at the Department of Ocean Engineering IIT Madras. This annual event is being envisioned as a platform to inspire innovation in

autonomous underwater systems. As the first-ever vision-based AUV competition of its kind in India, Aquavision seeks to nurture young talent, encourage hands-on problem-solving, and connect students with global research and industry in ocean engineering. By combining technical challenges with real-world applications, the event aligns with the goals of the **UN Ocean Decade Initiative**, fostering the next generation of ocean engineers committed to sustainable marine technologies. The competition brought together talented students and young researchers from across the country.

Figure 1. Aquavision 2025: Empowering innovation, inspiring sustainability, shaping the future of our oceans.

Centered on the theme *"Vision-Based Autonomy,"* the event showcased cutting-edge innovations in autonomous underwater robotics, with participants demonstrating navigation, vision-based object detection, and autonomy. With a Rs. 500,000 (approx. 5500 USD) prize pool, exciting opportunities for industry interaction, and a strong emphasis on hands-on experience, Aquavision 2025 celebrated creativity and technical excellence while inspiring future ocean engineers to contribute toward sustainable marine technologies. Over 16 teams registered for this event from all over India, with five selected finalists competing in the main challenges at IIT Madras.

The competition was officially initiated by **Mr. Vallabh Deogaonkar**, Treasurer IEEE IIT Madras SB and AUV Master, who warmly welcomed the chief guests, jury members, faculty, sponsors, the organizing student committee, and participating teams. **Prof. S. A. Sannasiraj,** Past Chair IEEE OES Madras Section and Branch Counsellor IEEE OES SBC IIT Madras, inaugurated the event by operating the Autonomous Underwater Vehicle (AUV) created specifically for the event with the support of MAV Lab team, IIT Madras. **Dr. M. A. Atmanand,** Chair of Ocean Decade Initiative of IEEE OES and Technology Committee Coordinator of IEEE OES and **Prof. V. Sriram,** Chair, IEEE OES Madras Section delivered inspiring talks on innovation, hands-on experimentation, and excellence in ocean engineering, motivating participants to push the boundaries of AUV technology and autonomous underwater robotics. Insights were also shared by **Dr. V. Bharatwaja Ayyangar** from the Naval Research Board, DRDO, and **Dr. P. Krishnankutty**, Cochin University of Science and Technology, offering valuable perspectives that enriched the students' learning experience. Participants interacted with experts, gaining practical guidance on AUV design and operations. The session set an inspiring tone for the competition, fostering creativity, teamwork, and problem-solving.

Figure 2. Prof. S. A. Sannasiraj inaugurated the event and unveiled the event's custom-built AUV.

Figure 3. Inaugural and special addresses delivered by Dr. M. A. Atmanand and Prof. V. Sriram, with additional insights shared by Dr. P. Krishnankutty and Dr. V. Bharatwaja Ayyangar for the participants.

Figure 4. Celebrating the launch of IEEE OES AqUaVision (AUV) Challenge 2025 with faculty, chief guest, student committee and student teams.

Mr. Mohammed Ibrahim, AUV Master, introduced the participating teams, outlined the rules, and announced the stage timings, officially marking the start of an exciting series of

challenges**.** The day featured hands-on demonstrations and tasks in navigation, vision-based object detection, and autonomous operations, with enthusiastic participation from students and young researchers created by the organising team, showing the possibilities. Five teams, namely Team Titans, Nautical Navigators, Hydrobots, MTS AU-ZHCET, and AUV Society, Indian Institute of Information Technology, Design and Manufacturing (IIITDM), competed in person, showcasing impressive technical skills, creativity, and teamwork.

Figure 5. Teams presenting their custom-built AUVs during the IEEE OES AqUaVision 2025. Top-left: Team introductions by Mr. Ibrahim; other panels show AUVs from Hydrobots, Nautical Navigators, Team Titans, MTS AU-ZHCET, and IIITDM.

The jury for Aquavision 2025 comprised experts, including **Dr. V. Bharatwaja Ayyangar**, **Dr. R. Thiyagarajan** (IIT Tirupati), **Dr. Nidhi Varshney** (NIOT and Treasurer IEEE OES Madras Section), and **Dr. Abhilash Somayajula** (Co-Chair Technology Committee on Autonomous Maritime Systems, Faculty, IIT Madras and Mentor for Aquavision 2025). Their diverse expertise ensured fair evaluation and meaningful feedback. Additionally, **Dr. M. A. Atmanand** joined the panel, further enriching the process. Together, the panel guided participants through the competition, carefully evaluating their technical knowledge, creativity, and innovative approaches, offering valuable insights and ensuring fair assessment.

The challenge began with the **Preliminary Wet Test**, where teams demonstrated their AUV's ability to submerge to a depth of 50–100 cm and maintain stability underwater. This stage tested control, sensor accuracy, and station keeping skills, serving as a qualifier for the core tasks of navigation, vision-based detection, and autonomy. To streamline the process, teams split into two groups, one handling technical assessment while the other carried out preliminary tests in the arena.

Figure 6. Top-left: Teams assembling for the competition briefing; Top-right: Jury panel engaging with organizing committee for technical assessment; Bottom-left: Evaluation and Q&A session with individual teams; Bottom-right: Team Titans custom-built AUV bot prepared for the preliminary tests.

The core of Aquavision lay in three progressively challenging tasks, designed to test precision navigation, vision-based recognition, and autonomous control. After successfully completing the preliminary test, teams moved on to showcase their AUVs' skills in three exciting tasks:

Task 1: Path Tracking: The AUV followed a straight 3 m course, demonstrating precise navigation and directional control. Judges assessed its ability to maintain a stable heading and minimize drift using onboard sensors.

Task 2: Gate Detection: The AUV identified and passed through the correct gate: red or green announced just before its turn. This tested visual recognition, decision-making, and quick trajectory adjustments.

Task 3: Slalom Race: The AUV navigated a zigzag course of colored gates, showcasing agility, speed, and precision. Judges evaluated maneuverability, sharp turns, and overall control, highlighting both design and software performance. The event was filled with high energy and excitement as each team pushed the limits of underwater autonomy and innovation. Jury members closely evaluated the performance of every team across the tasks and finalized the results.

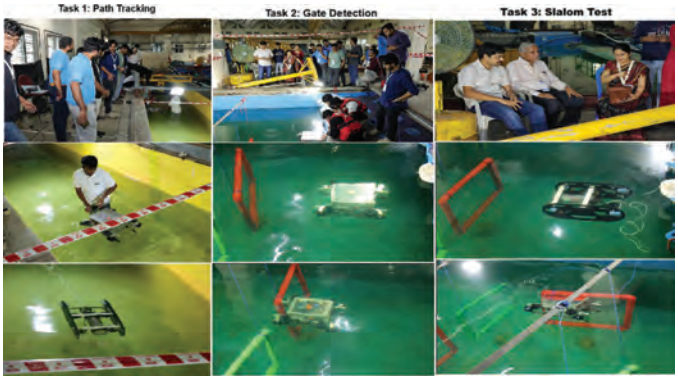


Figure 7. Teams performing AUV challenges at Aquavision 2025. Column 1: Path Tracking; Column 2: Gate Detection; Column 3: Slalom Test. The top row shows team members and the jury, while the middle and bottom rows highlight AUVs navigating the respective tasks.

The competition rounds unfolded with great excitement, driven by the collective spirit of the Aquavision team. Providing strong leadership, **Mr. Sridhar Krishnamoorthy** (Chair, IEEE OES SBC IIT Madras) guided the overall coordination, with **Mrs. Vijaya Lakshmi Thiagarajan** (Vice Chair, IEEE OES IIT Madras) extending valuable support. They were ably joined **by Mr. Rushikesh Kamble** (Secretary, IEEE OES SBC IIT Madras), **Ms. Sangeetha S** (Treasurer, IEEE OES SBC IIT Madras), **Mr. Vallabh Deogaonkar** (Treasurer, IEEE SB IIT Madras), and **Ms. Sree Nandhini E** (Secretary, IEEE SB IIT Madras), who worked together to ensure smooth management at every stage. Strengthening the team further, **Mr. Bhargav V** and **Mr. Hariram N** provided tireless assistance to both participants and jury members. Adding to this dedicated effort, volunteers – **Mr. Samyak Kumar, Mr. Sohrab Ali, Mr. Dilip Kumar, and Mr. Mrityunjay** – played an equally vital role in ensuring the seamless and successful conduct of the event.

Our distinguished faculty from IIT Madras and **Mr. Sridhar Krishnamoorthy**, IEEE OES YP Boost and Chair, IEEE OES SBC IIT Madras, warmly welcomed **Prof. Kamakoti**, Director of IIT Madras, who observed the student teams demonstrating their skills in navigation, detection, and autonomy. His presence inspired participants and energized the atmosphere. **Prof. Kamakoti** addressed the gathering, highlighting the importance of such initiatives in fostering innovation and teamwork, commended the dedication of all participants, and presented mementoes to each team for their outstanding efforts. This marked a memorable celebration of innovation and teamwork. Throughout Aquavision 2025, **Mrs. Srimathy K** served as the Event Anchor, skillfully guiding the proceedings and keeping the audience engaged.

Mr. Arun Kumar from Movella, who generously contributed **sensors worth Rs. 500,000 (approx. 5500 USD) for the winner and runner-up teams**. The much-awaited announcement of results followed, with **Dr. Abhilash Somayajula** declaring the winners of the competition. It was a proud and memorable moment as the Director, IIT Madras, presented certificates and mementoes to the champions, **Team Titans**, who secured first place, and to the runner-up team **AUV Society IIITDM Kancheepuram**. **Mr. Arun Kumar** handed over the sponsored sensors to both teams, adding to the celebration of innovation and teamwork.

Figure 8. Top-row and middle: Prof. Kamakoti graced the arena and interacted with the participants. Bottom-row: He presented mementos to AUV Masters and to the teams in recognition of their efforts.

Figure 9. Top row: Dr. Abhilash Somayajula announcing the results, followed by Prof. Kamakoti presenting certificates and mementoes to the winners, Team Titans. Bottom row: Prof. Kamakoti honoring the runner-up, IIITDM Kancheepuram, with Mr. Arun Kumar presenting the sponsored sensors to both teams.

Figure 10. Top row: Students and jury members at the valedictory session. Bottom row: Winners and runners-up receiving certificates and mementoes, along with special recognitions for participants.

Figure 11. The student committee presents mementoes to the jury members and the sponsor. Memorable moments captured with the Director, jury members, student committee, volunteers, and participants.

The event concluded with a valedictory session in the presence of the jury members, where prizes and mementoes were presented to the winner and runner-up teams, and certificates were awarded to all participants in recognition of their active involvement. During the session, the jury also presented special recognitions: the 'Outstanding Team Award' and the 'Best Sustainable AUV Design' to Team MTS AU-ZHCET, and the 'Excellence in Algorithm Development Award' to Team Titans, celebrating their innovative solutions to the competition tasks. The jury members shared inspiring messages with all participants, encouraging them to continue their journey of creativity, innovation, and passion in line with the vision of the UN Ocean Decade Initiative. The successful conclusion of Aquavision 2025 has set the stage for its future editions, promising to grow as a flagship platform for young innovators in ocean engineering and autonomous underwater robotics.

The team also extends their sincere gratitude to the event sponsors- **Movella|Xsens, Center of Excellence in maritime experiments to maritime experience (ME2ME), Ocean Robotix, National Technology Centre for Ports, Waterways and Coasts (NTCPWC), and ABCD Centre (The Global Water and Climate Adaptation Centre)** for their generous support.

The competition drew to a memorable close with the valedictory address by **Mr. Rushikesh Kamble**, Secretary of IEEE OES SBC IIT Madras. In his remarks, he extended heartfelt gratitude to the participants, organising team, faculty mentors and sponsors whose support made the event a success. Adding to the excitement, he unveiled the much-anticipated *Aquavision 2.0*, igniting enthusiasm and setting the stage for a new wave of innovation and collaboration.

Once again, the Aquavision team expresses heartfelt thanks to the faculty, the student committee, the volunteers, and participants for making this event a grand success.

Stay tuned for **AquAVision 2.0!**

Aquavision 2025 Sponsors and Partners

Experience the excitement of Aquavision 2025 on the official YouTube channel of IEEE OES SBC IIT Madras.

HydroStrider, the AUV that won First Place in Underwater Robot Convention in JAMSTEC 2025!

Yew Qi Ming, Jinyu Tong, The University of Tokyo

Introduction

On 23 and 24 August, students, engineers and enthusiasts gathered at JAMSTEC's headquarter in Yokosuka, Japan, for the Underwater Robot Convention in JAMSTEC 2025. The event, organized by NPO Japan Underwater Robot Network, provided a platform for participants to exchange technical ideas and networking through the competition and presentations of their own underwater robots. For further details on the convention, please visit the official website [1] (in Japanese), and additional reports from past conventions attended by our seniors can be found in [2], [3], [4], [5], [6], [7] and [8].

We, the authors, are master's students from The University of Tokyo, supervised under Prof. Toshihiro Maki (IEEE OES AdCom member). We have participated in the AI-challenge division as "Team HydroStrider" [Figure 1]. Our main goal was to gain essential knowledge and skills in underwater robotics to support our future research. Additionally, we gained valuable experience in teamwork, which is crucial for the development and operation of underwater robots.

The remainder of this article is structured as follows. The second section provides rules of AI-challenge division this year. Third section illustrates our strategy, coming with the specifications of the AUV that is documented in the fourth section. The final section summarizes the results and our experience from the competition.

Competition Rules

The AI-challenge division was introduced to promote the use of Artificial Intelligence (AI) in underwater robotics. In this division, underwater robots are required to break balloons that are placed in a pool autonomously. There are 3 types of balloons: Red, Yellow and Blue. Each of the balloon colors has a designated height in the pool and represents for different point values [Table 1]. The layout of the balloons is random. Unlike the previous rules, a yellow balloon is placed 1.5m from the start position, allowing each team to have a higher chance to get the first 10 points of score. The only tool allowed to break the balloons is a thumbtack given by the organizers. Figure 2 shows a diagram of the water tank setup. Each team will first need to make a poster presentation for the judges to evaluate the concepts and level of autonomy expected from the robot. Then they will also need to get as many scores as possible within 4 minutes by breaking the correct balloons with their robot autonomously. Every team will be given some time to practice and fine tune their robot before the competition. During the competition, each team will be given two attempts, and the attempt with the highest score will be taken into account as the performance of the team.

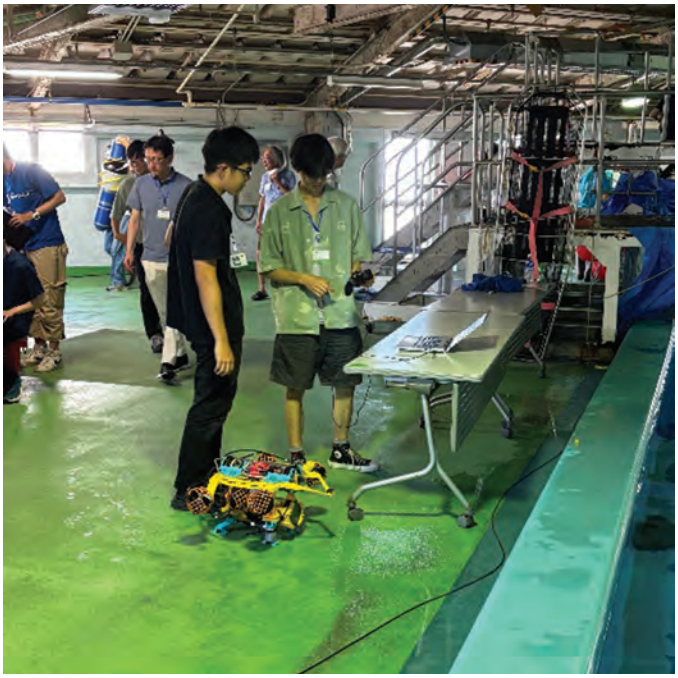


Figure 1. Team HydroStrider and HydroStrider AUV.

Table 1. Height and score of balloons.

Color	Height [m]	Score
Red	0.5	30
Yellow	1.5	10
Blue	0.7	–10

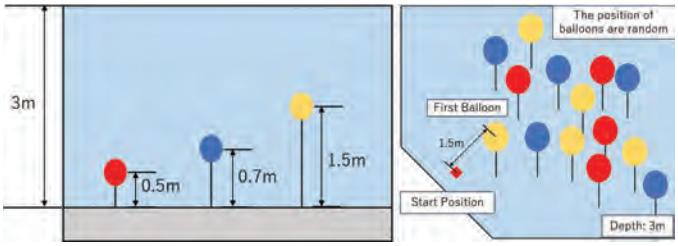


Figure 2. Overview of water tank setup, side view and top view.

Strategy

HydroStrider is a newly designed Autonomous Underwater Vehicle (AUV) for the competition. Our strategy for the competition this year is to establish a stable AUV system that could persist for the long run, together with several handy tools that are suitable for quick decision making on the spot based on the competition environment in JAMSTEC. To do so, many aspects of the AUV are reconstructed and standardized.

First, a 6 Degree of Freedoms (DOFs) configurated AUV is decided. In that way, the AUV could be fully actuated in all DOFs (Surge, Sway, Heave, Roll, Pitch, Yaw). Then, the hand-soldered donut board is switched to a printed circuit board (PCB) to ensure the electronics system can be operated consistently and in a neat way without exposing the AUV to risks of minor mechanical issues as happened in previous years. To make the program more readable and beginner friendly for future students, we re-wrote and re-structured the program with Robot Operating System 2 (ROS2) with our own standardized structure for every script. The ROS2 firmware runs on Ubuntu 22.04 (LTS) and does not require ROS Master to be operated such as in ROS 1. We believe this transition will allow future students to program and modify the AUV comfortably. Taking a step further to make it more readable, instead of making the ROS2 nodes subscribe to each topic they need, the desired topic info is first centralized at one script in a custom format, and pass onto another script as a big chunk of information together. This approach will cause some redundant info being send again and again, but we still decided to do this to make the programming diagram tidier without arrows crossing around all over the diagram, just by sacrificing some computation resources, which is believed to be negligible [Figure 3].

At the same time, the desktop version ubuntu is switched to server version (headless). All the ROS2 scripts have also been optimized on their running frequency to reduce computation load. With the extra computation resource, we decide to improve the detection method from Hough Circle detection to Hough Ellipse detection, which is able to detect the balloons more accurately. The RGB picture is also changed to HSV color space, which suits underwater environment better theoretically [Figure 4]. Data Logging while running is also possible although the frame rate of camera detection will drop from the standard 8 Fps to 6 Fps. Since the adjustment of proper HSV parameters usually takes a long time, we also prepared a separated HSV tuning kit so that we could optimize the detection parameters of HSV efficiently, intuitively and precisely by using the User Interface (UI) with sliders [Figure 5].

Based on the HSV Tuning outcome, we also make some strategical decision on the spot. We found that our detection method provides astonishingly accurate and long distance of detection on the yellow balloons. But the red balloon will appear black and look too similar with the floor of the pool in

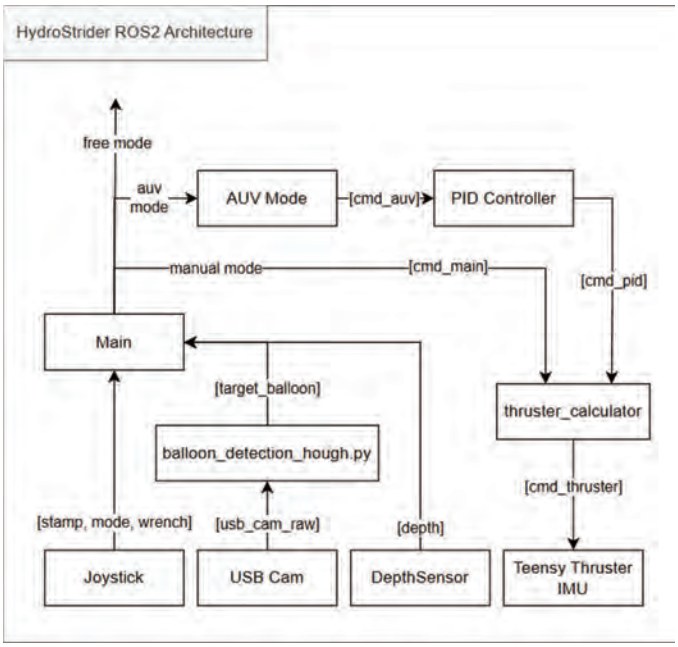


Figure 3. ROS2 Architecture of HydroStrider AUV.

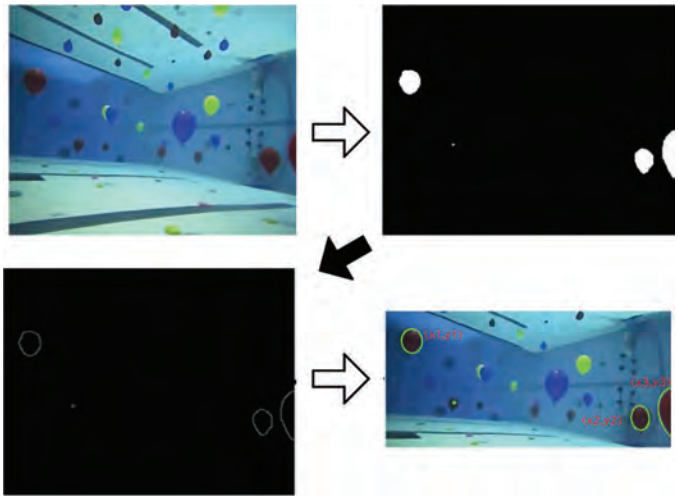


Figure 4. HSV Filter and Hough Ellipse Detection of Hydrostrider using video from JAMSTEC official webpage.

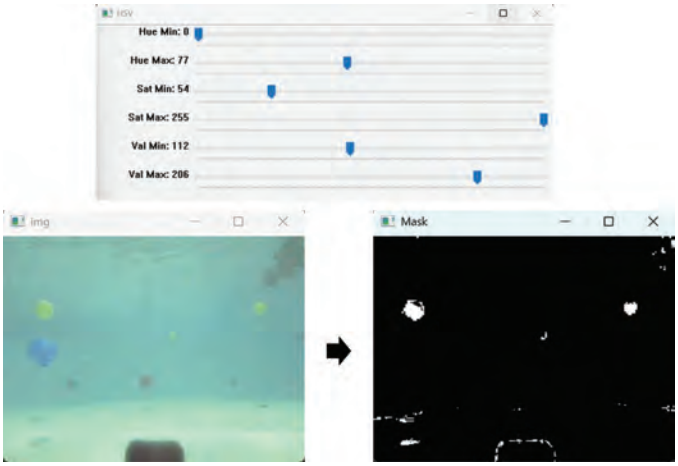


Figure 5. HSV filter tuning kit with sliders.

color. We also managed to break 2 balloons on the first practice day while running the AUV in low speed. Hence, we decide to "play it safe" by aiming only the yellow balloons and running at low speed.

After diving into the pool, the HydroStrider AUV will keep doing a search loop by moving forward for 5s then yaw for 90 degrees until it detects any target balloons. If any balloon is spotted, the AUV will charge to the balloon until no balloon exists within the AUVs view before switching back to the search loop. When deploying the AUV, we decided to look for patches of yellow balloons that are aligned more similar to a diamond shape, and we will pick a strategic position and put our AUV in a way that it could possibly detect and break those balloons consecutively, by leveraging our advantage on detection distance on yellow balloons and 90 deg turn and forward strategy. The original pseudocode of HydroStrider AUV is shown in Figure 6.

AUV

The AUV "HydroStrider" [Figure 7], [Table 2], is a fully actuated 6DOF AUV. The name HydroStrider is used due to it having 6 thrusters and charging forward to break balloons representing 6 legs and the swimming movement of an AquaStrider insect.

As mentioned, HydroStrider can move in all surge, sway, heave, roll, pitch and yaw with the 6 thrusters. All the aluminum structures are replaced with 3D printed parts just to show that the fully 3D printed part is possible for the competition. The net-like structure is wrapped around the thrusters so that the team and the

Algorithm 1 HydroStrider AUV search loop

Input: AUV mode **P**, Balloon detection flag **F**, Timer **T**, Turning angles **A**, AUV Depth **D**

Output: None

```
Initialize related parameters
launch AUV
P ← "Dive"
lastdepth ← D
while True do
    Update AUV states
    if P == "Dive" and D − lastdepth > 0.2 then
        P ← "Dive"
    else
        Set Search Depth
        P ← "Front"
    end if
    if P == "Front" and F == False then
        if T > 2sec then
            P ← "Turn"
        else
            keep forward
        end if
    end if
    if P == "Turn" and F == False then
        if A >= 90degs then
            P ← "Forward"
        else
            keep turning
        end if
    end if
    if F == True then
        P ← "Aiming"
    end if
    lastdepth ← D
    Publish AUV mode P
```

Figure 6. Pseudo code of AUV HydroStrider.

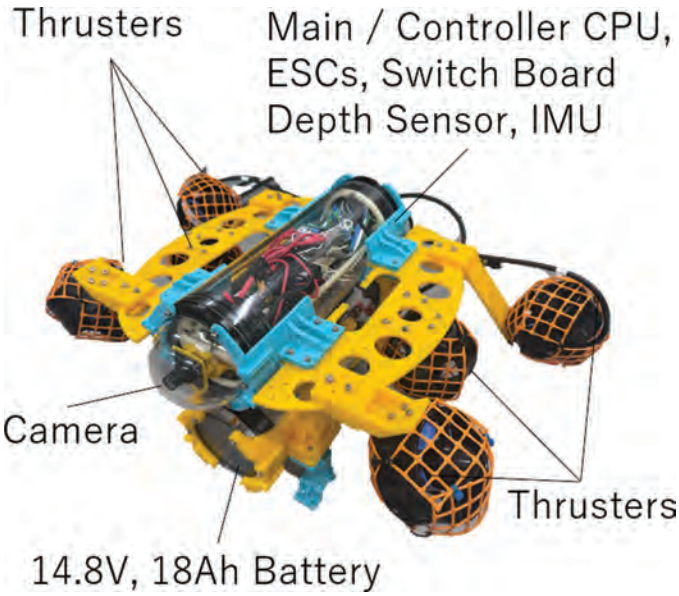


Figure 7. General Layout of the AUV HydroStrider.

Table 2. Dimensions and the number of thrusters on HydroStrider.

Components	**Specifications**
Length [mm], Width [mm], Height [mm]	540*385*265
Weight [kg]	7
Computers	Raspberry Pi 4B+, Teensy 4.0
Sensors	Depth Sensor, IMU, Camera Module
Actuators	6 Thrusters

divers in the competition could handle the AUV safely. Tether module is added behind the main hull for us to debug and tune it real time. The main components in the main hull are separated from the battery hull, to prevent risk of main components being damaged in case if battery explodes or chemical leakage happens. The twin hull configuration is switched from left and right configuration to top and bottom, so that the center of mass is placed lower with the battery hull being lowered. Besides, the camera can also be fixed to the center of the AUV for it to be modified and programmed more intuitively by anyone. For sensors, the camera is used to capture images of balloons, depth sensor for estimating the depth of pool, and IMU use to control the orientation of AUV. The sensor data is processed on Raspberry Pi 4B+ and thrusters are controlled with Teensy 4.0 through ESC, by calculating the required thrust from the estimation of balloons position based on its virtual size on camera and reference size of 20cm based on the rule book.

The AUV is constructed with ROS2 firmware. Debugging and Logging can be done systematically.

Result

At the first day of the competition, each team presented their AUV and overall strategy with an A0-sized poster. The judges then ask questions based on the presentation and the category of participation. Other teams are also free to exchange their views during this session. After the poster presentation session, it is given a time slot for every team to test and fine tune their AUV. We tested our AUV with a tether cable and a HSV filter tuning software. We found that even with our own eyes, we could not differentiate the color of Red Balloons and the bottom of the pool when seen from the camera. And the detection distance and accuracy for the yellow balloons are exceptionally outstanding. Hence, we decided to aim only for the Yellow Balloons and we managed to break two of them during the practice.

On the second day of the competition, each team is again given a time slot to test and fine tune again. On this day, we found the optimum HSV filter parameters are almost the same even though we test at afternoon on the first day and morning on the second day. We also tried to run the AUV mode with data logging which could cause the detection processing rate to drop from 8fps to 6fps, as the logging could cost some computational resources. During practice, the AUV seems to work well enough for competition.

On the first round of the real competition, we try to place our AUV in a strategic position that could detect and break the balloons consecutively, even though the positioning may only save up to a few seconds at most. Since the AUV has a good ability on detecting yellow balloons from a distance, and the search mode will be looped within going forward for 5s and 90-degree yaw, our AUV does keep finding balloons and charging to them without stopping, just like a pinball machine. Although, it does not break more than 2 balloons consecutively [Figure 8].

On the second round of the real competition, we do not let our guard down even though we managed to break more balloons than the other team on the first round. We checked our AUV and made sure every part is intact and no parts of the AUV are damaged. At the end, we managed to break only 1 balloon on the second round.

We were awarded first place out of all four teams for breaking the most balloons and for our AUV to be highly stable in detecting and attempt to break balloons autonomously and consecutively. We received a certificate, an amazon gift card and an educational module of Analog Device as a prize [Figure 9].

Throughout this competition, we realize that some minor details like system stability, code readability, and handy toolkits might seem unimportant for a one-off event (The Underwater Robot Convention), but they did actually become our greatest weapon in performing comfortably and making our decision faster. Therefore, it is important to make a good and simple solid foundation first before diving into complexity even though they are not state-of-the-art products. These foundations could also be beneficial for other students to modify comfortably in the future.

Finally, we believe the experience we gained from this competition could allow us to contribute better in our research and future careers.

Comments

Yew: I think there is still a lot space of improvement on our AUV since this AUV is still not solid enough to be applicable

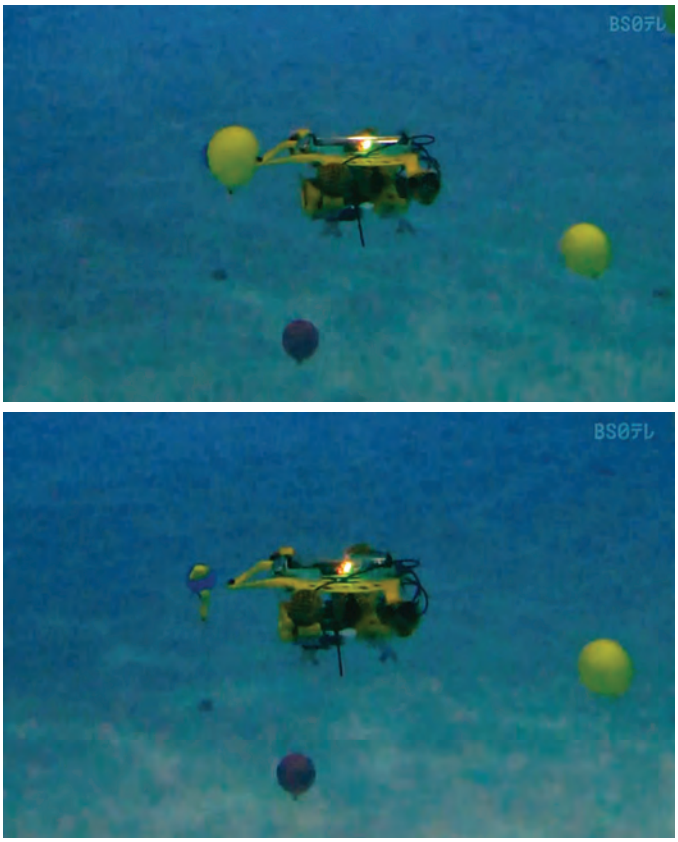


Figure 8. HydroStrider AUV breaks a yellow balloon captured by BS日テレ (TV Station in Japan).

Figure 9. Team HydroStrider with the prizes.

in solving any real-life problems. But I think we have lay a good foundation, given the amount of free time we had.

Tong: It is a remarkable experience for me to participate in such a competition. I saw many elaborate AUVs from other teams and learned a lot from their strategies. Whatever, I want to thank my teammate and our labs' support. All our hard work was worth it.

Acknowledgement

The Underwater Robot Convention in JAMSTEC 2025 was co-hosted by IEEE/OES Japan Chapter, Techno-Ocean Network and The Japan Society of Naval Architects and Ocean Engineers, Japan Underwater Robot Network and MTS Japan Section. Additionally, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Oki Electric Industry Co., Ltd., Oki Com-Echoes Co., Ltd., IDEA Consultants Inc., ARAV Co., Ltd, Minebea Mitsumi Inc., Sea challenge Co., Ltd., Nortek Japan LLC, HAMA Inc., Analog Device, Inc., Matsuyama Industry Co., Ltd., IWAKITEC Co., Ltd., Misago Co., Ltd., FullDepth Co., Ltd., KOWA Co., Ltd and Robotis Co., Ltd. sponsored the event, and the Ocean Policy Office, Kanagawa Prefecture, Yokosuka City, Tokyo University of Marine Science and Technology, and Center for Integrated Underwater Observation Technology at Institute of Industrial Science, the University of Tokyo provided the support.

We would like to express our sincere appreciation to the sponsors for their strong support and cooperation in realizing this convention.

References

[1] Underwater Robot Convention in JAMSTEC 2025 (Japanese). https://jam25.underwaterrobonet.org

[2] T. Kento, Y. Teni, S. Motoki, Y. Qi Ming, MakiComet, the AUV participated in Underwater Robot Convention in JAMSTEC 2024! IEEE OES Beacon Newsletter, 13(4), 84-87 (2024.12) https://ieeeoes.org/wp-content/uploads/2025/03/OES-Beacon-December-2024.pdf

[3] H. Kasuga, L. Hakataya, H. Yokohata, Sebastian, the AUV Won First Place in Underwater Robot Convention in JAMSTEC 2023! IEEE OES Beacon Newsletter, 12(4), 76-79 (2023.12) https://ieeeoes.org/publication/oes-beacon/

[4] A. Toriyama, M. Ohashi, H. Yokohata, wARIEL, the AUV Won First Place in Underwater Robot Convention in JAMSTEC 2022! IEEE OES Beacon Newsletter, 11(4), 83-86 (2022.12)

[5] K. Yamamoto, S. Chun, Y. Sekimori, C. Kawamura, ARIEL, the AUV Won First Place in Underwater Robot Convention in JAMSTEC 2021! IEEE OES Beacon Newsletter, 10(4), 70-73 (2021.12)

[6] Y. Sekimori, T. Maki, Underwater Robot Convention in JAMSTEC 2020 – All Hands on Deck! Online!!, IEEE OES Beacon Newsletter, 10(1), 39-42 (2021.3)

[7] K. Fujita, Y. Hamamatsu, H. Yatagai, Reflection for Singapore Autonomous Underwater Vehicle Challenge – the Comparison Between SAUVC and a Competition Held in Japan, IEEE OES Beacon Newsletter, 8(2), 64-67 (2019.6)

[8] H. Yamagata, T. Maki, Underwater Robot Convention in JAMSTEC 2018 – from an Educational Perspective, IEEE OES Beacon Newsletter, 7(4), 68-72 (2018.12)

University of Haifa IEEE OES Student Branch Chapter Activities Report

Nadav Cohen, Netta Palez, Michal Levin, Aviad Etzion, Barak Diker, Zeev Yampolsky, Itzik Klein
University of Haifa, Israel.

Over the past year, the IEEE Student Branch and Oceanic Engineering Society (OES) Chapter at the University of Haifa (UoH) have continued to strengthen their presence on campus and within the broader marine technology community. Through a series of initiatives, collaborations, and outreach activities, the chapter has fostered an active community of students passionate about ocean engineering, advancing both technical knowledge and professional engagement in the field.

After officially establishing our leadership board in April 2024, the chapter quickly began organizing events aimed at introducing students to the wide-ranging world of oceanic engineering. Since then, our community has steadily grown to include twelve enthusiastic members, each driven by a shared passion for advancing ocean technology and strengthening Israel's presence in the global marine innovation landscape.

Our first official event, the Oceanic Engineering Meet-Up, took place on 21 January, 2025, marking a major milestone for our newly established OES Student Branch Chapter (SBC). The gathering featured presentations from OES student members, our Student Branch Chair, and our academic advisor, attracting around 25 participants from both academia and industry. During the event, the OES SBC Chair and academic advisor delivered opening remarks to inaugurate and celebrate the launch of the new branch at the University of Haifa, Israel. The program included six engaging talks by OES student members, each showcasing their ocean engineering research. *Figure 1* presents selected moments from the student talks and the OES SBC Chair's address.

The meet-up also featured a small robotics exhibition, providing OES students with an opportunity to showcase their engineering projects, exchange ideas, and network in a friendly, collaborative atmosphere.

Later in the year, on **10 September, 2025**, we hosted the **OES Student Poster Session** as part of the Marine Technologies Conference at the University of Haifa. Several student members presented their research, sparking valuable discussions with academic colleagues and industry representatives. To further increase visibility and attract new members, the chapter organized a registration booth at the conference entrance, featuring a poster highlighting recent activities and a committee member available to engage with prospective students. The poster session, held immediately after the conference, fostered lively conversations among students and researchers alike, as shown in *Figure 3*.

Figure 1. The Oceanic Engineering Meet-Up, launch event of the OES Student Branch Chapter at the University of Haifa. Shown are student presentations delivered during the event.

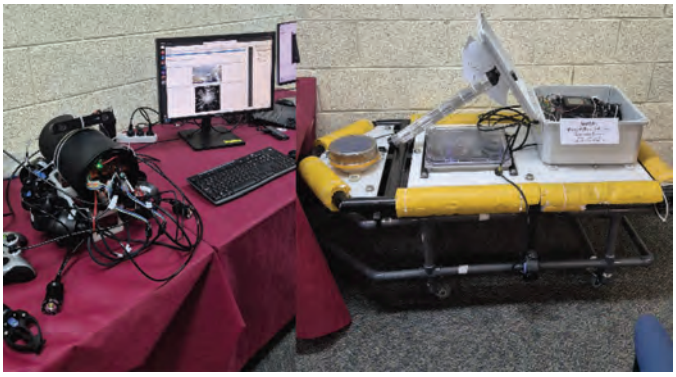


Figure 2. Student marine robot exhibition during the OES SBC meet-up event.

Figure 3. The OES Student Poster Session, showing student researchers engaging in discussion on the left, and the chapter's registration booth at the conference entrance on the right.

These activities mark the beginning of a vibrant and engaged chapter community that brings together students, researchers, and professionals in oceanic and marine technologies. We look forward to building on this momentum through new initiatives, events, and collaborations in the coming year.

IEEE OCEANIC ENGINEERING SOCIETY EX-OFFICIO ADMINISTRATIVE COMMITTEE

Co-Editors-in-Chief, OES BEACON
HARUMI SUGIMATSU
University of Tokyo
ROBERT WERNLI
First Centurion Enterprises

Earthzine Editor-in Chief
HARI VISHNU

Student Newsletter Editor
LUYUAN PENG

Social Media
KAREN RENNINGER-ROJAS

Webmaster
RAJAT MISHRA

Student Activities
VACANT

Membership Development
VACANT

Fellow Evaluating Committee
ROSA ZHENG

Women in Engineering
JACQUELINE NICHOLS

Young Professional
ROBERTO PETROCCIA

Technology Committee Coordinator
M. A. ATMANAND

OCEANS Central Coordination Committee (OCCC)
VENUGOPALAN (VENU) PALLAYIL

Awards, Nominations
CHRISTIAN DE MOUSTIER

Chapter Coordinator
MAURIZIO MIGLIACCIO

CHAPTER CHAIRS

REGION 1-6, USA
PROVIDENCE
Gopu Potty

HOUSTON
Rami Jabari

SAN DIEGO
Gregory Laugle

SEATTLE
Vacant

HAWAII
Brianne Tengan

REGION 7, CANADA
CANADIAN ATLANTIC
Mae L. Seto

NEWFOUNDLAND & LABRADOR
Weimin Huang

OTTAWA
Monirosharieh Vameghestahbanati

QUEBEC
Saeid Homayouni

TORONTO
AliReza Sadeghian

VANCOUVER
Jacqueline Nichols

VICTORIA
Jim Collins

REGION 8, EUROPE, MIDDLE EAST & AFRICA
FRANCE
Philippe Courmontagne

ITALY
Maurizio Migliaccio

NORWAY
John Potter

POLAND
Pawel Prajzendanc

PORTUGAL
Nuno Cruz

SPAIN
Joaquin del Rio Fernandez

RUSSIA
Igor Shirokov

TUNISIA
Habib Kammoun

UKRI
Radhakrishna Prabhu

REGION 9, SOUTH AMERICA
ARGENTINA
Gerardo Acosta

REGION 10, ASIA & PACIFIC
AUSTRALIA
Melanie Olsen

DELHI
Monika Aggarwal

GUANGZHOU SECTION
Fei Ji

HONG KONG
Paul Hodgson

INDONESIA
Endang Widjiati

JAPAN
Masanao Shinohara

KOCHI
Sooraj K. Ambat

KOREA
Son-Cheol Yu

MADRAS
V Sriram

MALAYSIA
Zool H Ismail

NEW SOUTH WALES
Ollencio D'Souza

SHANGHAI
Lian Lian

SHANDONG
Haiyong Zheng

SINGAPORE
Bharath Kalyan

TAIPEI
Chen-Fen Huang

TECHNOLOGY COMMITTEE CHAIRS

AUTONOMOUS MARITIME SYSTEMS (AMS)
CHAIR: HAYATO KONDO
CO-CHAIRS: ABHILASH SOMAYAJULA, BHARATH KALYAN

DATA ANALYTICS AND AI
CHAIR: GOPU POTTY
CO-CHAIR: ZOOL HILMI ISMAIL

ENERGY
CHAIR: YE LI

LIVING RESOURCES
CHAIR: SULEMAN MAZHAR
CO-CHAIR: ANANYA SEN GUPTA

MOORINGS AND STRUCTURES
CHAIR: ANDREAS MAROUCHOS

OPTICS AND IMAGING
CHAIR: HAIYONG ZHENG
CO-CHAIR: JOHN WATSON

OCEANOGRAPHY AND METEOROLOGY
CHAIR: WEIMIN HUANG
CO-CHAIR: LORENZO LUINI

REMOTE SENSING
CHAIR: FERDINANDO NUNZIATA
CO-CHAIRS: PAOLO DE MATTHEIS, JIAHUA ZHU

METROLOGY AND INSTRUMENTATION
CHAIR: ROEE DIAMANT
CO-CHAIR: YANG YANG

UNDERWATER ACCOUSTICS
CHAIR: MEHDI RAHMATI
CO-CHAIR: MONIKA AGGARWAL

UNDERWATER COMMUNICATION AND POSITIONING
CHAIR: MILICA STOJANOVIC
CO-CHAIR: MANDAR CHITRE

JOURNAL ASSOCIATE EDITORS

Anwar, Saeed
Atmanand, M.A.
Bachmayer, Ralf
Barclay, David
Brekke, Edmund
Chotiros, Nicholas
Cochenour, Brandon
Cong, Runmin
Costanzi, Riccardo
Cruz, Nuno
De Masi, Giulia
Del Pizzo, Silvio
Englot, Brendan
Ferreira, Fausto
Foote, Kenneth
Gill, Eric
Gomes, Joao
Guo, Chunle
Haller, Merrick
Hayes, Michael
He, Wei
Huang, Weimin
Hunter, Alan
Illig, David
Li, Chongyi
Li, Guoyuan
Li, Hua
Maki, Toshihiro
Michalopoulou, Eliza
Morozov, Andrey
Munafó, Andrea
Nad, Dula
Neilsen, Traci
Nicolas, Barbara
Pelekanakis, Costas
Piscopo, Vincenzo
Potter, John
Potty, Gopu
Rekleitis, Ioannis
Ren, Peng
Ridolfi, Alessandro
Sæbø, Torstein
Socheleau, François-Xavier
Song, Yan
Sousa, João
Stojanovic, Milica
Takagi, Ken
Tang, Yufei
Tao, Jun
Thornton, Blair
Walree, Paul Van
Trucco, Andrea
Tsimenidis, Charalampos
Wang, Yu
Watson, John
Xu, Wen
Zhang, Fumin
Zhang, Peng
Zheng, Haiyong
Zheng, Y. Rosa
Zhou, Yifan

STUDENT BRANCH CHAPTER ADVISORS AND CHAIRS

University of Southern Mississippi
Advisor: Vacant
Chair: Azadeh Razavi Arab

Western Washington University
Advisor: John Lund
Chair: James Kintzele

University of Zagreb
Advisor: Nilola Miskovic
Chair: Igor Kvasic

University of Limerick
Advisor: Gerard Dooly
Chair: Matheus Santos

University of Haifa
Advisor: Itzik Klein
Chair: Nadav Cohen

University of Florence
Advisor: Alessandro Ridolfi
Chair: Alessandro Bucci

National Agronomic Institute of Tunisia
Advisor: Vacant
Chair: Chatti Nour

National Engineering School of Sfax (ENIS)
Advisor: Habib Kammoun
Chair: Abir Abid

Strathclyde University
Advisor: Andrea Coraddu
Chair: Katarzyna Patryniak

Federal Fluminense University
Advisor: Andre L. Belem
Chair: Silvana Cristina Paz do Couto

Pontificia Universidad Catolica de Chile
Advisor: Giancarlo Troni
Chair: Javiera Fuentes

Escuela Tecnologica Inst Tecnico Central
Advisor: Jose Lugo
Chair: David Alejandro Bermudez Rojas

Escuela Superior Politecnica Del Litoral
Advisor: Vacant
Chair: Vacant

Universidad Peruana de Ciencias Aplicadas
Advisor: Nikolai Vinces
Chair: Dana Alessa Rojas Vasquez

Shanghai Jiao Tong University
Advisor: Zheng Zeng
Chair: Yufei Jin

Southwest Petroleum University
Advisor: Suleman Mazhar
Chair: Qingyuan Pu

Zhejiang Ocean University
Advisor: Lu Cao
Chair: Ying Xiong

Chinmaya Vishwa Vidyappth
Advisor: Anupama Jims
Chair: Mohith M

Indian Institute of Technology-Delhi
Advisor: Monika Aggarwal
Chair: Puja Dube

Indian Institute of Technology -Chennai
Advisor: M. A. Atmanand
Chair: Sridhar Krishnamoorthy

KMEA Engineering College-Aluva
Advisor: Sunil Paul
Chair: Anfal Hisham Thangal P

Panimalar Institute of Technology -Chennai
Advisor: Arun M
Chair: Vacant

Zakir Hussain College of Engineering & Technology
Advisor:Saleem Anwar Khan
Chair: Mohammad Haadi Akhter

Sri Sai Ram Engineering College
Advisor: Sivaramakrishnan S
Chair: Vijay Agritha

Welcome to
OCEANS 2026 Sanya

"To the Sea, to the Deep"

IEEE Oceanic Engineering Society

May 25-28, 2026 Sanya China

The OCEANS 2026 Sanya conference is for global maritime professionals to learn, innovate and lead in the protection and utilization of the world's largest natural resource – our OCEANS.

VENUE:

Sanya Convention Center

IMPORTANT DATES:

- Abstract Submission opens: October 01, 2025
- Deadline for Abstract submission: December 22, 2025
- Call for Tutorials: October 01, 2025
- Tutorials Close: December 15, 2025
- Notification for Authors: February 15, 2026
- Final Paper Submission: March 22, 2026

Join us May 2026 in Sanya, China—where the world's leading experts in marine science, technology, and innovation will gather to explore the conference theme: ***"Deep-Sea Technology, Marine Energy, and Ocean AI."***

For further information please visit our website.

https://sanya26.oceansconference.org