OES BEACON

Newsletter of the Oceanic Engineering Society

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Welcome to
Global OCEANS 2021 San Diego – Porto
In-Person & Virtual: September 20–23, San Diego, 2021

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IEEE Oceanic Engineering Society

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

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Member Benefits—Did You Know?

Teaching Excellence Hub

IEEE Educational Activities and IEEE Education Society are proud to announce the launch of the Teaching Excellence Hub. This website serves as a resource that provides articles and links to events and resources for those teaching engineering, computer science, and technology at the university level. For more information visit the following: https://teaching.ieee.org/

From the OES BEACON Editors

Harumi Sugimatsu and Robert Wernli

Welcome to the June 2021 issue of the Beacon. Are you tired of meeting virtually as your Beacon editors are in the attached photo? We certainly are. So, are you ready to "Drop the Mask!?" Well, that's exactly what is being planned for the Global OCEANS 2021 San Diego—Porto conference, planned for the week of 20 September, as discussed in this issue's article on the event. Restrictions due to the pandemic are due to end in California about the time this issue is published. That's three months before the conference, so we should be running smoothly with meetings by September. Fingers crossed.

An emerging area of global interaction is our society's participation in the UN Decade of Ocean Science for Sustainability effort. This includes their involvement in the upcoming decade of OCEANS conferences, starting in San Diego, and a recent virtual summit addressing the Indian Ocean Blue Economy that is reported herein.

Once again, the success of our society in recruiting younger members and getting them actively involved in the society activities is well covered in reports on such activity from the University of Zagreb Student Branch Chapter and the Student Branch Chapter at the University of Strathclyde. The report from our VP for Professional Activities highlights these and other related ongoing efforts from Social Media to Membership Development.

Our student chapters are not alone in their activity. They are joined by reports from our Providence, Malaysia, Argentina, Japan and Canadian Atlantic chapters. Our chapters will be busy in the future as outlined in the report on upcoming events by the VP for Workshops and Symposia. Included are the results of the Underwater Technology 2021 (UT21) virtual symposium competition. Such events often include talks by our Distinguished Lecturers (DL), as reported herein. And, if you're interested in becoming a DL, see the article on our call for Distinguished Lecturer nominees for 2022–2025.

The remainder of our ExCom has also been quite active. The Journal EIC again provides recently released papers that are available to our members and our VP for Technical Activities provides the latest on our technical committee activities and chapters. This includes a report on the OES Polar Oceans Technical Committee. In addition, we have excellent articles from our Secretary, which includes a view of the future, and the latest breaking news from our OES President.

Included in this issue is the election information on the OES AdCom candidates. The election for our 2022–2024 AdCom members is underway until 29 June. Be sure and vote. We're also soliciting nominees for our OES awards, which has a closing date of 30 June. Vote, get involved, and you may be a future AdCom candidate or award winner. Submit your Member Activities for future issues of the Beacon. Maybe you'll get highlighted like our latest Who's Who in the IEEE OES.

Your Beacon editors "enjoying" a virtual meeting.

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.

From the President

Christopher Whitt, OES President

There is so much happening in your society in 2021! You'll find this issue of the Beacon full of new activities at both the society level and from our chapters around the world.

First, we are eagerly anticipating connecting with you again (both virtually and in person) at Global OCEANS 2021 San Diego—Porto in September[1]. There will be a full in-person program of activities to reconnect with colleagues in San Diego. In addition, there is a full virtual program so that you can present and attend even if you are not able to join us in person.

The next OCEANS in Chennai, India, is just around the corner in February 2022. Expect to hear more about future OCEANS conferences in the coming months.

OES is proud to be a partner with the UN Decade of Ocean Science for Sustainable Development[2]. The Ocean Decade is a global movement to bring together scientists, engineers, policy makers and funders to achieve "the science we need for the ocean we want" over the decade 2021–30. We all know how important the ocean is to every aspect of life on earth; the Ocean Decade is a challenge for us all to both communicate that message to the rest of society, and to work together to enhance our ability to understand and sustainably manage all aspects of the ocean.

OES is participating in many Ocean Decade activities, including regional summits and workshops, early career ocean professionals' meetings, as well as highlighting the Ocean Decade at our own OCEANS conferences and other meetings. Contact me if you have ideas for how the Society can support the goals of the Ocean Decade.

Along the theme of more coordination among ocean science and technology communities, it is exciting to announce that we have partnered with the organizers of Ocean Sciences Meeting. This means that there will be several OES-organized technical sessions, and you will be able to access a member registration rate should you be able to join us in Honolulu in February of 2022(URL: https://www.aslo.org/osm2022/)

It is hard to believe we are already half-way through 2021. That means it is time to elect your representatives on the Administrative Committee of OES for 2022–24. The election is open until 29 June 2021. If you are a voting member you should have received your IEEE Oceanic Engineering Society ballot material electronically by email on or about 18 May 2021 from ieee-oevote@ieee.org.

Finally, in this issue of the Beacon, we sadly commemorate the passing of Dr. Ferial El-Hawary. Dr. El-Hawary was a passionate, long-serving volunteer with OES and IEEE. She will be dearly missed.

I hope you are staying safe as we continue to navigate the challenges of the pandemic. We look forward to connecting with you soon, as we keep working to bring together the ocean engineering, science, and technology communities.

[1]https://global21.oceansconference.org/
[2]https://www.oceandecade.org/

Breaking Oceans Conference News!!

The UN Endorses Global OCEANS 2021 San Diego—Porto

On 5 December 2017, the United Nations proclaimed a Decade of Ocean Science for Sustainable Development, to be held from 2021 to 2030. This Decade will provide a common framework to ensure that ocean science can fully support countries' actions to sustainably manage the Oceans and more particularly to achieve the 2030 Agenda for Sustainable Development. The OCEANS conferences cover this decade and will be supporting the Decade of Ocean Science by providing a continuing international forum. This support begins with the Global OCEANS 2021 San Diego—Porto conference, which has been endorsed by the UN. The San Diego conference plenaries will highlight the Decade of Ocean Science program.

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

VPTA Column

Venugopalan Pallayil, Vice President for Technical Activities, IEEE OES

The COVID-19 vaccination program is progressing in many countries. Nevertheless, the impact of pandemic is continuing unabated across the world. Possibility of organizing in-person technical events still appear to be remote. So, OES has to continue its technical activities and member engagement using online virtual platforms.

Following is a summary of technical activities under VPTA after the last report.

Technology Committees (TC)

TC Chair for Data Analytics, Integration and Modeling (DAIM), Dr. Gopu Potty, organized a talk on Introduction to machine learning in acoustics: theory and applications, by Dr. Michael Bianco, Assistant Project Scientist, Marine Physical Laboratory, University of California San Diego (UCSD), La Jolla, CA, USA. The talk was attended by about 50 people online and for those who missed this talk it is available for viewing at the IEEE OES YouTube Channel. Additional talks are being planned and the next related talk is expected to be sometime in June 2021. Please look out for the announcement through our social media handles.

I would like to encourage other TC Chairs also to organize similar talks and keep the community engaged in their respective fields. I anticipate online talks are to stay at least for another couple of years, if not longer.

Chapter Activities

OES now has 22 active Chapters and 9 student branch chapters (SBCs) worldwide. In addition, OES is either leading or is part of 16 joint chapters (JC) as per the information available from the IEEE OU Analytics website. The Chennai Chapter, which had been dissolved in 2019 by the IEEE India Council, has now been regrouped under the IEEE Madras Section and a new Chapter, namely OES Madras Chapter, has been formed. This is timely as Chennai is preparing to host OCEANS 2022. We are also happy to note that a new student branch chapter has been formed in Tunisia (Details may be obtained from VPPA).

I would like to request the Chapter Chairs to consider organizing their technical activities online through virtual talks and workshops. They may explore with TC Chairs and DLs on the possibility of them contributing to these events. Note that your chapter coordinator is available for suggestions and support.

Distinguished Lecturers (DL)

The first DL for this year, as planned, was delivered by Dr. James Candy in collaboration with the University of New Orleans (UNO). The talk titled "Ocean Acoustic Signal Processing—a Bayesian Approach" was hosted on 3 March 2021 and was attended by over 100 participants across the globe. For those who missed this talk, you can still watch it on our OES YouTube Channel. Jim also provided additional materials for the attendees to familarise themselves with the topic and Matlab codes to practice the algorithms. We have these materials available for download on our website or they can be requested directly from Jim. There is a separate article in this edition of Beacon on the details of the talk.

The next (virtual) DL talk is scheduled for 25 May at 12PM UTC (8PM SGT) and will be delivered by Dr. Milica Stojanovic, Professor in Electrical and Communication Engineering, Northeastern University, Boston, USA. The details of the talk, including the web link, have been shared over emails and through IEEE OES social media outlets. The talk is being organized by the Singapore OES Chapter under its chapter activities. Details on the talk will be provided in the September issue of the Beacon.

A call for nominations for DLs for a new term of 4 years commencing from Jan 2022 had been announced in the last edition of Beacon and is also published in this newsletter. We have received one interest so far. Once the relevant call deadline is closed, the DL Committee will evaluate the submissions and the names of selected candidates will be put up for approval by the AdCom. The nominations close on 31 July 2021.

Other VPTA Activities

Dr. Atmanand, the OES coordinator for UN Decade of Oceans activities, organized a webinar on 'Indian Ocean Blue Economy Summit' on 6 May 2021. He has covered the details of this summit in a separate article in this issue. The IEEE OES President was one of the panelists in the webinar and I had the opportunity to chair one of the sessions. The webinar was well organized and attended globally. Another technical activity was related to the participation of OES in the forthcoming Ocean Science Meeting (OSM22), scheduled for 27 Feb–4 Mar 2022. A committee consisting of Dr. Jay Pearlman, as the OES Technical Program Committee Chair, and with Dr. Mal Heron, VPWS and VPTA as members has been formed to discuss and decide on the technical sessions to be organized during this conference under the OES umbrella. Thanks to the proposals made by some of the TC Chairs and ExCom/AdCom members. VPWS has covered the details of OSM 22 conference and the level of involvement of OES under his report. VPWS will also cover various OES co-sponsored symposia and workshops planned for this year and beyond.

Reminder: Call for OES Distinguished Lecturers—Jan 2022 to Dec 2025 Nominations Close on July 31, 2021

Venugopalan Pallayil, Vice President for Technical Activities, IEEE OES

The IEEE Oceanic Engineering Society (OES) invites nominations for OES Distinguished Lecturers. The IEEE OES Distinguished Lecturers Program provides high quality speakers to the Oceanic Engineering Community, especially, OES Chapters, Student Branch Chapters, and Student Clubs. Appointment as an OES Distinguished Lecturer is a major Society recognition. The selected Distinguished Lecturers will be approved by the OES AdCom in one of their follow-up meetings.

Requirements

Distinguished Lecturers will have

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

The DL nominee must be nominated by an OES member who does not have conflict with the selection process. Self-nominations are not accepted. If you are looking for a nominator we encourage you to contact the chair of the most relevant OES Technology Committee. A nomination email to the Vice-President for Technical Activities should include a brief CV (1 page) of the nominee, contact details for the nominee, the nominator and endorsement by the relevant Technology Committee Chair. Please send your emails to vp-technical-activities@ieeeoes.org.

The Distinguished Lecturer Committee will consider nominations, taking into account the diversity of topics and geographic spread of the pool of Distinguished Lecturers, in addition to the criteria given above.

Duties

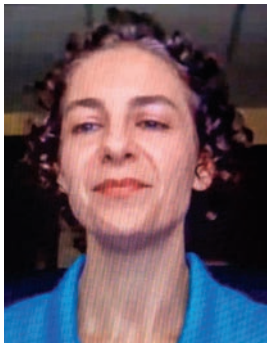
The Distinguished Lecturers will start their four-year term in January 2022. Each Lecturer should submit topics in his/her field of expertise that will be posted on the Society Website. The Distinguished Lectures should be readily available to travel within their geographical area upon contact by the Chapters or appropriate organizations and are expected to add small diversions to their international travels to present lectures as opportunities arise. Reasonable travel expenses will be paid by the Distinguished Lecturer Program based on the availability of funds. The DLs are encouraged to use the virtual online platforms for delivering their lectures, if a travel is deemed not possible for any reasons.

Closing Date

Nominations for a four-year term Jan 2022–Dec 2025 close on **31 July 2021.**

After a Tough Year, We're Ready for More Connection

Brandy Armstrong, VP of Professional Activities, vp-professional-activities@ieeeoes.org



2021 is moving fast, can you believe it's almost summer? While vaccinations role out and in person meetings are still at a minimum, we'll continue to take advantage of all the new and innovative ways we can engage our members virtually.

Social Media Initiative

Are you curious how your chapter or student branch chapter can earn some Social Media Initiative Support in 2021? Our social media initiative is in its third and final year and there are plenty of ways to get involved. This year's initiative, which combines the skill and creativity of social media coordinator Manu Ignatius and YP Boost Awardee Rajat Mishra, is focused on opportunities to collaborate with members to create video and audio content, including testimonials and podcasts, which will reach a larger audience. Apply by submitting your plan to vp-professional-activities@ieeeoes.org .

Have you subscribed to our IEEE Oceanic Engineering Society (OES) YouTube channel? The Young Professionals

(YP) and Women in Engineering (WIE) Panels from Global OCEANS 2020 are now available to watch at your leisure. You can also watch lectures by Dr. James V. Candy (Ocean Acoustic Signal Processing—A Bayesian Approach) and Dr. Michael Bianco (Introduction to machine learning in acoustics: theory and applications). Be sure to share the "What is IEEE OES?" playlist with students and colleagues who are curious about why they should join us as members of IEEE OES. You can engage with us and share IEEE OES with your friends, students and colleagues on Facebook, Twitter, LinkedIn, Instagram and YouTube.

Membership Development Committee

What does every Executive Committee member have in common? We are all Senior Members of IEEE OES! Being a senior member not only recognizes your career achievements and makes you eligible for Society leadership, it enables you to help others gain that recognition. When our definition of success includes helping others to succeed, we all find success.

Student Activities Committee

We're looking forward to the next student poster competition at Global OCEANS 2021. Students, if you missed the abstract deadline for OCEANS 2021, don't despair. Just make sure you are ready to submit for OCEANS 2022 in Chennai, India.

Promotion Committee

Do you have a question or see something that needs to be updated on our website? Did you know that you can reach important OES leadership and volunteers, including the webmaster, with the form available at https://ieeeoes.org/contact-us/ ? Just use the drop down to select the recipient.

Stephanie Kemna is keeping our calendar up to date, so please be sure to check out our upcoming events. OES sponsored event organizers, be sure to keep Stephanie and our VP of Workshops and Symposia, Fausto Ferreira, updated on all the latest dates and deadlines.

The United Nations Decade of Ocean Science for Sustainable Development

Did you know that IEEE OES is an official part of the Ocean Decade community? Our Young Professionals are sharing the efforts of IEEE OES with the rest of the Ocean Decade community through a video presentation and virtual exhibit booth during the Virtual Early Career Ocean Professional Day on June 1, 2021, a 24-hour livestream event following the sun around the world. Hari Vishnu (YP Boost 2019-2021), Editor of Earthzine, is also seeking submissions for the UN Decade of Ocean Sciences theme. Now is the time to get involved and help shape the Ocean Decade.

Like what you're reading? After you read that interesting article in the Beacon, be sure to share the html version with your friends.

See You at OCEANS!

I have submitted my abstract and, if all goes to plan, I will be staffing the IEEE OES booth at Global OCEANS 2021 live in San Diego. If you can't make it live, don't worry, we've got you covered. There is also a virtual component! We are planning special panels for both Young Professionals and Women in Engineering with the Marine Technology Society as part of a program focused on Justice, Equity, Diversity, and Inclusion. We are also hoping to enable both virtual and live participation in this special program. I hope to see you there!

From the Vice President for Workshops & Symposia

Fausto Ferreira, Vice President for W&S

Since the last Beacon, a lot has been happening in my portfolio. While the COVID-19 pandemic still affects our workshops and symposia, plans are moving forward to hold all planned conferences either in hybrid, virtual or in-presence mode throughout 2021 and 2022.

Underwater Technology 2021

As I mentioned last time, we had already one fully virtual conference this year, the Underwater Technology 2021 (UT 21) Online—Video Competition. An article detailing this event can be found elsewhere in this newsletter. I would only like to highlight the attendance (over 100 participants from 13 countries) showing that the innovative format and the affordable registration fees were a winning combination.

China Ocean Acoustics (COA) 2021

China Ocean Acoustics is going forward as planned with a hybrid format expecting local attendees on-site and attendees unable to travel to participate online. By newsletter publication time, the paper deadline will be closed, but by having an online component (with a reduced registration fee), anyone can register to attend. The conference will take place between the 14th and 17th of July, 2021, in Harbin. Parallel events are being setup, including student and industry competitions and tutorials. For more about the conference, please refer to the website http://www.chinaoceanacoustics.cn/COA2021/

Antarctic and Southern Ocean Forum (ASOF) 2021

The Antarctic and Southern Ocean Forum (ASOF) 2021 will follow previous successful forums in this area and will be addressing polar technology challenges for the coming decade. ASOF 2021, organized by the OES Australia Chapter, and originally planned for Hobart, Tasmania, will now take place as a fully virtual event, which again stimulates anyone on the planet to attend and listen to the presentations of this exciting topic. ASOF 2021 is scheduled for the 4th–6th of August, 2021. More information is available on https://asof2020.ieee.org/

European Robotics League Emergency 2021—Virtual Only

The European Robotics League (ERL) Emergency 2021 competition, now coupled with the Robotics for Asset Maintenance and Inspection (RAMI) competition that was planned to take place in Italy in July 2021, has been moved to the virtual realm. Organizing a robotics competition online is not an easy task but can be interesting enough to attract researchers from the Artificial Intelligence (AI) domain. Indeed, RAMI 2021 will be a virtual competition based on object detection and classification tasks and will soon be announced on the website https://metricsproject.eu/inspection-maintenance/. Plans to hold both a virtual and a physical competition in 2022 are in place and will be detailed later.

Underwater Communications and Networking (UCOMMS) 2021

The 2021 Fifth Underwater Communications and Networking (UCOMMS) will also be online. While the conference has been postponed initially to 2021 with hopes of having an in-person event, due to the continued uncertainty and pandemic situation, a decision has been made to have the conference online. The provisional dates are the same, 31 August–2 September, but due to time zone differences, it will not be a three-full days meeting as usual. For updates, please follow this link http://ucomms.net/.

Breaking the Surface 2021

The 13th International Interdisciplinary Field Workshop of Maritime Robotics and Applications—Breaking the Surface (BTS) 2021 will take place from the 29th of September to the 3rd of October in Biograd na Moru, Croatia. The plan of the organizers is to hold it in-person, but the health and safety of participants will be the priority when making the final decision. The OES University of Zagreb Student Branch Chapter has been involved in the organization of this workshop since 2019, and several Technical Committee members of the Autonomous Marine Systems TC are part of the Program Committee. More on http://bts.fer.hr/

IEEE 9th International Conference on Underwater System Technology: Theory and Applications (USYS 2021)

USYS 2021 is currently being planned for the 6th to 8th of December in Melaka, Malaysia. More details will be made available in due course.

Symposium on Ocean Technology (SYMPOL) 2021

The International Symposium on Ocean Technology (SYMPOL) 2021 is currently planned to take place in Kochi, India, from the 9th to the 11th of December 2021. The call for papers is open until July 4th, and the meeting is being planned as a hybrid event as of now. The current COVID-19 situation in India is being monitored and is being considered when choosing

the final format of the event. Please consult the website for the call for papers and all updates. http://sympol.cusat.ac.in/

The Year Ahead

Looking towards 2022, exciting plans have been made. In particular, besides the RAMI 2022 competition, we have established a new partnership with the Ocean Sciences Meeting (OSM) 2022 and we are going ahead with concrete plans for our biennial AUV symposium.

Ocean Sciences Meeting 2022

In my past article, I mentioned the interest in exploring new partnerships and creating new conferences. The agreement established with the OSM 2022 organizers fits within this vision. OES is a co-sponsoring society of the OSM 2022 meeting after having signed an agreement with the three sponsoring societies: The Oceanographic Society (TOS), the American Geophysical Union (AGU) and the Association for the Science for Limnology and Oceanography (ASLO). This is a landmark agreement that connects OES to the flagship meeting in Ocean Sciences and widens considerably the reach of our society. I would like to mention that the negotiations for this agreement have been started by the previous ExCom in 2020 and that several OES leadership members have been fundamental to make this come to reality. This partnership allows OES to be included in the Technical Program Committee (Dr. Jay Pearlman is the OES representative). OES members will have reduced registration fees for the OSM event as well. Moreover, it allows OES to organize town halls and special panels at OSM'22 and to be promoted throughout the conference. Currently, a set of session proposals with OES as lead organizers is being prepared and coordinated by the OES working group created for this purpose. In July, sessions proposers will be notified and the call for abstracts will open. I encourage you to check the website and submit abstracts in July, search for the OES-affiliated approved sessions and make OES presence at OSM stronger! If you wish to get involved and plan a special workshop/panel please contact Dr. Jay Pearlman or myself. OSM'22 will take place in Honolulu (and online) from the 27th of February to the 4th of March 2022 and more info can be found on https://www.aslo.org/osm2022/.

2022 IEEE OES Autonomous Underwater Vehicles (AUV) Symposium

The IEEE OES Autonomous Underwater Vehicles (AUV) 2022 is currently planned to take place in Singapore from the 19th to the 21st of September 2022. Dr. Bharath Kalyan from the National University of Singapore, and IEEE Senior Member will be the General Chair. More news on this symposium will be available in future newsletters.

Other 2022 events are still under confirmation and will be announced soon. I would also like to highlight that our Chapters, Student Branch Chapters and Technical Committees under VPTA have been very active in organizing both online meetings and generating new conferences and workshops. You can read more about several online workshops and lectures organized under VPTA in his column.

Finally, I would like to remind any OES members that wish to get involved in current workshops, or propose new ones, to contact me at vp-workshops-symposia@ieeeoes.org. We are here to serve the OES members and the larger community, and if you have ideas on improving current workshops, you are more than welcome to forward them to me!

From the OES Secretary

Marinna Martini, OES secretary

Let me open this piece by saying, we are human, and as humans we need personal contact with each other to be the most effective at working together. The pandemic has shown us, however, that the amount of in person contact necessary is likely less than we think. Now you may be thinking, this is the Secretary of the OES writing, what does that position have to do with travel? A lot, in the past. It was my job to plan, contract, execute the bookings for and attend the thrice yearly ExCom meetings and the biannual AdCom meetings. In addition to the minutes for same plus other duties. With AdCom meetings I had a lot of help from the OCEANS PCOs as the AdCom meetings were part of OCEANS. Travel to places I would not have been able to see was a great perk. It was also expensive for the Society. Travel to places on the other side of the planet takes time, and even if one's employer is supportive, that is time away from family and work priorities. Indeed, there were a number of OCEANS meetings I simply could not attend, as AdCom and one as Secretary.

Now in my second stint as Secretary, under pandemic conditions, I have to admit I am happy to leave most of the complications and paperwork of travel behind. It is a much easier job now. Once we are all using the features of Office 365 and Teams it will be easier still. Thankfully, because I have less time to accomplish the work with other new commitments in my life. As an introverted geek, I have had an easier pandemic than most, psychologically. I can get away with it though, because I have already met in person just about everyone I'm working with on ExCom and AdCom at least once, so voices, manners and even some cultural differences are familiar, and

they are familiar with my foibles. Perhaps it is better that they can't see me peering over my glasses at them from behind a laptop saying "Can you repeat that?" I hope to lose that advantage soon, though, as more new faces appear on AdCom, and hopefully in time, on ExCom. Yes, OES is changing. OES *needs* to change with a changing world. And travel must resume so that the new members of leadership can meet and get to know each other in person, over a beverage or meal, in and outside of meetings to have conversations in formal and informal settings. To get comfortable with one another across walks of life, professional specializations, age and nationalities.

So, the question becomes, how much travel is necessary? How much can we afford? As a committed environmentalist, I posit that it cannot be the level of travel we did as a Society before. As a practiced manager, I know that it cannot be nothing. We are humans. We will require personal contact for the best understanding of each other, and we are a global organization. Remote meetings open the door to more diversity. It is easier for underserved populations to have access to meetings and conferences. We may use this to our advantage to recruit more volunteers and get members more involved. It also makes it easier for Young Professionals to be involved in leadership, as they may not have a lot of vacation time to use for meetings, or flexibility in their jobs. In addition, students are restricted by the school calendar. Both are at points in their lives where finances can be tight. Yet both groups would benefit greatly from in person networking at meetings.

I do not know the answer to these questions. This is a debate for the membership and leadership of the Society, perhaps a very urgent debate. IEEE advances technology for humanity. OES endorses the UN Decade of Ocean Science (see Dr. Atmanand's article in this issue on the Indian Ocean Blue Economy Summit); one way we can put actions behind those words is to look carefully at air travel [1]. Then there is the question of the expense. OES has been very fortunate to have the funds in the past to pay for a lot of travel. We got used to it. We might even have started taking it for granted. We do not yet know how much of it will be restored as the world economy revives. Every dollar spent on travel for ExCom and AdCom is a dollar not spent on professional activities for members, chapter funding, student scholarships, diversity and inclusion, production of quality distinguished lectures. OES leadership has some difficult prioritization to do this year.

Reference

[1] https://www.nbcnews.com/science/environment/pandemic-show-us-can-cut-carbon-emissions-sort-rcna715

From the Journal Editor's Desk: IEEE Journal of Engineering Early Access Papers

Mandar Chitre, Journal Editor-in Chief

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

- "Modeling of a Marine Hydrokinetic Cycloturbine Vehicle", M. Goldschmidt; J. Horn; M. Jonson; R. Medvitz.
- "Validation Experiment of a Single-View Image-Sequence Algorithm to Identify Scale and Sea-State Characteristics", Y.C. Lin; C.J. Earls.
- "Target Bearing Estimation for Ship-Borne HFSWR Using Doppler Effect and Very Small Antenna Array", T. Wen-Long; L. Gao-Peng; Z. Bin; X. Rongqing.
- "Predicting Acoustic Variability: Pragmatic Considerations for Selecting a Stochastic or Deterministic Approach", C.D.S. Tollefsen.
- "High-Frequency Radar Ocean Current Mapping at Rapid Scale With Autoregressive Modeling", B. Domps; D. Dumas; C.-A. Guérin; J. Marmain.
- "Pruned Distributed and Parallel Subarray Beamforming for 3-D Underwater Imaging With Fine-Grid Sparse Arrays", D. Zhao; P. Chen; Y. Hu; R. Liang; H. Wang; X. Guo.
- "Guidance and Control Based on Adaptive Sliding Mode Strategy for a USV Subject to Uncertainties", A. Gonzalez-Garcia; H. Castañeda.
- "Joint Message-Passing-Based Bidirectional Channel Estimation and Equalization With Superimposed Training for Underwater Acoustic Communications", G. Yang; Q. Guo; H. Ding; Q. Yan; D.D. Huang.
- "Real-Time Outlier Detection Applied to a Doppler Velocity Log Sensor Based on Hybrid Autoencoder and Recurrent Neural Network", N. Davari; A.P. Aguiar.
- "A CFAR Detection Approach for Identifying Gas Bubble Seeps With Multibeam Echo Sounders", T.C. Weber.
- "An Approach for Computing Parameters for a Lagrangian Nonlinear Maneuvering and Seakeeping Model of Submerged Vessel Motion", S. Jung; S. Brizzolara; C. Woolsey.
- "A Strategy for Sizing and Optimizing the Energy System on Long-Range AUVs", A. Chiche; G. Lindbergh; I. Stenius; C. Lagergren.
- "Angular MIMO for Underwater Wireless Optical Communications: Link Modeling and Tracking", A. S. Ghazy; S. Hranilovic; M.-A. Khalighi.

- "Autosub Long Range 6000: A Multiple-Month Endurance AUV for Deep-Ocean Monitoring and Survey", D. Roper; C. A. Harris; G. Salavasidis; M. Pebody; R. Templeton; T. Prampart; M. Kingsland; R. Morrison; M. Furlong; A.B. Phillips; S. McPhail.
- "Transdimensional Geoacoustic Inversion Using Prior Information on Range-Dependent Seabed Layering", J. Bonnel; S.E. Dosso; J.A. Goff; Y.-T. Lin; J.H. Miller; G.R. Potty; P.S. Wilson; D.P. Knobles.
- "Multibeam Echosounder With Orthogonal Waveforms: Feasibility and Potential Benefits", A. Blachet; A. Austeng; J. Aparicio; A.J. Hunter; R.E. Hansen.
- Corrections to "The Optimal Lift–Drag Ratio of Underwater Glider for Improving Sailing Efficiency", X. Tian; L. Zhang; H. Zhang; Y. Wang; Y. Liu; Y. Yang; L. Song.
- "Gridless Variational Direction-of-Arrival Estimation in Heteroscedastic Noise Environment", Q. Zhang; J. Zhu; Y. Gu; Z. Xu.
- "Multiobjective Risk-Aware Path Planning in Uncertain Transient Currents: An Ensemble-Based Stochastic Optimization Approach", S. Albarakati; R. M. Lima; T. Theußl; I. Hoteit; O. Knio.
- "A Two-Stage Underwater Enhancement Network Based on Structure Decomposition and Characteristics of Underwater Imaging", S. Wu; T. Luo; G. Jiang; M. Yu; H. Xu; Z. Zhu; Y. Song.
- "Passive Acoustic Glider for Seabed Characterization at the New England Mud Patch", Y.-M. Jiang; S. E. Dosso; J. Bonnel; P. S. Wilson; D. P. Knobles.
- "Performance Analysis of Underwater Acoustic Communications in Barrow Strait", K. Pelekanakis; S. Blouin; D. Green.

Obituary on Dr. Ferial El-Hawary, IEEE OES AdCom Member, IEEE Fellow and Life Member

Adapted by Your Editors from the Halifax Saltwire.com Obituary for Ferial

Ferial El-Hawary, age 78, of Halifax, passed away peacefully with family at her side on Thursday, May 6, 2021, at her home in Halifax, Nova Scotia, Canada. Born in Mansoura, Egypt, she was predeceased by her husband, Mohamed El-Hawary.

Dr. El-Hawary received her B.Eng from the University of Alexandria, Egypt, M.Sc in Electrical Engineering from the University of Alberta, Edmonton, Canada, and Ph.D. in Oceans Engineering from Memorial University of Newfoundland, Canada. Prior to her Ph.D. she spent two years (1971–1973) in Brazil along with her husband Mo in being part of the team for establishing a Higher Engineering Research Institute which is well-recognized as COPPE in Rio de Janeiro, Brazil. She was President and Co-founder of BH Engineering Systems Ltd. and a former Professor, Faculty of Engineering at Dalhousie University, Canada where she established and directed the Modeling & Signal Analysis Research Laboratory. Her sustained research was devoted to Control and Signal Processing for Ocean Engineering Applications with significant impact in the Marine Industry.

Published widely in IEEE Journals. She was the Editor-in-Chief of The Ocean Engineering Handbook CRC Press, 2nd Ed. 2004 and served as Associate Editor of the IEEE Oceanic Engineering Journal. As Co-founder of BH Engineering Systems Ltd she established professional development courses linking academic innovations to industrial needs. She had been heavily involved in Engineering both technically and administratively as a current member of the IEEE Oceanic Engineering Society Administrative Committee having served as Vice-President International, and Past Chairman of the Membership Development Committee. She was nominated to serve as

President of the Society. Ferial had been instrumental in establishing the Canadian Atlantic Chapters of Oceanic Engineering Society, and she was recognized for her leadership roles in establishing strong IEEE/OES European Chapter based in France as well as the IEEE/OES Chapter based in Trondeheim, Norway. Ferial was heavily involved in the organizing Committees of OCEANS'87, OCEANS'97 Conferences, and CCECE'2000 in Halifax, and OCEANS'94, OCEANS'98 in France. Dr. El-Hawary was also the current Chair of Eastern Canada Council of IEEE Canada, and a member of IEEE Committee on Women in Engineering. She was a recipient of IEEE Canada Wally Read Service Award for 2000, the IEEE

Third Millennium Medal 2000, the 1999 RAB Achievement Award, 1997 IEEE Oceanic Engineering Society Distinguished Service Award. She was a Fellow of IEEE, a Fellow of the Engineering Institute of Canada (EIC), and a Fellow of the Marine Technology Society (MTS). Ferial served as president of IEEE Canada in 2008 and 2009.

As a woman "ahead of her time" she has served as a role model and passionate advocate for Women in STEM (Science Technology, Engineering and Mathematics) initiatives around the world. Nanny Fifi, as she was known to her family, was a great lover of animals especially her cats, dancing, yoga, Zumba, swimming, and traveling around the world. She was a devoted wife, mother, grandmother, sister, and friend. She enjoyed spending as much time as possible with the love of her life (Grampy Mo) with whom she has shared so many amazing adventures in exotic locations all around the world. Their favorite place was their cottage at White Point Beach, Nova Scotia where they will lie together for eternity.

Following are some comments from OES members:

- Ferial (and her late husband Mo) profoundly influenced my IEEE activities, even before I was involved with OES. They mentored several generations of volunteers in the Canadian Atlantic Section, and IEEE Canada. They both had a passion for IEEE volunteering, and especially for students. Their impact will endure for many years to come—Christopher Whitt
- Ferial has been one of the most dedicated OES members, whether as a society officer or a presenter and participant at OES meetings and events. Always with a bright smile, as shown in this issue's "Blast" article, there were very few events and activities that she missed. She will surely be missed—Robert Wernli
- She was a bit of a character, but a very lovely person. We'll miss her—Tamaki Ura
- Ferial was a force to be heard and a continuing part of the OES leadership with participation in most of our discussions—Sandy Williams

Reminder: Request for Nominations for OES Awards 2021

Jerry Carroll, Chair of IEEE/OES Nominations and Appointments Committees

Each year at the beginning of January, the Oceanic Engineering Society is proposing a call for four Awards, with **a closing date of June 30th**. A reminder call for nominations is issued mid-March. The Awards Committee requests the nominator to provide the listing of qualifications of the nominee relevant to the award criteria, and up to 5 references, by filling the Awards Nomination on-line form (https://ieeeoes.org/menu/award-forms/oes-awards-nomination-form/).

The Awards descriptions are given below.

Request for Nominations for DTAA: The Distinguished Technical Achievement Award 2021

The Distinguished Technical Achievement Award is given to honor an outstanding technical contribution to oceanic engineering in either the fundamental or applied areas. The award recognizes either a single major invention or scientific contribution or a distinguished series of contributions over a long period of time.

Request for Nominations for DSA: The Distinguished Service Award 2021

The Distinguished Service Award is given to honor an individual IEEE OES member for outstanding contributions towards furthering the objectives of the Oceanic Engineering Society.

Company/Institution Award

The award will be presented to a corporation or institution that has significantly supported the activity and goals of OES through such areas as conference participation, patronage, technical innovation and technical or administrative participation.

Emeritus Award

The award will be presented to an OES member having been particularly important for the Society and who is no longer in any position of Society governance.

For more info, please visit the OES website as below: https://ieeeoes.org/menu/award-forms/

Chapter News

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

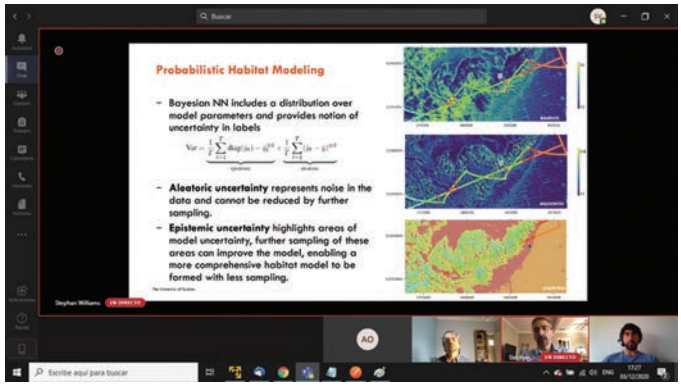
Argentina Chapter

OES Special Session on ARGENCON 2020

Reported by Gerardo Acosta, Argentina Chapter Chair

From the 1st to the 4th, the Argentina Section's biennial conference was held during the past December. In cooperation with its General Chair, Dr. Carlos Alejandro Pérez, and the Program Committee Chairs, Dra. María Daniela López De Luise and Dr. Ricardo Armentano, the IEEE OES Argentina Chapter members organized a special session with the presentation of some papers about related ocean technology topics and three excellent talks of our program of Distinguished Lecturers. With about 60 attendees on average for each of them, the first talk was a pleasant description of the insights gained from a decade of autonomous marine systems development at the University of Sydney's Australian Centre for Field Robotics, led by Stephan Williams. During this time, this team has developed and deployed numerous underwater vehicles and imaging platforms in support of applications in engineering science, marine ecology, archaeology, and geoscience. They have successfully collected millions of images of the seafloor around Australia and made these available to the scientific community through online data portals developed by the facility and affiliated groups. These observations are providing important insights into the dynamics of key ecological sites and their responses to oceanographic condition changes through time. They have also contributed to expeditions to document coral bleaching, cyclone recovery, submerged neolithic settlement sites, ancient shipwrecks, methane seeps, and deepwater hydrothermal vents.

The second talk was an amusing lecture given by John Potter about underwater acoustic communications. He explained how, in the last decades, technological advances in autonomous vehicle engineering, control theory, Global Positioning, battery chemistry, computational power, memory, advanced materials, additive manufacturing, and so many other fields have combined to enable the dream of sampling the ocean to gather as much information as possible. But to empower these new autonomous vehicles, they need to communicate, even more than that, they need to collaborate through an Internet of Underwater Things. This can only be achieved over significant distances by acoustic communications. Thus, this formerly highly specialized field, initially developed almost exclusively for military purposes, has now been catapulted into the forefront of necessary enabling technologies for the future. Underwater communications and networking is now a critical enabling technology for the future of maritime activities, just as WiFi and the internet has become an indispensable foundation for everything we do on land and in the air and space above. Maritime robotics is a game-changing disruptive technology wave that, like a tsunami, is drawing breath to swamp everything we thought we knew about how to operate in the largest and most important biosphere on our planet. And this tsunami is founded on underwater acoustic communication and networking.



Part of the amusing conference of Stefan Williams about marine environment exploration with autonomous robots.

The three talks given by our IEEE OES Distinguished Lecturers.

Part of the amusing conference of John Potter about underwater acoustic communications.

The third talk was a very interesting conference given by Hanumant Singh, about his enormous experience in marine and polar robotics. Using amazing examples from Marine Robotics, he described some of the roots of the current efforts of his team to use robots in areas with strong social relevance—Fisheries, Coral Reef Ecology, Oil Spills, and Marine Geology in the Arctic, and understanding the role of climate change in the Antarctic and how that is affecting the ecology of the Southern Ocean. He showed how these applications had motivated fundamental analysis in the areas of SLAM, Imaging, and Computer Vision and Autonomy. Finally, he gave us a look to the future to provide a vision of the challenges we will face in the coming decades.[1]

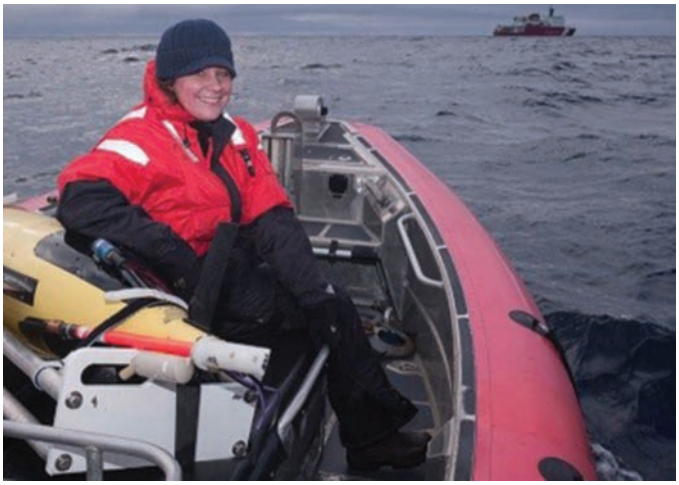
Ref.1: the summaries of the talks were extracted from the abstracts of them given by the lecturers.

Providence Chapter

Reported by David Leslie, OE22 Chapter Secretary

On March 11, 2021, Lora J. Van Uffelen, Ph.D., delivered a technical talk to the Providence Section, Ocean Engineering Chapter, titled "Global Positioning Systems: Over Land and Under Sea." Dr. Van Uffelen is an Assistant Professor in the Ocean Engineering Department at the University of Rhode Island, Narragansett, RI, USA, where she teaches undergraduate and graduate classes and directs the Ocean Platforms Experiments and Research in Acoustics Lab (OPERA). Her research focus is on long range acoustic propagation and she has extensive cruise experience. This was our chapter's 3rd online presentation made remotely via Zoom during the COVID-19 pandemic.

Global Navigation Satellite Systems (GNSS) provide reliable positioning for the land, air, and space domains using electromagnetic signals, but are not useful below the sea surface due to attenuation. Sound on the other hand can travel long distances underwater and can be used for positioning of underwater vehicles, sensors, and even animals. In her talk, Prof. Van Uffelen provided an overview of different methods for determining position underwater using acoustics and explored the challenges and potential for the implementation of a large-scale acoustic positioning system underwater. Many of the topics discussed were also described in her recent feature article in Acoustics Today (1).



Figuer 1. Prof. Lora Van Uffelen deploying Seagliders on an expedition in the Beaufort Sea conducted using the Coast Guard vessel Healey.

GNSS has a long history of development both in the USA (GPS) and internationally (GLONASS, BEIDOU, GALILEO). The GPS project itself started in 1973 with the NAVSTAR satellite being launched in 1978 and the full 24 satellite constellation becoming operational in 1995. Coverage has improved over the years. Prof. Van Uffelen highlighted the early contributions of Gladys Mae West and others who generated databases to make localization calculations. The GPS system grew out of military applications such as localization, tracking, navigation, mapping and timing. The system was designed with submarines in mind, but it only works at the sea surface. Oceanographic platforms, which use GPS, include Argo floats, buoys off Block Island, Seagliders with GPS antenna and the Liquid Robotics wave glider, among others.

In the absence of GPS, subsea systems have navigated using dead reckoning or MEMS-based inertial measurements. Doppler velocity logs can be used close to the bottom. Underwater acoustic positioning systems have operated using long, short and ultra-short baselines. Long baseline systems employing four transponders on the seafloor, for example, are effective at ranges up to a few kilometers. Short baseline systems may use transponders on different ends of a surface vessel. Ultra-short baseline, making use of small transponder arrays, may also be deployed on vessels. These systems use acoustical signals in the tens of kHz.

Long-range applications make use of sound propagation through the SOFAR channel where acoustical energy, trapped at depths near the sound speed minimum, does not interact with the bottom. This enables sound propagation to very long distances. Swallow floats are neutrally buoyant oceanographic floats equipped with acoustic pingers. While drifting at depths in the SOFAR channel theses devices have been tracked using near shore SOSUS hydrophone arrays at distances up to 1000 km. A variation on this technology, so-called RAFOS floats, reverses the process by putting receivers rather than sound sources on the floats. This allows for a smaller float. Such floats have been used to help map ocean circulation. Initially these systems used narrow band, low-frequency sound sources (500–600 Hz). More recently, the use of broadband sources (~50 Hz bandwidth in the 100–200 Hz range) has enabled higher resolution of arrival time and better estimation of both travel time and receiver location. Estimates of travel time over long path lengths can also be used to invert for average sound speed, or to map sound speed if many travel paths are available in tomographic experiments.

Prof. Van Uffelen illustrated these principles using results she obtained in the Ocean Acoustic Tomography Experiment in the Philippine Sea: 2010–2011. In that experiment six sources were used to broadcast broadband signals (center frequency= 250 Hz, 100 Hz bandwidth) to four Seagliders. The sources and receivers could all transmit to each other. When their positions were known it was possible to invert for sound speed and infer ocean temperature. The localization of underwater vehicles at long ranges is an active area of research. Scattering of acoustic signals due to internal waves makes peak matching and arrival

time estimation more difficult. Automatic peak matching is now being performed using machine learning techniques.

In the Canada Basin Acoustic Propagation/Glider Experiment, acoustic Seagliders were deployed in August/September of 2016 and 2017. The gliders circulated in the area, listening to 250 Hz sources at distances of up to 250 km. There is no deep SOFAR channel in the Arctic Ocean, but there is a so-called Beaufort duct near the surface, within which acoustic rays bounce back and forth. Near real-time range estimates were computed using WHOI Micromodems on the gliders. Acoustic arrival time matching (AAM) was performed using Parabolic Equation modelling. Results showed that position uncertainty could be reduced by a factor of 4-5 in postprocessing using AAM to match the acoustic peaks.

A Global Navigation Acoustic System is now being envisioned which could serve multiple purposes, including tomography, thermometry, geo-positioning, timekeeping, and passive acoustic monitoring. The technical requirements of such a system are challenging. Sound sources need to be powerful, yet environmental considerations may constrain the system as attention is given to its impact on marine life. Standards need to be developed and precision insured. Operational expense needs to be justified. Yet encouraging precedent exists in the success of the International Monitoring system for Nuclear Testing (IMS) for which extensive coverage of the world's oceans is obtained using a limited number of listening stations (2).

Prof. Van Uffelen left us with optimistic and hopeful final thoughts. GPS was designed to meet national defense, civil, commercial and scientific needs in air, sea and on land. It has only been 25 years since it became fully operational and it is now being aided by big data and AI. An underwater analogue would revolutionize ocean science, naval applications, and underwater vehicles. Underwater acoustics is a promising way to approach this on a large scale.

Ref.1: Van Uffelen, Lora J., "Global Positioning Systems: Over Land and Under Sea," Acoustics Today, Spring 2021, Vol. 17, Issue 1.

Ref.2: Howe BM, Miksis-Olds J,Rehm E, Sagen H, Worcester PF and Haralabus G (2019) Observing the Oceans Acoustically. Front. Mar. Sci. 6:426. doi: 10.3389/fmars.2019.00426

Japan Chapter

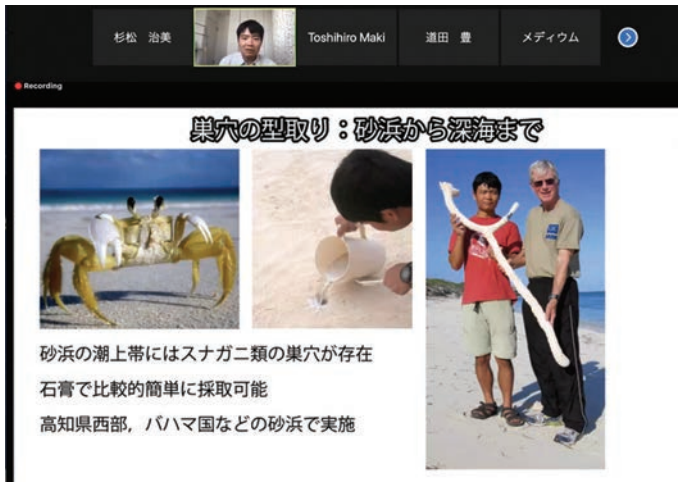
The 5th Underwater Technology Forum ·ZERO -Online

Reported by Harumi Sugimatsu, OES- J Vice Chair

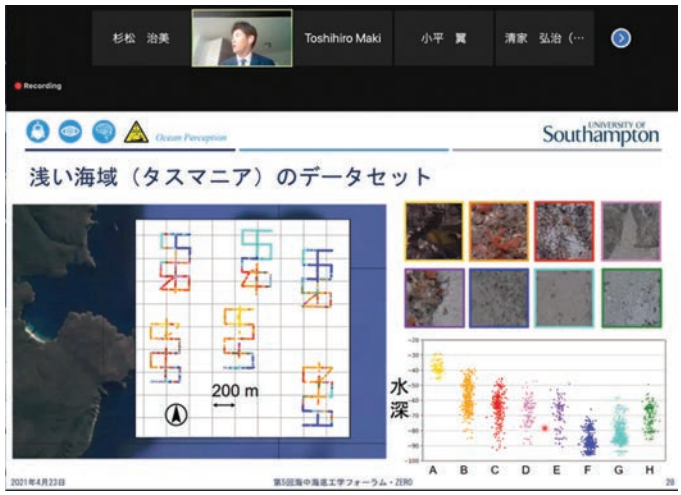
The 5th Underwater Technology Forum • ZERO was held online from 13:00 to 17:00 on 23rd April 2021, on the U-Tokyo Komaba Research Campus in Tokyo. As this is the third online forum since the one held on April 2020, we, organizers and participants, are getting familiar to the online meeting. Still, sometimes, technical issues such as the presentation slides getting stuck occur, however, it has become possible for people who live in a distance area can participate and give a lecture.

The topics of this forum are as follows;

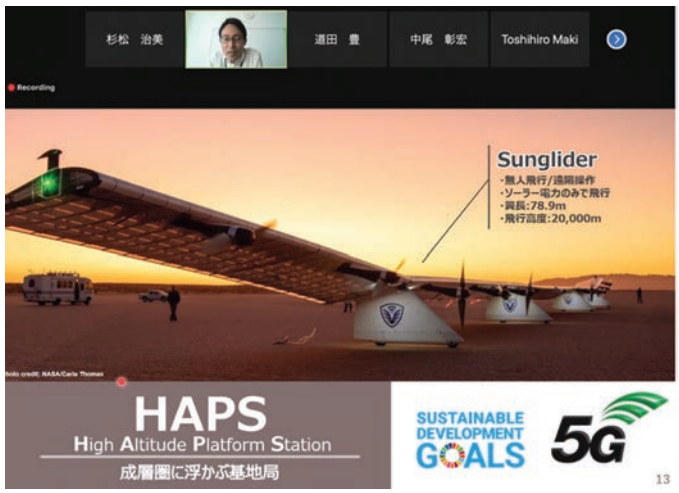
• Impact of benthic burrows on marine environment



From "Impact of benthic burrows on marine environment" by Koji Seike (Geological Survey of Japan, AIST).



From "Automatic classification of seafloor images by machine learning" by Takaki Yamada (University of Southampton).



From "Wide area deployment of 5G/6G realized by stratosphere platform "HAPS"" by Akinori Machida (SoftBank).

- Temperature rise and freezing delay mechanism in the Pacific Arctic Ocean
- Automatic classification of seafloor images by machine learning
- Development and operation of AUV by a private corporation –Introduction of Tuna Sand class hovering type new AUV "YOUZAN"
- Special Session on IoT for Ocean Observation
  - Application of advanced Information and Communication technology to the ocean
  - Wide area deployment of 5G/6G realized by stratosphere platform "HAPS" (unmanned solar aerial vehicle)
  - Development of high-speed underwater acoustic communication tool (>600 kbpsXkm) for deep sea exploration.

More than 280 people participated in the forum and enjoyed the discussions. The next forum will be held on October 8th. We are looking for the speakers from overseas (sorry for the time difference).

Malaysia Chapter

6th Annual General Meeting 2021

Reported by Mohd Shahrieel Mohd Aras & Zainah Md. Zain

The 6th IEEE OES Malaysia Chapter Annual General Meeting (AGM) was held on 30 January 2021 virtually via Google Meet. The 2020 chapter activities report was presented by the Chair, Dr. Khalid Isa. The chapter had conducted 15 administrative meetings, 22 educational activities, 7 technical activities, 1 membership drive, 1 proffesional activity, 1 social activity and 4 others. The AGM was then followed by the Treasurer's report, which was presented by Assoc. Prof. Ir. Dr. Zool Hilmi Ismail. Next, the election for 2021/2022 IEEE OES Malaysia Chapter Executive Committees was conducted. The standing committees for 2021/2022 can be seen in the table below.

2021/2022 IEEE OES Malaysia Chapter Executive Committee.	
Chair	Mohd Shahrieel Mohd Aras
Vice Chair	Zool Hilmi Ismail
Secretary	Zainah Md. Zain
Treasurer	Zulkifli Zainal Abidin
Excom	Ahmad Faisal Mohamad Ayob Ahmad Anas Yusof Nur Afande Ali Hussain
Auditor	Herdawatie Abdul Kadir Maziyah Mat Noh

1st Technical Talk 2021: Modelling of Underwater Remotely Operated Vehicle for Depth Control

Reported by Zainah Md. Zain & Mohd Shahrieel Mohd Aras

Mohd Shahrieel Mohd Aras is an Associate Professor at the Mechatronic Department, Faculty of Electrical Engineering, UTEM. He is also a Chair of the IEEE OES Malaysia Chapter 2021/2022. His main area of interest focuses on Underwater research (Remotely Operated Underwater Vehicle, Underwater Glider, Autonomous Underwater Vehicle, Underwater Crawler), Artificial Intelligence (Fuzzy logic, Neural Network) System Identification, Control system, and PSO. This technical talk discussed on the modelling of

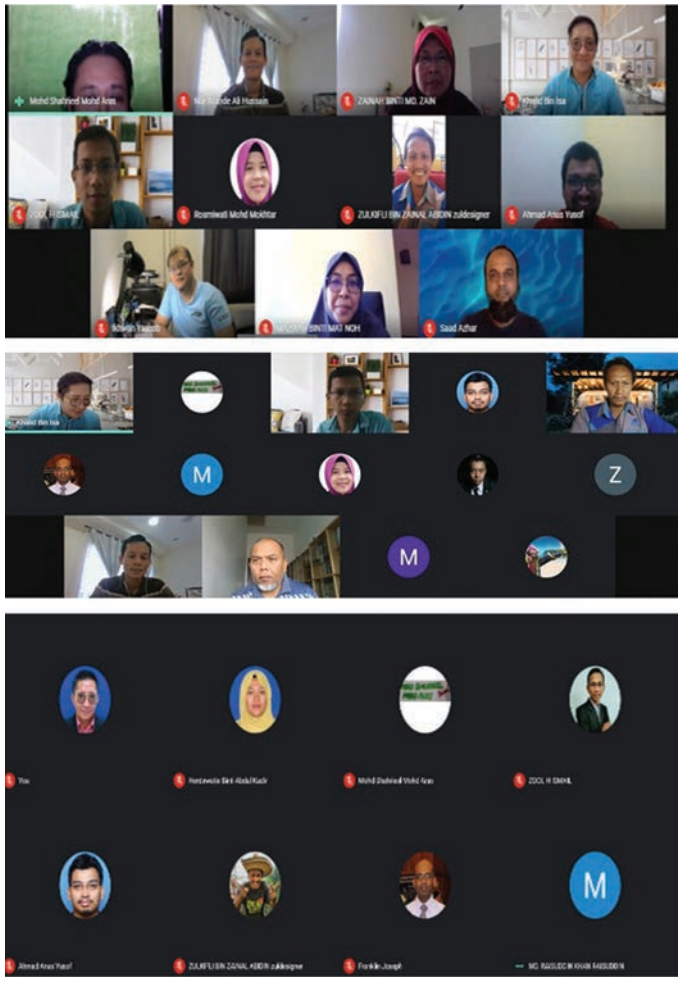


Photo taken after the 6th AGM.

Mohd Shahrieel Mohd Aras and his talk on 6 May, 2021.

underwater remotely operated vehicle for depth control, which included technical concepts and ideas that make it easier for others to contribute to OES projects. This talk was held on 6 May 2021, virtually in FB live at IEEE Oceanic Engineering Society—Malaysia Chapter as well as to promote the chapter.

Canadian Atlantic Chapter

Reported by Dr. Mae Seto, Chapter Chair

First, the Canadian Atlantic Section (CAS) wishes to acknowledge the recent passing of Dr. Ferial El-Hawary. Ferial was involved in founding the CAS OES Chapter and was deeply involved in many other activities in both OES and the Section for well over 30 years. She was an inspiration and mentor to many and will be deeply missed.

The Canadian Atlantic Chapter has held several events recently.

1) Joint OES Events Hosted by East and West Coast Chapters in Canada

In December 2020, the Canadian Atlantic Section (CAS) and Vancouver Section Oceanic Engineering Chapters decided to jointly host a series of presentations. Although these chapters are separated by four time zones, they successfully held the events with great attendance!

The first presentation was entitled "Multi-Domain Robot Collaboration Towards Situational Awareness on a Floating Target" (also jointly hosted by the CAS Robotics and Automation Society Chapter) by Dr. Mae Seto from Intelligent Systems Laboratory within Dalhousie University. This event provided an overview on a successful project between an east coast University and their industrial partner on the west coast, Cellula Robotics. This is a topic of particular interest to the Canadian Coast Guard and Department of National Defence (DND). It was attended by IEEE and non-IEEE members alike, from both the east and west coasts of Canada.

The second presentation was in February 2021 entitled "Can we really deploy thousands of lab-on-ship systems in marine environments" by Dr. Vincent Sieben from Dartmouth Ocean Technologies Inc. (Dartmouth, Nova Scotia). The presentation explored the emerging application of microfluidic devices to ocean sensing and its potential for measuring ocean-based environmental DNA and nutrients. The presentation was attended by a diverse group of engineering students, engineers from industry, chemists, defence contractors, and many more. For this event, once again, there were attendees from the east and west coasts of Canada.

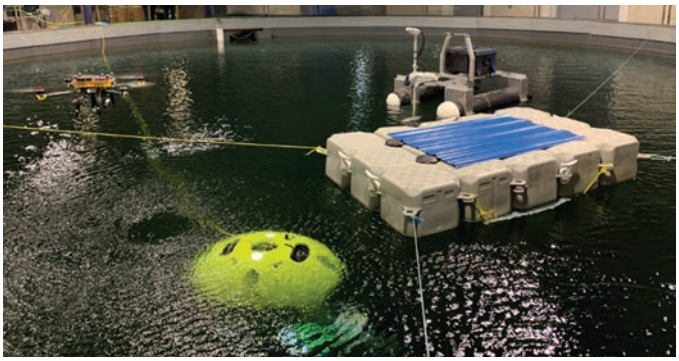


Figure 1. West coast – east cost of Canada project on collaboration of multi-domain marine robots for situational awareness (drone on the left, UUV in the foreground, USV in the background, and the barge (target) is in the mid-ground).

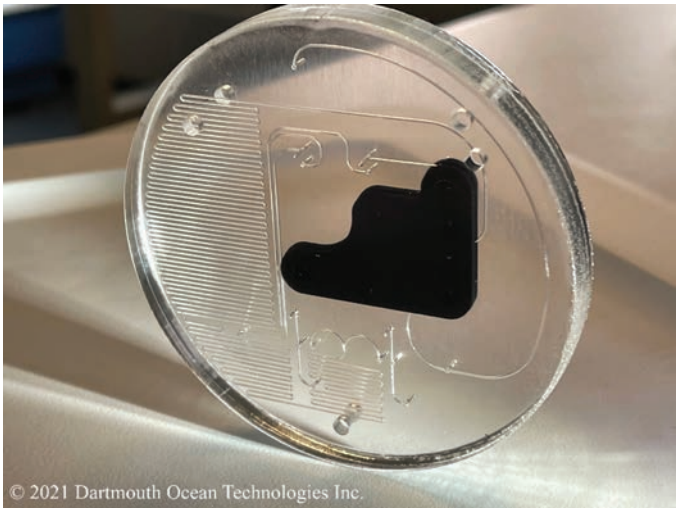


Figure 2. A lab-on-chip for performing chemistry on the high seas. The microchannels in the phosphate chip shown are based on a patent-pending inlaid optical channel technology, which interweaves black and clear materials for creating integral optical windows.

A third event in this series is in the planning stage.

2) On-line Career Fair for Undergraduate Engineers

On April 29, 2021, the CAS OES Chapter, Dalhousie University Student Branch and CAS Industry Relations Committee hosted an on-line job fair with three organizations (companies ranging from start-ups to multi-nationals) representing oceans/marine-based companies and a utilities company.

This event deliberately targeted undergraduate engineering students, both electrical and mechanical, who had just graduated, as well as those soon to graduate. This group has been especially impacted by the downturn in the economy due to the global pandemic. The main intent was to focus on the most junior engineers seeking opportunities.

Despite it being soon after the local universities' winter term exams, there was still a good attendance at the event. The on-line career fair agenda was kept simple and focussed on the students. Each organization was given 5 minutes to talk about their organization. Then, the organizations went into their assigned breakout rooms. Each breakout room had an IEEE CAS member to assist with moderating questions from the students as needed. The students freely circulated through the 4 breakout rooms throughout the remainder of the event.

The industrial partners expressed gratitude for the opportunity to speak with interested students. They have related that online fairs give them the opportunity to talk to the most interested students first before considering their applications further.

Due to the global pandemic, both events were hosted as Zoom meetings. While in-person events are preferred, the on-line format facilitated participation across different time zones and made it possible for Chapters from different Sections to work together.

The First IEEE OES Distinguished Lecture for This Year on 3 March 2021 Ocean Acoustic Signal Processing—A Bayesian Approach

James V. Candy, IEEE OES distinguished lecturer

The first IEEE OES distinguished lecture for this year was delivered by James V. Candy in collaboration with the Depart of Physics, University of New Orleans (UNO), on 3 March 2021. Title of the Talk: Ocean Acoustic Signal Processing—A Bayesian Approach. The lecture was given online, and is now available on YouTube: https://www.youtube.com/channel/UC6wjVnDY2-BmzdS8LzxrdHQ

Please view and enjoy this distinguished lecture.

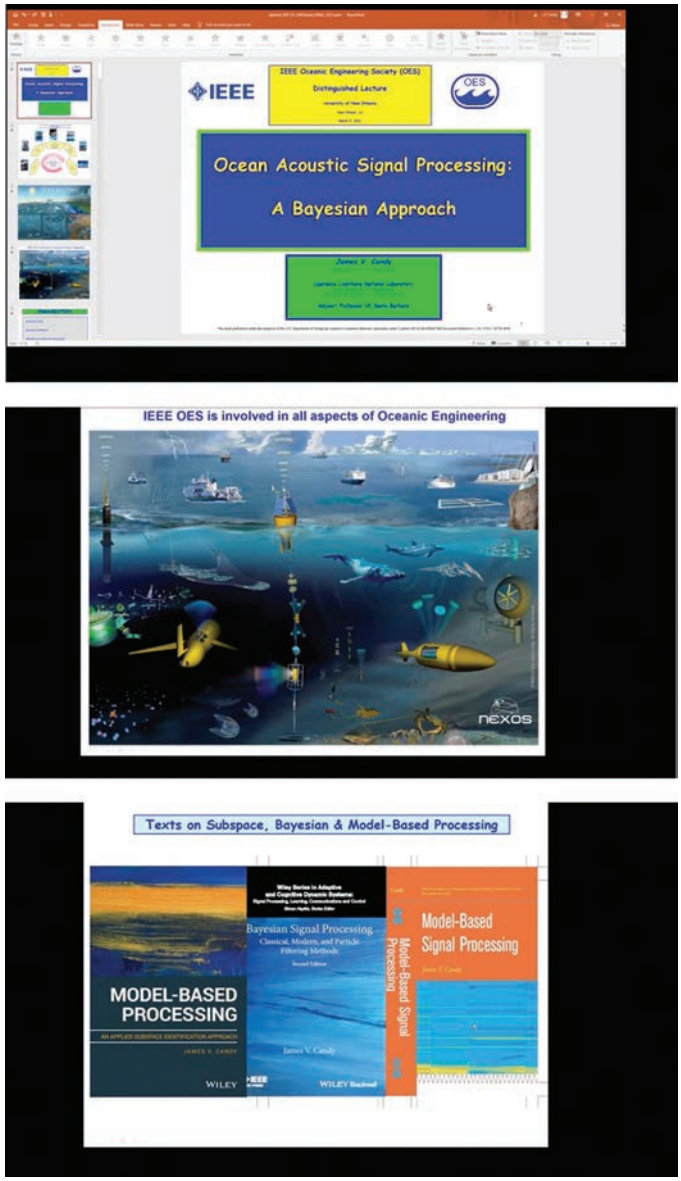
James V. Candy

James V. Candy is the Chief Scientist for Engineering, a Distinguished Member of the Technical Staff and founder/former Director of the Center for Advanced Signal & Image Sciences (CASIS) at the Lawrence Livermore National Laboratory. He is also an Adjunct Professor, Electrical & Computer Engineering Department, University of California, Santa Barbara.

He is a Fellow of both the IEEE and the Acoustical Society of America (ASA). A Distinguished Alumnus of the University of Cincinnati, Dr. Candy is a recipient of many awards such as the IEEE OES Distinguished Technical Achievement Award, and Interdisciplinary Helmholtz-Rayleigh Silver Medal in Signal Processing/Underwater Acoustics by the Acoustical Society of America. He has published over 225 journal articles, book chapters, and technical reports as well as written six texts in signal processing. He has presented a variety of short courses and tutorials sponsored by the IEEE and ASA in Applied Signal Processing, Spectral Estimation, Advanced Digital Signal Processing, Applied Model-Based Signal Processing, Applied Acoustical Signal Processing, Model-Based Ocean Acoustic Signal Processing and most recently Bayesian Signal Processing for IEEE Oceanic Engineering Society/ASA. His research interests include Bayesian learning, estimation, identification, spatial estimation, signal and image processing, array signal processing, nonlinear signal processing, tomography, sonar/radar processing and biomedical applications. For a full CV please visit this page: https://ieeeoes.org/technical-activities/distinguished-lecturers/

Abstract

The application of Bayesian methods to complex ocean acoustic processing problems, especially in shallow water, has evolved from well-known probability distributions like Gaussian leading to model- based, Kalman filtering solutions to nonparametric representations driven by the uncertain ocean environment leading to sequential Monte Carlo or equivalently particle filtering solutions. In this lecture, an overview of particle filtering methods coupled to a shallow ocean modal tracking application motivated by the nonlinear nature of underlying ocean acoustic phenomenology is presented. Beginning with a brief overview of Bayesian inference leading to sequential processors, the Bayesian paradigm is established. Simulation-based methods using sampling theory and sequential Monte



From the lecture on YouTube.

Carlo realizations are discussed. Here the usual limitations of nonlinear approximations and non-gaussian processes prevalent in classical algorithms (e.g. Kalman filters) are no longer a restriction to perform Bayesian processing. It is shown how the underlying state variables are easily assimilated into this sequential Bayesian construct. With this in mind, the idea of a particle filter, which is a discrete nonparametric representation of a probability distribution, is developed and shown how it can be implemented using sequential methods. Finally, an oceanic application of this approach is discussed comparing the performance of the particle filter designs with that of the classical unscented Kalman filter.

Report on Indian Ocean Blue Economy Summit—Webinar on Blue Economy in the Indian Ocean Region Towards United Nations Decade of Ocean Science for Sustainability (2021–2030)—held on May 6, 2021

Dr. M. A. Atmanand, Chair, IOCINDIO IOC, UNESCO & Senior IEEE Member

Oceans play a very significant role and that has a direct bearing on the human life with wide socio-economic implications. Due to increased anthropogenic activities and effect of climate change, there are many inherent challenges and issues being faced today such as marine pollution, global warming, ocean acidification, overfishing etc., that is leading to rapid decline in the health of oceans and its ecosystems. Keeping this in view, the UN Decade of Ocean Science for Sustainability (2021–2030) recognizes the importance of sustainable development in order to improve the overall ocean health and also create awareness for the sustainable development of oceans, seas, and the coast.

Keeping this in view, the 'Indian Ocean Blue Economy Summit'—a live webinar on Blue Economy in the Indian Ocean region towards United Nations Decade of Ocean Science for Sustainability (2021 2030) was held on May 6, 2021 (Thursday) from 08:30 AM–12:30 PM UTC. This event was jointly organized by the IOC Regional Committee for the Central Indian Ocean (IOCINDIO), IEEE Oceanic Engineering Society, Marine Technology Society (MTS), Ocean Society of India (OSI), Kuwait Institute for Scientific Research (KISR), Kuwait, Ministry of foreign Affairs, Bangladesh, South Asia Cooperative Environment Programme (SACEP), Department of Oceanography, University of Chittagong, Bangladesh, Indian Institute of Technology, Madras, India, Basrah Marine Science Centre, Iraq, Iranian National Institute for Oceanography and Atmospheric Science, Iran, Ministry of Municipality and Environment, State of Qatar, National Institute of Oceanography, Pakistan, University of Portsmouth, UK and King Abdullah University of Science and Technology, Saudi Arabia.

This important event was chaired by Mr. Rear Admiral (Retd.) Khurshid Alam, Bangladesh, and co-chaired by Dr. M. A. Atmanand, Chair, IOCINDIO, India. The other distinguished members in the Organizing Committee were from Indian Ocean Rim countries.

At the Opening, Dr. M. A. Atmanand, Chair, IOCINDIO IOC, UNESCO & Senior IEEE Member, delivered the welcome address to all participants. He mentioned that the Indian Ocean region, owing to its complexity and amazing diversity with complementary strengths, is the place where regional and international cooperation is more needed to demonstrate the added value of the IOC of UNESCO. He indicated that the IOCINDIO, the regional body of IOC is precisely attempting to bring all the Indian Ocean rim States together so that the gap areas could be filled up effectively and all the countries in the region reap the benefits of Blue economy. He mentioned about the IEEE/MTS OCEANS 2022 International conference, which will be held at Chennai, India, in February 2022, and invited all to actively participate in the conference.

This was followed by Mr. Rear Admiral (Retd.) Khurshid Alam, Chairman, Organizing Committee. He briefed on the ambitious plan of Bangladesh in the area of Blue Economy like fishing, port, marine aquaculture, ship building, hydrocarbons, bio technology etc. He reiterated the importance of IOCINDIO and the need to revitalize it into a sub commission.

Thereafter, the opening address for this event was addressed by Dr. Ariel Troisi, Chair, IOC, UNESCO. He explained about the multiple stressors for the ocean and the need to bring in multiple stake holders like political leaders, policy makers, private sector, financial institutions, academia, researchers and local community. He gave the importance of the Indian Ocean region and the commencement of the UN Decade of Ocean Science for Sustainable development, from 1 January this year,

indicating that science included all areas like natural sciences, human sciences etc.

Dr. Vladimir Ryabinin, Secretary, IOC, UNESCO, said that oceans are the 7th economy of the world with output of 1.5 trillion dollars. Developing countries have high percentage of Ocean economy of their GDP. Also, ocean economy in developing countries is moving in a riskier direction due to stronger environmental degradation. Thus, developing countries need more science to have a sustainable ocean economy. Hence the UN Decade is necessary for all in the region.

Mr. Justin Ahanhanzo, Programme Officer, IOC, UNESCO, mentioned that study of the Indian Ocean was one of the ambitions of IOC during its formation in the 1960s. It was necessary to know scientifically the ocean, which was least known at that time.

The inaugural talk was delivered by Prof. Peter Haugen, Former Chair, IOC, Programme Director at Institute of Marine Research, Norway, and Professor at University of Bergen, Norway. This talk on 'Towards sustainable ocean economy and ecosystem-based ocean management in Norway' covered the vision for clean and rich oceans and coastal regions. Three oceanic areas viz; the North Sea, the Norwegian Sea, and the Barents Sea off Lofoten were chosen for integrated ocean management and marine spatial planning in Norway that involves countries and municipalities. Interesting examples on Salmon farming highlighting on the crucial role of environmental regulation and management were discussed. Importance of traffic light system in regulating the level of salmon lice induced mortality on wild salmonids at production areas with risk levels of mortality was demonstrated. The talk also highlighted on the role of ocean panel in climate based solutions, along with ocean based climate mitigation measures prone to have more benefits than trade-offs.

The Session-1 was chaired by Dr. Venugopalan, Senior Member, IEEE, National University of Singapore and Session-2 was chaired by Dr. M. Ravichandran, President Ocean Society of India and Director, National Centre for Polar and Ocean Research (NCPOR), India.

Martine Hippolyte (COI, Mauritius) and Dr. Marie-Alexandrine Sicre, Sorbonne Université, France, talked on 'Multifaceted blue economy actions in the Indian Ocean' covering aspects on two categories of projects under the upcoming presidency of France of the Commission de I'Ocean Indien (May 2021–April 2022) that had two components. The first component involved engagement with civil society and local communities having a total of 22 projects, and the second category has 11 projects based on research and innovation from various research institutions. Three themes were discussed covering aspects on protection of biodiversity and ecosystems, waste recycling and water treatment, and coastal resilience and risk prevention. Different countries involved for this study are Comoros, Madagascar, Mauritius, Seychelles, Kenya, Tanzania, Mozambique, and South Africa. Martine Hippolyte highlighted on the Indian Ocean Plastic Expedition with a mission to increase the living standard of human population emphasizing on the value of marine and coastal resources, promotion of socio-economic development conserving the environment. Primarily, the study focused on the problems with plastic pollution supporting behavioral development and commitment of stakeholders, in particular the companies involved.

Dr. Ali Bassal Mahmood, Iraq, presented the activities related to Blue Economy being pursued by Iraq in the Arabian Gulf – Indian Ocean region. This talk highlighted on the activities related to blue economy, sustaining marine resources, and managing the blue economy file. Importance of marine and river fishing and associated food processing industries involved in this activity have been discussed. The importance in sustaining marine resources such as preserving the safety of environment and ocean health of waters in the Gulf, rivers and marshes were also discussed. Finally, the talk also highlighted the potential to create enormous job opportunities and continuous food security aspects.

Dr. Arulananthan, Sri Lanka, delivered the talk on 'Potential contribution of the blue economy to Sri Lanka's growth' covering different aspects on the opportunities, challenges, initiatives, and the way forward. In terms of opportunities, the talk covered the role of small island developing state to large ocean state highlighting on the expansion of outer limit of the exclusive economic zone. Factors that contribute to economic activities, such as marine fisheries, aquaculture, extraction of minerals, oil & natural gas, desalination, renewable energy, eco-tourism, and shipping aspects, were also discussed. Challenges such as the impact of climate change and its effects on habitat and livelihood aspects were elaborated. Also, the major challenges involved with environmental drivers such as acidification, rising sea water temperature, circulation patterns, extreme weather events, sea level rise, coastal stability, and mixing were discussed. Finally, the talk also highlighted some of the recent initiatives such as: ocean observation network, fisheries policy, artificial reefs, ban on bottom trawling, marine protected areas, oil spill contingency plans, offshore sand mining regulations, commitment to adhere to regional/global conventions and agreements. Importance of technical, institutional, technological, and financial capacity building for innovative use of ocean resources for economic development and good governance of ocean health management were highlighted in this talk.

Dr. Yasser Abualnaja, KAUST, Kingdom of Saudi Arabia, delivered a talk on 'The Blue Economy: An Essential Pillar for Building a Development Model for the Kingdom of Saudi Arabia.' The role of Red Sea and Arabian Gulf in contributing to strategic, economic and social values to the Kingdom of Saudi Arabia and surrounding nations were covered in detail. Under Vision 2030, the Kingdom of Saudi Arabia has placed different plans to enhance the non-oil revenues by diversifying the economy. The Red Sea and Arabian Gulf resources can provide huge opportunities for increasing Saudi economic growth—especially the tourism and aquaculture sectors, and tackle unemployment rates, poverty and food security. Blue economy approach in Saudi Arabia is aimed to improve the overall human wellbeing, as well as significantly reduce environmental and ecological degradation. The talk covered a detailed elaboration and importance of six sectorial areas such as: Fisheries, Maritime transport, Climate Change, Marine tourism, Renewable energy, and Waste management. Challenges in climate change such as dust storms in Saudi Arabia has been discussed.

Dr. Saja Fakhraldeen, KISR, Kuwait presented a talk on 'Research Activities Related to the Blue Economy in Kuwait.' The talk highlighted on the measures required to mainstream Blue economy into future sustainable development goals. It includes various aspects such as: Development of access and benefit sharing rules for marine bio-prospecting, Investment in R&D, infrastructure, capacity, and use of marine and other renewable energy sources, investment in sustainable coastal and maritime tourism and infrastructure, reducing marine pollution from land-based sources, sustainable management and protection of marine and coastal ecosystems, mitigation efforts for ocean acidification, regulating fish harvesting, and restoration of fish stocks to safe levels. Different research activities carried at KISR, Kuwait were highlighted. Some of the environmental challenges on desalination technologies, keeping in view increased salinity in waters off Kuwait, attributed due to damming of upstream rivers and reduction in flow, were highlighted in this talk.

Dr. Samina Kidwai, National Institute of Oceanography, Government of Pakistan, made a presentation on the topic 'A step forward for Pakistan - Advancing Blue Growth through Cooperation and Innovation.' This talk highlighted on the Pakistan perspective of blue growth, and national focus on preparedness and international cooperation. The importance of blue economy, its multi-sectoral and long-term benefits have been discussed. The ocean energy and seabed mining sector and joint cruises in collaboration with the Geological Survey of China for gas hydrates in the Makran coast, along with natural hazard studies, were highlighted. Blue partnership by opening CPEC regional office for environmental protection has also been discussed.

In the 2nd session, Dr. G. A. Ramadass, NIOT, India, delivered a talk on 'Blue economy—Indian way.' The talk started with an introduction and Ocean policy for Blue Economy in India. The role of different working groups under the Indian Government has been discussed. Different components of Blue Economy, such as extraction of non-living resources, harvesting of living resources, and ocean commerce and estimated blue resource potential in India, were highlighted. Further, the talk also highlighted different energy sources from the ocean such as waves, ocean currents, thermal gradient, and offshore wind as well as concentrated research efforts on wave devices and hydro-kinetic approaches for extraction of tidal energy. Efforts made on desalination from oceans and its implementation in Lakshadweep Island were highlighted in the talk. Involvement of India in exploration and technology development for harvesting deep ocean minerals such as polymetallic nodules was also covered in the presentation. In addition, the different technologies available for mapping ocean resources were also discussed. Research activities on coastal areas, such as the shoreline protection and management, marine and coastal pollution, and coastal vulnerability, coastal monitoring and protection measures, were highlighted.

Dr. Pierre Failler, University of Portsmouth, U.K., made a presentation on the topic 'Blue Economy Strategies: African perspectives.' The presentation covered aspects on Blue Economy and key principles for development covering strategies for Africa and Intergovernmental Authority on Development (IGAD). Value added in Blue Economy sectors and the value of Blue Economy components covering aspects, such as ecosystem services, education, research, etc., from 2018 to 2063, were discussed. Study signifies that Blue Economy sectors and components for Africa generate today 49 million jobs. It is projected that by 2030, the figures rise to 57 million, while in 2063 the estimates would be 78 million. Importance of Circular Economy, Good Governance, Environmental and social sustainability, Empowerment and inclusive decision-making were presented. Finally, the challenges such as insufficient structuring of the implementation of Blue Economy, lack of knowledge of blue potential, nutritional deficit, absence of accounting for Blue Economy activities and components, and the absence of an integrated and prospective approach to marine ecosystems and spatio-temporal management tools and strategic axes of intervention were discussed in the talk.

Dr Hussain Almuscati, Oman, presented on the topic 'Fisheries sector in the Sultanate of Oman Blue Economy Review.' The presentation covered aspects on: Overview of the Fisheries sector in Oman, Fleet Structure 2020, Evolution of Fisheries Landings, Long Term Strategy 2020, objective of the 2040 Oman vision, Objectives and Policies of the Eighth Five-Year Plan, Fisheries Sector Actions to meet Blue Growth Objectives, and Investment opportunities. Also, the ongoing projects, such as small & large pelagic resources, modernizing fishing fleet aquaculture development, artificial reef farms, and promotion of coastal women, were discussed.

The topic on 'Marine aquaculture in Iran' was presented by Dr. Abtahi, INIOAS, Iran. He stressed on the importance in reducing the pressure from fishing on living resources of the sea, and in turn reducing the impact of fish farming on limited freshwater resources in water-stressed countries like Iran. The presentation covered major cage culture producing countries and cage aquaculture production based on fish family around the world. Dr. Abtahi also discussed the various possibilities and advantages such as native species cultivated in all coastal waters for the southern and northern portions of Iran, environmental conditions and suitable ecological facilities available in the territorial waters, possibility of modern marine fish breeding system in cages, suitable sheltered areas in Persian Gulf for setting up marine fish farms in cages, increased production of marine farmed fishes to reduce the fishing pressure, and investment opportunities for the private sector.

Dr. P. Vethamony, UNESCO Chair, Qatar, presented on 'Management and protection of marine resources within the EEZ of Qatar.' A brief overview on the Arabian Gulf and Qatar EEZ was discussed, highlighting on the Blue Economy resources in the EEZ of Qatar. It involves sectors such as Oil and gas, seafood products, desalinated water, mangrove forests, intertidal mudflats, seagrass meadows, coral reefs, aquaculture, sea turtles, dugongs, and eco-tourism. The status of desalination, mangrove swamps within the EEZ, seagrass beds, distribution of coral reefs and associated ecosystems in Qatar was presented. Interesting points were made on the mushroom forest artificial reef, a new patented design made at ESC, Qatar University. Discussions were made on the impact of fisheries when sea turtles disappear. The importance of dugongs (sea cows), eco-tourism, land

reclamation for Pearl, Airport and Seaport in Qatar waters were highlighted. Aspects on seasonal hypoxia events and marine debris and associated biota, microplastics and tarmat distribution for Qatar waters were covered in the presentation.

The concluding session had a panel discussion moderated by Dr. M. A. Atmanand, Chair, IOCINDIO. The panel-list participants were Mr. Rear Admiral (retd.) Khurshid Alam, Bangladesh, Chairman, Organising Committee, Dr. SSC Shenoi, Vice Chair, IOC, Mr. Christopher Whitt, President, IEEE Oceanic Engineering Society, and Dr. Pierre Failler, University of Portsmouth, U.K. The Question that was asked to the panel-list participants was the following: '**Indian Ocean is least studied and its coasts are prone to many natural hazards. The Indian Ocean rim countries have lot of untapped resources as far as Blue economy is concerned. Where do you see the Indian Ocean region after the conclusion of the UN decade of Ocean science for sustainability taken up by IOC in 2030?**'

The panelists from varied backgrounds gave their inputs. The final outcome and recommendations from this webinar based on discussions are: (i) cooperation and collaboration is the key to success, (ii) mariculture is the best option to meet fisheries demand, (iii) special focus is required on natural hazards in the Indian Ocean region, (iv) studies on pollution, micro-pollution, ship related pollution needs to be emphasized by researchers from IOC, (v) it is envisaged that the next generation should see more productive ocean health. It is also recommended to tap Blue Economy, keeping in view to increase the economy of people. More attention is required on climate change aspects. Also, the Indian Ocean is warming at a higher rate. Its relation to natural hazards like tropical cyclones, frequency, and duration etc., needs a thorough understanding in relation to ocean warming. Another aspect is sea level rise implications on climate change. Impacts on fisheries sector for sustainable developed needs to be focused. In line with the International Indian Ocean Expedition (IIOE-2), aspects of climate change affecting Indian Ocean region is required with collaborative efforts of IOC, SCOR, IOGOOS. It is important to transfer research to applications for sustainable development and governance for societal benefit.

Overall, the Blue Economy Summit was a successful event. The contents of lecture from distinguished experts was quite intense and provided valuable insight on various activities in the Indian Ocean rim countries. There was an overwhelming response from the large number of participants with about 125 participants in WebEx and more than 400 views in the YouTube as of now. Youtube link is available for viewing: https://www.youtube.com/watch?v=gzEARMitNzk.

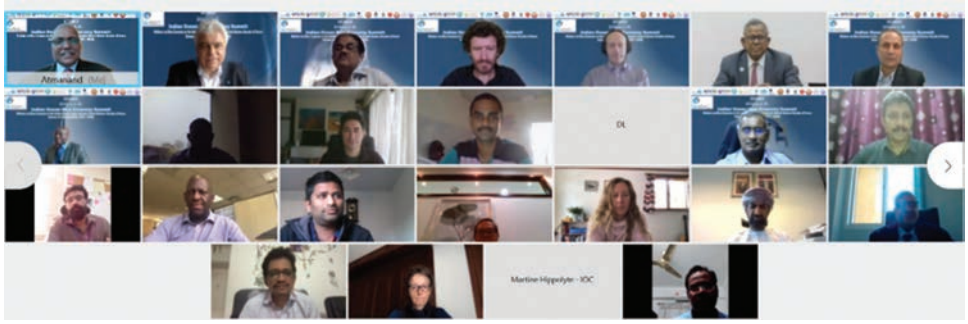


Photo of a section of participants.

Flyer

IOCINDIO

Indian Ocean Blue Economy Summit

Webinar on Blue Economy in the Indian Ocean region towards UN Decade of Ocean Science for Sustainability (2021-2030): 6th May 2021; UTC 8:30 AM

Organiser : The IOC Regional Committee for the Central Indian Ocean (IOCINDIO)

Co-organisers : IEEE Oceanic Engineering Society, Marine Technology Society (MTS), Ocean Society of India (OSI), Kuwait Institute for Scientific Research (KISR), Kuwait, Ministry of foreign Affairs, Bangladesh, South Asia Cooperative Environment Programme (SACEP), Department of Oceanography, University of Chittagong, Bangladesh, Indian Institute of Technology, Madras, India, Basrah Marine Science Centre, Iraq, Iranian National Institute for Oceanography and Atmospheric Science, Iran, Ministry of Municipality and Environment, State of Qatar, National Institute of Oceanography, Pakistan, University of Portsmouth, UK and King Abdullah University of Science and Technology, Saudi Arabia.

Organising Committee for Webinar on Blue economy in the Indian Ocean region towards UN Decade of Ocean Science for Sustainability (2021-2030)

6th May 2021; UTC 8:30 AM

Chair : Mr. Rear Admiral (Retd.) Khurshid Alam, *Bangladesh;*

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Co-Chair : Dr, M. A. Atmanand, Chair IOCINDIO, India;

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Dr. Yasser Abualnaja, KAUST, Saudi Arabia,

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Program Schedule

Opening Session: 2 PM IST to 2: 45 PM IST (UTC: 8:30 AM to 9:15 AM)

Welcome address:	**Dr. M. A. Atmanand**, Chair, IOCINDIO, Visiting Professor, IIT, Senior Member, IEEE (3 min.)
Address:	**Mr. Rear Admiral (Retd.) Khurshid Alam**, Chairman, Organising Committee (5 min.)
Opening address:	**Dr. Ariel Troisi**, Chair, IOC, UNESCO (5 min.)
Address:	**Dr. Vladimir Ryabinin**, Secretary, IOC, UNESCO (5 min.)
Address:	**Mr. Justin Ahanhanzo**, Programme Officer, IOC, UNESCO (5 min.)

Inaugural talk (15 minutes): Towards sustainable ocean economy and ecosystem based ocean management in Norway, **Prof. Peter Haugan**, Former Chair, IOC, Programme Director at Institute of Marine Research, Norway and Professor at University of Bergen, Norway

Sessions – each talk for 10 minutes followed by 2 minutes interaction; 2:45 PM IST (UTC: 9:15 AM) to 5.45 PM IST (UTC: 12:15 PM)

Session 1

Chair: Dr. Venugopalan, Senior Member, IEEE, National University of Singapore **(2:45 PM IST (UTC: 9:15 AM) to 4:00 PM IST (UTC 10:30 AM)**

1) *Multifaceted blue economy actions in the Indian Ocean - **Dr. Marie-Alexandrine Sicre**, Sorbonne Université, France & **Martine Hippolyte** (COI, Mauritius)*
2) *The activities related to Blue economy being perused by Iraq in the Arabian Gulf - Indian Ocean region, **Dr. Ali Bassal Mahmood**, Iraq*
3) *Potential contribution of the blue economy to Sri Lanka's growth, **Dr. Arulanantham**, Sri Lanka*
4) *The Blue Economy: An Essential Pillar for Building a Development Model for the Kingdom of Saudi Arabia, **Dr. Yasser Abualnaja**, KAUST, Saudi Arabia*
5) *Research Activities Related to the Blue Economy in Kuwait : **Dr. Saja Fakhraldeen**, KISR, Kuwait*
6) *A step forward for Pakistan- Advancing Blue Growth through Cooperation and Innovation : **Dr. Samina Kidwai**, NIO, Pakistan*

Session 2

Chair: **Dr. M. Ravichandran**, President Ocean Society of India and Director, National Centre for Polar and Ocean Research (NCPOR), India **(4:00 PM IST (UTC: 10:30 AM) to 5:15 PM IST (UTC 11:45 AM)**

7) *Blue Economy in Bangladesh: National Initiatives and Public Awareness, **Dr. Mohammed Uddin**, University of Chittagong, Bangladesh*
8) *Blue economy - Indian way, **Dr. G. A. Ramadass**, NIOT, India*
9) *Blue Economy Development around the Indian Ocean : **Dr. Pierre Failler**, University of Portsmouth, UK*
10) *Fisheries sector in the Sultanate of Oman Blue Economy Review, **Dr Hussain Almuscati**, Oman*
11) *Marine aquaculture in Iran, **Dr. Abtahi**, INIOAS, Iran*
12) *Management and protection of marine resources within the EEZ of Qatar, **Dr. Vethamony**, UNESCO Chair, Qatar*

Concluding Session (5:15 PM IST (UTC 11:45 AM) to 5:45 PM IST (UTC 12:15 PM)

Discussion on outcomes of the webinar and future activities

Moderator: **Dr. M. A. Atmanand**, Chair, IOCINDIO

Participants: Mr. Rear Admiral (retd.) Khurshid Alam, Bangladesh, Chairman, Organising Committee, Dr. SSC Shenoi, Vice Chair, IOC, Mr. Christopher Whitt, President, IEEE Oceanic Engineering Society, Dr. Pierre Failler, University of Portsmouth, UK.

Polar Oceans Technical Committee Report

Andreas Marouchos, Chair Polar Oceans Technical Committee

Focus Back on Polar Research and Technology

The Polar Oceans Technology Committee (POTC) supports the work addressing challenges in science and technology in the Arctic and Antarctic, through relevant streams in conferences and the hosting of workshops and symposia. In particular, we strive to build communities of engineers and technicians across both polar regions in working together to address our common challenges. In the coming year we'll be looking to identify new opportunities to further strengthen the community and bring together those of us working on challenging polar technology problems. More info on the POTC can be found on our website: http://polaroceans.org/

ASOF 2021 Workshop is Back!

Last year the Antarctic and Southern Ocean Forum (ASOF) organizing committee decided to postpone the event to 2021 due to the COVID-19 pandemic. We are very happy to announce that the event is now back on! This year's event will be virtual and is scheduled to take place during August 4–6th, 2021. In another change this year we are making participation in the workshop free to all. With the start of the UN Decade of Ocean Science (en.unesco.org/ocean-decade), the theme of this year's workshop is *"Addressing Polar technology challenges for the coming decade."* There are a broad range of technical areas of interest under this theme and chances are, if you're working on polar technology, you will find a category relevant to your work. In addition, we are encouraging participation from both Arctic and Antarctic researchers. With the focus on engineering and technology, sharing presenters will be asked to submit an abstract for review and prepare a presentation of 20 min. A written paper submission is optional for this workshop. Submission of abstracts is now open, so please get your abstracts submitted as soon as possible since we have limited presentation slots. More details on the workshop can be found at asof2020.ieee.org, and page 26 of this issue.

Sponsoring Societies: Oceanic Engineering Society, and GeoScience and Remote Sensing Society

Antarctic and Southern Ocean Forum (ASOF)

August 4th - 6th 2021

Hobart, Australia

A Virtual Forum for Engineering, Science and Technology

Topics relating to the Extreme Conditions include:
Autonomous Observing; Observation Technologies; Sustained measurements; Biology and Biomass; Data Science; Science challenges.
https://asof2020.ieee.org/

CALLS FOR ABSTRACTS OPEN NOW

OES Conference Calendar

Stephanie Kemna, OES Calendar Coordinator

OCEANS

Global OCEANS 2021 San Diego—Porto
In-Person & Virtual, September 20–23, 2021
Town & Country Resort, San Diego, CA, USA
https://global21.oceansconference.org

OCEANS 2022 Chennai
February 21–24, 2022
Chennai, India
https://chennai22.oceansconference.org

OCEANS 2022 Hampton Roads
October 17–21, 2022
Hampton Roads, Virginia

OTC

OTC 2021
Hybrid, August 16–19, 2021
Houston, TX, USA
http://2021.otcnet.org

OTC 2022
May 2–5, 2022
Houston, TX, USA
http://www.otcnet.org

OTC Asia 2022
March 22–25, 2022
Kuala Lumpur, Malaysia
https://2022.otcasia.org

OTC Brasil
October 25–27, 2022
Rio de Janeiro, Brasil

OES Sponsored

COA 2021
Hybrid (online/physical), July 14–17, 2021
Harbin, China
http://www.chinaoceanacoustics.cn/COA2021/

ASOF 2021
Virtual, August 4–6, 2021
Hobart, Australia
https://asof2020.ieee.org

UCOMMS 2021
Virtual, August 31–September 02, 2021
Lerici, Italy
https://www.ucomms.net/index.php

SYMPOL 2021
December 09–11, 2021
Kochi, India
http://sympol.cusat.ac.in/index.php

Ocean Sciences Meeting (OSM) 2022
February 27–March 4, 2022
Honolulu, HI, USA
https://www.aslo.org/osm2022/

Non OES

Please contact us if you have any information about “Non OES event that some OES members are involved in”.

Underwater Technology 2021 Online (UT21 Online)—Underwater Video Competition, Tokyo, Japan, 2 March, 2021

Katsunori Mizuno, Technical Program Committee Co-Chair of UT21 Online, Beacon Associate Editor

The IEEE OES International Symposium on Underwater Technology 2021 (UT21) was postponed till March 2023 due to COVID-19. However, the organizers decided that the research on underwater technology and international exchange among researchers, students, and professionals should be continued and encouraged, so an online event was organized during the original symposium dates. The Underwater Technology 2021 online (UT21 Online), organized by the IEEE/OES Japan Chapter, Institute of Industrial Science, the University of Tokyo, and Earthquake Research Institute, the University of Tokyo, was held on 2 March, 2021, with technical co-sponsor, the IEEE Oceanic Engineering Society (IEEE/OES). A special program was prepared for this event: two keynote talks and an Underwater Video Competition (URL: http://www.ut2021.org).

There were 101 registrations from 13 countries. Due to the time difference, the maximum number of on-site participants was 27, but the number of on-demand (YouTube) viewers was up-to 124 during March 3–10, when the site was open. Prior to the event, the author gave an introduction to the symposium. A picture of cherry blossoms was used as a virtual background to give the audience a sense of Japanese spring. I hope it has been effective.

At the opening ceremony, Dr. Katsuyoshi Kawaguchi, a general co-chair of UT21 online, the Director of Engineering Department, Japan Agency for Marin-Earth Science and Technology (JAMSTEC), gave a welcome address. He explained the purpose of the event, wishing for the safety of people around the world, and stated that the society will contribute to the world today through the underwater technology.

Keynote talks

The introduction of Keynote speakers was given by Professor Changkyu Rheem, a general co-chair of UT21 online, IIS, The University of Tokyo. Professor Yosuke Kaifu, the university Museum, the University of Tokyo, gave the first keynote talk. Prof. Kaifu's speech is on an experimental voyage project to

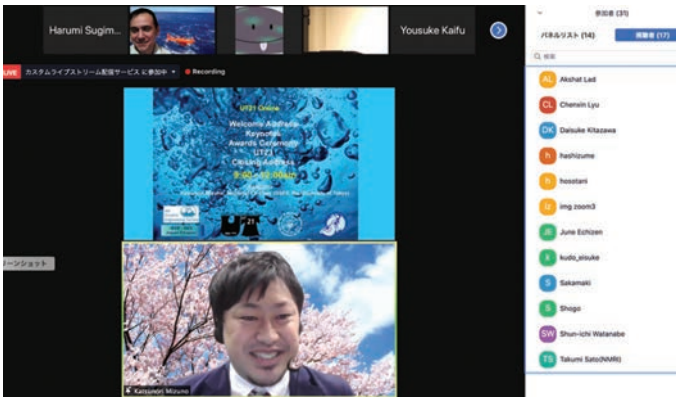

Figure 1. Introduction of the event by the author.

Figure 2. At the opening ceremony, Dr. Kawaguchi, a general co-chair of UT21 Online gave a welcome address.

Figure 3. Professor Changkyu Rheem (Top), a general co-chair of UT21 Online, introduced the keynote speakers. Professor Yosuke Kaifu (Bottom) gave a keynote talk entitled "The Beginning of Human hallenges in Marine Environments: An Experimental Study on Voyage More than 30,000 Years Ago."

unravel mysteries of Palaeolithic voyages in East Asia. In the project, he built several kinds of ancient boats and repeatedly tested them at sea, and finally rowed a round wooden boat from Taiwan to Yonaguni Island. The story of our ancestors' challenge to the sea 30,000 years ago is an encouraging one for us today. People have overcome difficulties all the time!

The second talk was given by Professor Blair Thornton, IIS, the University of Tokyo/University of Southampton. He talked about autonomy beyond just the platform, and discussed how technology can help to overcome bottlenecks in the flow of information generated through robotic exploration, to help build human insight in a more scalable way. At the beginning of the presentation, there was a problem with the internet connection that caused the screen to freeze, but his quick thinking saved it. The network trouble is one of the possible risks of online events, but being flexible is always important.

Underwater Video Competition

As one of the special events of UT21 Online, an Underwater Video Competition was organized. This competition aims to stimulate research and development in undersea technology and oceanographic monitoring by providing intellectual stimulation to researchers and engineers by introducing their research and attractive videos to each other. In addition, we aim to build momentum for UT21, which has been postponed for two years. UT21 online

Figure 4. Professor Blair Thornton gave a keynote talk entitled "Re-imaging Seabed imaging."

Figure 5. At the awards ceremony, Professor Toshihiro Maki announced a ranking of underwater video competition and congratulated the Prizewinners.

Figure 6. Category 1 – Research Presentation, Grand Prize. The award speech was given by Dr. Kangsoo Kim, National Institute of Maritime, Port and Aviation Technology, Video title: "New Approaches for Practical Simultaneous Operation of Multi-AUVs."

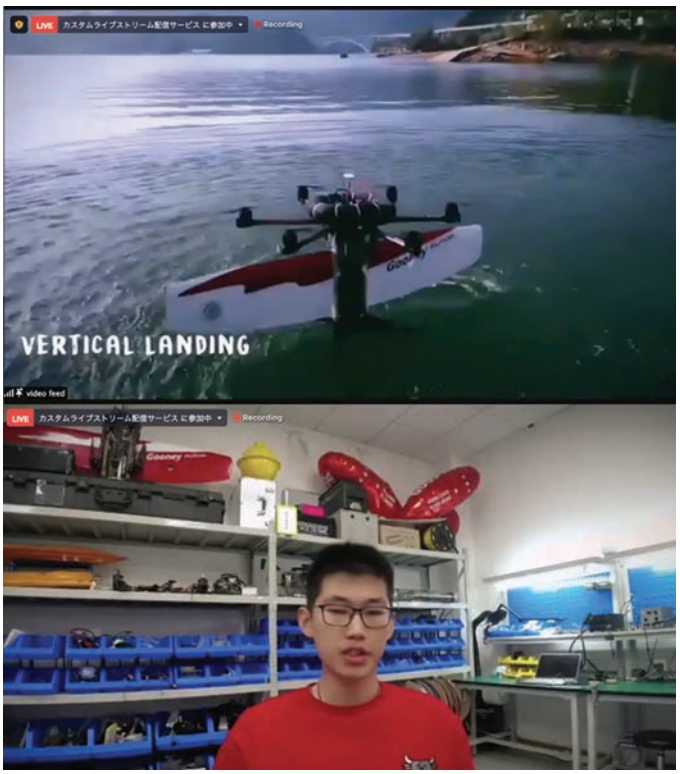

Figure 7. Category 2 – General Presentation, Grand Prize. The award speech was given by Dr. Chenxin Lyu, Shanghai Jiao Tong University, Video title: "A Multimodal Hybrid Aerial Underwater Vehicle NEZHA-III."

Figure 8. Prizewinners in Category 1 gave award speeches. (left) Runner up Prize. Dr. Taesik Kim, Pohang University of Science and Technology, Video title: "Development of underwater amphibious robot "PEAR"", (middle) Young Researcher Prize1. Dr. Takumi Matsuda, Meiji University, Video title: "Parent-Child-Based Navigation Method of Multiple Autonomous Underwater Vehicles for Ship-Free Underwater Survey", (right) Young Researcher Prize2. Dr. Tomoko Takahashi, JAMSTEC, Video title: "-RamaCam- deep-sea particle analyser by integrating holography and Raman spectroscopy."

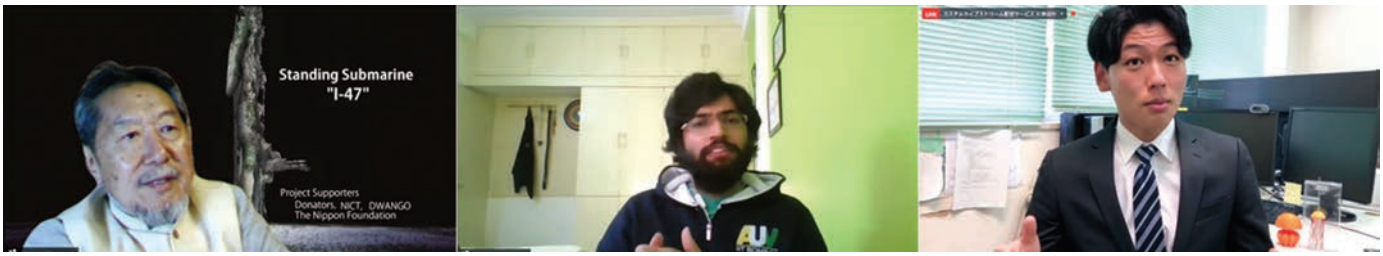

Figure 9. Prizewinners in Category 2 gave award speeches. (left) Runner up Prize. Prof. Tamaki Ura, The Society La Plongee for Deep Sea Technology, Video title: "Standing Submarine "I-47"," (middle) Young Researcher Prize1. AUV-IITB, Indian Institute of Technology Bombay, Video title: "AUV-IITB | IEEE OES | UT2021." (right) Young Researcher Prize2. Dr. Yusuke Inoue, Marine Robotics, Video title: "Jelly fish robot to catch micro plastic debris."

Figure 10. An announcement of UT 23 was given by Dr. Kawaguchi, a general co-chair of UT 21 Online. Top view shows the planned next venue, Komaba II Campus, IIS, the University of Tokyo.

called for videos designed to promote the appeal of Underwater Technology (Undersea Engineering) to a wide audience. Specific themes and categories for the videos were as follows:

- Environmental Monitoring
- Marine Robotics
- Marine Mineral Resources
- Renewable Energy
- Marine Construction
- Observatory and Disaster Mitigation
- Fishery Engineering
- Acoustics and Communications
- Sensors

Category 1—Research Presentation (submitted 12, accepted 10)

Video is expected to be of an applicant speaking on research, however, as long as the video describes the research, the format is not limited to conventional presentation style.

Category 2—General (submitted 20, accepted 14)

Any style of presentation is acceptable. For example, trouble, funny or unusual scenes, beautiful or exciting scenes captured on video during underwater experiment.

The nominated (accepted) videos were made public in advance on the website, and the rankings were determined by voting by OES members and technical committee members of UT21 Online.

Awards Ceremony

According to the results of competition, an award ceremony was held. Professor Toshihiro Maki, a Technical Program Committee

Figure 11. Closing remarks were given by Prof. Shinohara, a general co-chair of UT 21 Online.

Figure 12. Acknowledgement for all attendees and cooperators.

co-chair of UT 21 Online, IIS, the University of Tokyo, announced the ranking, followed by the screening of the award-winning videos and short speeches by the winners. The following prizes were awarded in each category.

- Grand Prize (1 winner per category)
- Runner-up (1 winner per category)
- Young Researcher Prize (2 winners per category)

Before the closing of UT21 Online, Dr. Kawaguchi made an announcement about Underwater Technology 2023 (UT23), which will be held during March 6–9, 2023, Tokyo, Japan. He said, "I sincerely hope things will turn around so that we can have an on-site event next time." Finally, closing remarks were given by Professor Masanao Shinohara, a general co-chair of UT21 online, Earthquake Research Institute, the University of Tokyo.

This online event was very different from the previous onsite events, and many things were new to us from the preparation stage. However, we felt that there were some advantages, such as the success of the video competition and the fact that people in distant areas, who normally have difficulty participating, could easily participate. I think it was a good experience and the most important things were to be flexible and to do our best according to the situation. Thank you very much for your participation. Looking forward to seeing you at UT23 Tokyo!

Drop the Mask!! Global OCEANS 2021 San Diego—Porto is Bringing us Back Together!

Robert Wernli, Global OCEANS 2021 San Diego Co-Chair

The Global OCEANS 2021 San Diego—Porto committee invites you to participate in this event—in person in beautiful San Diego, California, and virtually in Porto, Portugal. We will once again be able to assemble at this truly Global, diverse and prestigious conference and exposition regarding our most critical resource—the oceans. This will be the 8th time the OCEANS conference has come to San Diego and the first for Porto.

The OCEANS conference is jointly sponsored by the IEEE Oceanic Engineering Society (IEEE/OES) and the Marine Technology Society (MTS). This international conference is a major forum for scientists, engineers and those with an interest in the oceans to gather and exchange their knowledge and ideas regarding the future of the world's oceans. Since we combined the Porto and San Diego conferences into a single event due to the pandemic, the local organizing committees (LOCs) are working together to address their respective original conference themes.

Our Global OCEANS 2021 Porto themes are:

- **Opening the Ocean Frontier: A New Age of Discoveries**
- **Ocean science and technology for the benefit of humankind**

The theme for Global OCEANS 2021 San Diego is **"Sustaining our Oceans . . . Sustaining our Future,"** reflecting on the critical nature and importance of our industry and its sustaining technologies.

In addition to the excellent technical program for which OCEANS is well known, Global OCEANS 2021 San Diego will be structured with three key underlying categories of interest to all attendees:

- **"InFocus"**—on the latest in new and emerging technologies
- **"InQuire"**—on innovative research and science
- **"InVest"**—investment strategies and spending priorities from high-level stakeholders and officials from the U.S. and international governments, the oil and gas industry, Departments of Defense and Energy, local and federal regulatory agencies and a wide range of ocean industries.

So, is our technical program coming together, even in the dying throes of the pandemic? That is a very big YES! We have received 740 abstracts: 403 virtual (54%), 337 on-site (46%). 107 of the abstracts are submitted by students for the Student Poster Competition. Of those accepted, 20 or so will receive funding to come to the conference and participate in the competition and the others will join the technical program. The abstracts, from 42 different countries, cover 97 technical areas. And, with our virtual program, all accepted authors can make it to the conference, even if there are travel restrictions still in place. With over 200 of the abstracts from the U.S., the in person technical sessions should be tightly packed. A series of televised special sessions, panels and forums will also be held.

Our Tuesday and Wednesday morning plenaries will certainly highlight the conference presentations. Our speakers will include Honorary Co-Chair Vladimir Ryabinin, Executive Secretary of the UN Intergovernmental Oceanographic Commission (IOC) and Assistant Director General of UNESCO. The OCEANS conferences are coordinated with the kickoff of the United Nations "Decade of Ocean Science (2021–2030)" and will provide a forum for the program for the upcoming decade.

Also speaking at the plenary will be our Honorary Co-Chair Margaret Leinen, Director, Scripps Institution of Oceanography (SIO). The involvement of SIO will certainly add to the success of the conference. OCEANS 2003 teamed with SIO for their 100th anniversary. The result was the largest OCEANS conference ever held with over 5000 attendees and 300+ exhibitors.

We're also about to announce our third Honorary Co-Chair, from the U.S. Department of Defense, who will soon join us.

The exhibitors are also returning to the conference circuit and it looks like we'll sell out the exhibit space, which has a centrally located theater to highlight our exhibit technology. In-situ demonstrations by some exhibitors, that will be televised back to the conference halls, are also planned at a nearby pier.

And to top things off, the San Diego portion of the event will kick off with a two-night film festival and weekend golf tourney. Receptions will be held on Monday and Tuesday nights with the gourmet Wednesday night Gala being held around the resort pool at the conference hotel. And for those who'd like to add a little holiday time to their trip, San Diego offers a variety of entertainment and activities that include the Birch Aquarium, the San Diego Maritime Museum, Sea World, Mexico, San Diego Zoo and the Safari Park, all just a short ride from the Town and Country Resort and Conference Center. Combine all that with a spectacular coastline sporting magnificent beaches, great shopping, and the cuisine of the wide range of international restaurants, and you can see why San Diego is one of the most desirable destinations in the world. We look forward to physically greeting you in San Diego in September, 2021, and virtually in Porto, at the Global OCEANS 2021 San Diego—Porto conference.


GLOBAL
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2021
San Diego - Porto
September 20-23, 2021
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Sustaining our Oceans ...
Sustaining our Future
2,000 ATTENDEES | 500 TECHNICAL PAPERS | 100+ EXHIBITORS | UNLIMITED OPPORTUNITIES
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Remote Sensing
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Optics, Imaging, Vision and E-M Systems
Marine Law, Policy, Management and Education
Sonar signal/Image processing and communication
Underwater Acoustics and Acoustical Oceanography
Marine Environment, Oceanography and Meteorology
Ocean Observing Platforms, Systems and Instrumentation
UN Decade of Ocean Science for Sustainability (2021-2030)
Ocean Data Visualization, Modeling and Information Management
INSPIRE-INNOVATE-SUSTAIN
OCEANS 2022, CHENNAI
OCEANS 2022
Chennai- Feb 21-24,2022

INSPIRE-INNOVATE-SUSTAIN

OCEANS 2022, CHENNAI

OCEANS is the event for global maritime professionals to learn, innovate, and lead in the protection and utilization of the world's largest natural resource – our Oceans. Join the thousands of professionals who have made OCEANS their home for continued learning in Chennai, India, from Feb 21 - 2 2021

Global thought leaders, innovators and students in the areas of marine technology, engineering, science, research, and education will gather together to learn and experience cutting-edge technologies in the field of marine science, hear from industry experts and engineers regarding the latest research and innovations, discuss current environmental issues and policies affecting the field, and collaboratively work together to move the fields of marine technology and engineering forward.

COME EXPERIENCE CHENNAI

Chennai, formerly known as Madras is a conglomerate of urban villages and diverse neighbourhoods. The capital of a Tamil-speaking state, has emerged as a cosmopolitan city, playing an important role in the historical, cultural and intellectual development of India. In addition it holds an interesting fair of south Indian architecture, music, dance, drama, sculpture and other arts and crafts. Chennai with its historic background have a lot to offer to people.
It is emerging into a major IT hub and has a big market for textile industry.
It has lots in store for the tourists. Mahabalipuram, a neighbouring town, is famous for its ancient temples and rock carvings of the 7th century Pallava kingdom and is also an UNESCO world heritage site. Chennai also offers a wide variety of cuisines for the foodies. Overall it is a colourful, traditional and pleasant place to be in. You will cherish your memories...

MTS marine technology society

OES IEEE Oceanic Engineering Society

IEEE

NIOT

A Blast from the Past! … In Honor of Ferial

Bob Wernli—Beacon Co-Editor-in-Chief and Stan Chamberlain

Ferial's obituary is in this issue, but because of her amazing support of the IEEE and OES, your Beacon editors decided to dedicate this "Blast from the Past" to her and her ever-present smiles at almost every OCEANS conference.

OCEANS '07 Vancouver
Tony Eller & Ferial El Hawary & Pat-Jim Candy

OCEANS '07 Vancouver—Ferial with
Peggy Barbera, Pat Candy, Van Czika Faith Collins

OCEANS '07 Aberdeen
Bob, Ferial, Rene and Todd

OCEANS '08 Quebec
with Plenary speakers

OCEANS '16 Monterey
Harumi Sugimatsu, Tamaki Ura and Ferial

OCEANS '19 Marseille
Izzie and Sandy Williams and Ferial

Who's who in the IEEE OES

Diane DiMassa

Who's Who? I have no idea. So I did what everyone does, I "googled" it. The Miriam dictionary website tells me—*a compilation of brief biographical sketches of prominent persons in a particular field*. Well, that definition is a bit of a problem for me. I'm not sure I qualify as "prominent" and the "in a particular field" certainly does not apply. Who's Who? Um, no.

Who am I? What will you do in the name of science? Well now, those I should be able to answer. I am a self-professed generalist who thinks everything in STEM is interesting. Yeah, that's why the "in a particular field" part above just doesn't fit.

My Ph.D. from the Joint Program between MIT and the Woods Hole Oceanographic Institution says Oceanographic Engineering, and that is of course the birth of my career. I spent the majority of graduate school (even before joining the Joint Program) developing navigation systems for AUVs. The field of autonomous vehicles was relatively new, and it was exciting to be on what seemed like the most amazing cutting edge. The most enjoyable part of it all was the field testing on the Charles River in Boston. Day after day we packed up all the gear, went out on the water, and "made science happen." Like any endeavor the days were mixed with glorious successes as well as dramatic failures, and I am happy to say that despite all the things that went wrong, not one of us ever fell into the river.

Currently, I am a tenured Full Professor in the Engineering Department at the Massachusetts Maritime Academy (MMA)—a primarily undergraduate university with a focus on teaching much more than research. When I started as the first woman on the Engineering Faculty, I would have never guessed that I would have been asked to teach so many different courses. Changing subject areas so often has certainly kept me on my toes, but I am a self-professed generalist, so I just rolled along with it. Regardless, the two biggest highlights of my teaching career are 1.) creating the first Engineering Design class at MMA and 2.) writing the curriculum for and establishing an ABET-accredited degree in Energy Systems Engineering.

You know what else in STEM is interesting? Rocks from space. Somehow, I was in the right place at the right time and was selected to participate in two Antarctic scientific expeditions with the Antarctic Search for Meteorites program. Essentially my job was to live in a tent (about 300 miles from the South Pole), drive around on a snowmobile, and pick up rocks—rocks from space. We found hundreds. Most meteorites come from the asteroid belt, but our team was lucky enough to discover a few lunar samples. My Antarctic Service Medal and certificate hang proudly on my wall.

I have also been lucky enough to participate in projects that use HF radar to measure ocean surface currents, in projects that use acoustics to measure detritus, and in projects that analyze the potential for using vertical-axis wind turbines to generate power for long-term sensing stations. I was also a blue-water scuba diver for a biological research cruise in Antarctica that collected samples of gelantinous organisms (salps and ctenophores).

Collecting a small meteorite in Antarctica. No touching!! Photo credit Cady Coleman.

For a good laugh, check out this website and view the Dress the Diver slideshow https://www.divediscover.whoi.edu/archives/expedition10/hottopics/colddiving.html

There sure is a lot of interesting STEM in this world.

Despite all of these varied STEM experiences, OES is my true professional "home." It's where my main network lies and where I have spent the majority of my volunteer/service activities. I have been involved in OES leadership for nearly 20 years. I started as an AdCom member and then spent 10 years on the ExCom—5 as your Treasurer, 1 as the Assistant to the President, and 4 as Vice President of Conference Operations, which evolved into the Vice President for OCEANS. I received the OES Distinguished Service Award in 2014, but the far greater honor was the privilege of working with so many dedicated and talented people throughout the world. I admit that I thoroughly enjoyed being the Liaison to the OCEANS Genova conference in 2015 (yes, as an Italian, that conference was near and dear to my heart), and I promise to work just as hard as the Liaison for OCEANS Halifax 2024.

As I contemplate where the sun may set on my career, I realize that I have been drawn back to where it started—ocean robotics. Is that what they mean by the circle of life? But this time, instead of accurate navigation being the goal, the objective is to support aquaculture. I am Italian; I like food; and worldwide aquaculture production has essentially doubled in the last 15 years. Ah yes, something else in STEM that's interesting.

In other news, I am an avid sports enthusiast having played soccer, basketball and softball at the collegiate level. I earned MIT's Scholar-Athlete Award, which means that when one of my current students tries to use a sporting event as an excuse for not turning in an assignment, he or she simply gets "the look." Ha! In fact, I met my husband playing ice hockey and my current athletic activities include curling, golf, and pickleball. I am certainly not a Who's Who in any of them! My husband, John Danby, and I live on Cape Cod, Mass, USA. John is a former professional ice hockey player and currently co-owner of Top Shelf Hockey School, an elite youth hockey organization, and the Daily Whisker, a pet retail business in the Boston area. In my spare time (what exactly is "spare" time?) you might find me gardening, clamming, or making chocolate.

John and I at OCEANS Aberdeen 2017.
Photo Credit: Stan Chamberlain.

IEEE Oceanic Engineering Society Election of Members to the Administrative Committee For a Three-Year Term 1 January 2022–31 December 2024

Jerry Carroll, Chair of IEEE/OES Nominations and Appointments Committees

The OES Administrative Committee election **closes on 29 June 2021**. When you review the below candidates, I think you will agree that OES is truly becoming a major international society of IEEE, that includes participating members from students, Young Professionals to our Senior members. Be sure to cast your vote.

VOTE NOW at https://eballot4.votenet.com/IEEE

You will need your IEEE Account username/password to access the ballot. For quick reference, your username is <your email address>. If you do not remember your password, you may retrieve it on the voter login page. Please make sure you are signed out of all other applications in your browser. You can copy the link and paste into a private browsing window if using Firefox or an incognito window if using Chrome. Voting must be completed no later than 29 June 2021. Any returns received after this date will not be counted. The online voting site will close at 4:00 pm Eastern Time.

The photos, bios and statements of our excellent slate of candidates follows. You can see their information on the voting site.

M. A. ATMANAND (M'97-SM'07) Visiting Professor at the Indian Institute of Technology (IIT), Madras, India and Director (retd.) of the National Institute of Ocean Technology (NIOT), India obtained his B. Tech. degree in Electrical & Electronics Engineering from the University of Calicut in 1983. He took his M.Tech. and Ph.D. from the IIT, Madras in 1985 and 1997 respectively. From 1985 to 1997, he worked in the area of fluid flow measurement and control at the Fluid Control Research Institute, the standard laboratory for fluid flow in India. From 1997, he has been working at the National Institute of Ocean Technology (NIOT), in the area of deep sea technologies at various levels and retired as Director (two terms: 2009 to 2017 and 2018 to 2020). At NIOT, he was responsible for all the projects being executed by the Institute in the areas of Desalination, Ocean Energy, Deep Sea Technologies, Ocean Observations, Marine Sensors and

Marine Biotechnology. He was active in policy making, preparation of vision documents, a dollar 600 million Deep ocean mission program of the Government of India in the area of Ocean Technology, to lead India as a major player internationally. After retirement in September 2020 from NIOT, he currently is a Visiting Professor at the IIT, Madras, where he has developed a new course on Instrumentation for Ocean Technology, mainly covering his vast experience at NIOT and is teaching graduate students.

He received the International Society for Ocean and Polar Engineers award in 2020, the prestigious MoES National Award of Excellence in Ocean Technology in view of the pioneering work done in the area of deep-sea technologies in 2020, the team National Research Development Corporation (NRDC) National Societal Innovation Award in 2018, for "Underwater Remotely Operated Vehicle for Polar and Shallow Water Research" in 2019, the IEEE Oceanic Engineering presidential Award in 2016, the team National Geoscience Award 2010 from the Ministry of Mines, Government of India, for the work on Remotely Operable Vehicle under the category of Oil and Natural Gas Exploration.

He is the elected Chair of the Intergovernmental Oceanographic Commission Regional Committee for the Central Indian Ocean (IOCINDIO), Intergovernmental Oceanographic Commission (IOC) of UNESCO from 2016. He is a member of the Executive Planning Group (EPG) for the preparation towards the UN Decade of Ocean science for sustainable development (2021–2030).

He has to his credit nine patents (eight Indian and one German) and more than 150 research publications including in the IEEE, other international refereed journals and conferences.

He is currently an IEEE Senior Member of the Oceanic Engineering Society (OES), and the Instrumentation and Measurements Society (IMS). He has been active with the IEEE Madras Section in various capacities, the last being the Chair of the Section. He is the founding Chair of IEEE OES in India and organised the new OES Chapter under the India Council in May 2008. He has given technical talks in various countries, as part of the IEEE OES Chapters and otherwise at WHOI, Scripps institute of Oceanography, University of Rhode Island, University of Edinburgh, Korean Institute of Geoscience and Mineral Resources (KIGAM) etc., which were well received.

It was under his Co-chair ship that the IEEE Symposium on Underwater Technologies was held in India in 2015 successfully. The Student Autonomous Underwater Vehicle (SAVe) competition started under his leadership and has continued successfully for the past more than 8 years. The winners in this competition have been sent to compete in the AUVSI competition held annually in San Diego. He is currently one of the Associate editors of IEEE Journal of Oceanic Engineering. He is also the Technical Committee Chair of Underwater Cables and Connectors. He is a member, Editorial Board of the academic journal Underwater Technology of Society for underwater Technologies (SUT), UK. He is an elected member of SUT Council. He is serving as an elected member of the IEEE OES AdCom for 2019–2021. More details can be seen at: https://atmanand.co.in/

Statement: He has successfully bid for the IEEE Oceans conference for India to be held in 2022 and is a Co-chair for the same. It is all the more important that he is elected as an Adcom member to steer the conference through, being the first one to be held in India, especially under this trying Covid times.

The UN Decade of Ocean Science for sustainable development from 2021–2030 has just begun and IEEE OES has formed a subcommittee under him to undertake various programs under the major 7 heads of the UN decade action plan. It is proposed to hold thematic workshops, technical symposia and co-sponsored conferences with an additional motive of attracting new members to the OES. The specific problems in this part of the world with regard to ocean engineering will also be addressed. It is also proposed to evolve this subcommittee to a separate Technical Committee as the UN decade actions progress in the coming years. By virtue of being the Chair of IOCINDIO and member of EPG, it will be helpful to have a marriage between the IEEE OES and the UN Decade/IOCINDIO activities.

He seeks your support for election to the AdCom to achieve these important goals.

IGNACIO CARLUCHO (GSM'16-M'19) was born in Olavarría, Buenos Argentina. He obtained a B.S. degree in Electromechanical Engineering (2015) from the Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina. He obtained his Ph.D. degree in Engineering (2019) also from the from the iversidad Nacional del Centro de la Provincia de Buenos Aires, working under the direction of Dr. Gerardo Acosta. He is currently a Research Assistant in the Department of Mechanical & Industrial Engineering at Louisiana State University.

His main research interests are intelligent control techniques for marine robotics. Particularly, the use of reinforcement learning for the control of autonomous underwater manipulator vehicles. During his PhD he worked on hybrid reinforcement learning techniques for low level control. During his postdoctoral studies he was part of DARPA's Angler program for the advancement of autonomous marine operations. His latest research focus on data-driven techniques for the control of underwater manipulators under variable payloads. He has published in multiple high impact international journals and conferences.

He became a member of the IEEE Oceanic Engineering Society and the IEEE young professionals in 2016. In addition, he has been a secretary of the Argentinian chapter of the IEEE Oceanic Engineering Society for the past two years, were he played a prominent role in organizing different activities in the chapter.

He is currently an instructor in the Department of Mechanical & Industrial Engineering at Louisiana State University. He has also served as a reviewer for important conferences and international journals of high impact.

Statement: I have been a member of the IEEE Oceanic Engineering Society and the IEEE young professionals for the past five years. As a consequence of my involvement with the

community, I have been elected as a secretary of the OES Argentinian chapter, a role I have been fulfilling for the past two years. I have so far enjoyed the meetings and work done by IEEE and therefore I would like to increase my involvement with the community.

While I am impressed with the work done by IEEE and the OES, I still believe that there is more that can be done. Currently, the OES is facing an increased worldwide interest in oceanic systems, with governmental efforts towards mitigating the negative effects of climate change and reducing the pollution caused by humans. In this context, I believe the OES should play a primordial role, leading the way towards positive change. However, the difficulties we have seen last year during the pandemic will force the society to adapt to a new normality, and will require new ways of communicating and organizing.

In this sense, there are three main points which I consider my involvement of importance:

- **IEEE OES presence in South America**. I would like to help the society with the current activities performed in Latin America. Particularly, the conferences, such as Rio Acoustics and the Latin American Symposium, assuring that they are occurring periodi- cally. Thus, giving a chance to Latin American researchers to publish and expand their circles, securing a growing community in the continent. Additionally, I would like to work in the student branch chapters, particularly the one in Argentina, to make sure students are in contact and are aware of all the possibilities to organize events within the society. And more importantly are in contact with the important research and developments carried out by the IEEE OES.
- **Virtual presence**. I am also interested in working to make the online presence of the IEEE OES stronger. This past year has shown a tendency that may re shape the way the society works and consolidating the web presence is a must. Furthermore, improving social media presence can bring the activities of the society to young students and engineers, involving new people into the topics related to oceans and technology.
- **Oceans conferences**. I would also like to volunteer myself to work in the flagship conferences of the OES. Particularly, I would like to participate in the Reconnaissance Committee (RECOM), as an international minded person, I can collaborate by bringing new insight, and assuring that different regions of the world are represented.

JAMES S. COLLINS (M'66-S'68-M'74-SM'97-LS'08) Jim earned a Ph.D. in Electrical Engineering from the University of Washington, Seattle in 1973. Prior degrees are from Dalhousie University, Halifax. He has been an Adjunct Professor in the Dept. of Electrical and Computer Engineering at the University of Victoria since 1983. After holding a position as a computer consultant with the Ministry of Health in British Columbia he joined the Engineering Department of Royal Roads Military College (RRMC) in Victoria in 1979. He was Head of the Department from 1988 to 1995 when the College closed due to government cutbacks.

Jim has contributed professionally as a Registered Professional Engineer in British Columbia since 1973. His IEEE contributions began in 1984 as IEEE Victoria Section Chair. He was also Founding Chapter Chair of the IEEE OES Victoria Chapter in 1985. In 1993 he was General Chair of the IEEE OCEANS Conference held in Victoria with 280 papers and a surplus of C$99,600. He served many OES positions including VP for Professional Activities, 2004–2009, 2018–2019 and VP for Technical Activities, 1994–1998. He also served on the OES Elected AdCom, 1995–2000, 2010–2015. He Chaired the Committee responsible for a complete rewrite of the OES Constitution and Bylaws approved in 2006.

Jim was Co-Chair of the first Canadian Dept. of National Defence Military Robotics Applications Symposium held in 1987 at RRMC. His research area was acoustically sensitive mechanical mounts for narrow beam transducers suitable for communications use on AUV's. The work is featured in the 1993 IEEE Robotics and Automation Conference Video Proceedings.

Major awards received are the IEEE Millenium 2000 Medal and the 2002 IEEE OES Distinguished Service Award.

Statement: OCEANS Conferences have operated largely unchanged since the implementation of the two OCEANS per year policy in 2005 and continually thereafter from 2007. This activity has been focused solely on the Atlantic and Pacific Ocean basins with typically one OCEANS Conference in each basin annually plus a variety of smaller symposia and workshops. With more than two billion people living in the countries bordering the Indian Ocean plus immense economic activity and a new Chapter in India, the Indian Ocean area was overdue for an OCEANS level conference. Sponsorship of a UT Symposium at NIOT in Chennai and cosponsor ship of several SYMPOL Symposiums in Cochin have shown the viability of holding conferences in the area. I am pleased to say that an OCEANS is scheduled for Chennai, India in 2022.

I would like to address the long period of tenure of our Presidents and I suggest they be limited to one two-year elected versus two two-year elected terms. This will increase the opportunity for an expanded pool of potential leaders. Presidents can and have been holding office a total of twelve years with Junior and Senior Past Presidents' automatic appointments. Shifting one of these Past President positions forward to a new President Elect position merits discussion.

If elected I would like to better align the OES structure with the IEEE structure which emphasizes two activity areas, Technical Activities, and Membership and Geographic Activities. Chapters are an entity which network OES members on a geographic basis and not so much a Technical Basis. At the moment Chapters are treated as entities under the OES VP of Technical Activities. I propose Chapters be moved to the purview of the VP Professional Activities for more effective management.

These are just two of the topics I hope to address, the first complex and the second not so much.

I am privileged to have served the IEEE Oceanic Engineering Society as a volunteer in many capacities. It is a pleasure to work with the other Administrative Committee members. I will

continue to work with them and other members of the OES for the betterment of our Society.

VINCENZO FRANZITTA (M'13) Associate Professor of Environmental Technical Physics. The research topics are: environmental control, energy saving, use of energy sources, electrical energy production of from sea. Author of over 160 works, mostly published in international journals and/or presented in international conferences concerning renewable energy, wave energy, efficient use of energy in buildings. Present in the main International Scientific Databases such as Google Scholar, ISI-Thomson and Scopus where is indexed with 98 Documents, 1843 citations, Hindex 31. Significant experiences in the management of institutional relations, successfully promoting and assisting relations with opinion leaders, policy makers, institutions and stakeholders.

Education and Training

1997 Degree in Electrical Engineering with 110/110 cum laude
2000 Post-Graduate School of Specialization in Environmental Monitoring and Control Engineering
2001 PhD in Environmental Technical Physics
2002 Post-Doc
2005 MASTER IN ADVISOR EXPERT IN EUROPEAN PROJECT DESIGN

Academic Career

2002–2018 Researcher in UNIPA
2018–present Associate Professor in UNIPA
June–September 2019 VISITING PROFESSOR in USP—University of South Pacific
September 2020 Head the UNIPA ERASMUS+ Program KA107 with the FIJI
October 2020 Director Post-graduate specialization course for Acoustics Expert
November 2020 SCIENTIFIC QUALIFICATION OF FULL PROFESSOR, in TECHNICAL PHYSICS

Teaching Activity

Currently teaches: Wind and Sea Wave Energy in UNIPA, Environmental Technical Physics in UNIPA, RENEWABLE ENERGY DEVELOPMENT IN SMALL ISLANDS. THE USE OF RENEWABLE ENERGY AND SEA WAVE ENERGY IN DESALINATION APPLICATIONS in University of South Pacific (FIJI)

Main Organizational Activities

Since 2018-2019 GUEST EDITOR of many Special Issue about Sea Wave Energy topics, like the following "Renewable Energy from the Sea" in SUSTAINABILITY"

Since 2019-2020 Member of the following Scientific Advisory Board in the Int. conf. SDEWES 2019 DUBROVNIK - CROATIA, SDEWES BUENOS AIRES - ARGENTINA, SDEWES 2020 GOLD COAST—AUSTRALIA, SDEWES COLOGNE 2020—GERMANY

Since July 2019 Chair of the Italian Thermotechnical Association (A.T.I.) Sicily section

Awards For Scientific Activity

2015 won "Best paper award" in IEEE-IECON 2015 Montreal (Canada), for the paper: "A small scale prototype of a wave energy conversion system for hydrogen production"

Technological Transfer

Since 2016—present Co-founder and Vice-CEO of "EngCoSys S.r.l.", academic Spin-Off of UNIPA. The Spin-Off works in research, development, engineering sector in production of innovative systems for electricity production from sea and other renewable sources

Patent owner and inventor n°102021000001292 25.1.2021 "LINEAR GENERATOR WITH PERMANENT MAGNETS FOR SEA WAVE ENERGY CONVERSION"

Main Editorial and Conferences Committees Activities

Member of the Editorial Board of several international scientific journals including: Journal of Shipping and Ocean Engineering, Sustainability, Energies, Journal of Marine Science and Engineering, Session Chair in IEEE IECON 2012, MTS/IEEE OCEANS'2013, MTS/IEEE OCEANS'2014, MTS/IEEE OCEANS'2014, MTS/IEEE OCEANS'2016.

Main Research Activity

Since 2011 to 2016 headed the research project "IMPETUS (Marine Hydrogen from Sustainable Sea Wave Energy)" funded by the Italian Ministry of the Environment.

Head the research group in Energy production from the Sea and since June 2014 head the LA.SI.TEC.MA. LAB (Marine Systems and Technologies Laboratory)

Since January 2020 head the UNIPA unit in partnerships with C-PED and the Engineering Dept of ROMA TRE University, about the development of technologies for the exploitation of wave energy potential.

Since 2020 head NEEMO research (New Electrical Energy from Marine Oscillation) funded by UNIPA

Main International Research Activity Group

Since 2017—present head UNIPA unit in research "Hydrogen Production from Renewable Energy Sources for the public transport in Fiji (HPRES)", founded by Fiji Government.

Since 2018-present head UNIPA unit in research "Development of Technologies for the Exploitation of Wave Energy Potential". Research partner is Engineering School of the Royal Melbourne Technology Institute (New Zeland).

Since 2018 head UNIPA unit in research "Introduction of a renewable energy mix in microgrids and control optimization to promote the economic growth in small islands", funded by the Fiji Government.

Statement: If I will have the honor of serving the Administrative Committee, I will utilize my know-how and expertise to increase the knowledge and attention in various issues

characterizing the topics of the OES chapter, in particular those relating to production of electricity from the sea (sea wave, tidal, current, OTC, salinity gradient, etc) and its use for example in small islands where the problem of energy supply is important.

It will be important to enhance the attention and research on technologies of sustainable ocean energy systems in order to develop and disseminate systems totally sustainable and cheap for offshore energy production and its use for human activities, but also the environmental monitoring and protection of the marine ecosystem activities.

This promotion activity of research in the typical sectors of the OES Society topics will be realized with technical sponsorship and the creation of webinars, events and conferences.

Impetus will be given to the involvement in these activities of local authorities, institutions, universities as well as research organizations and students, who could thus be involved more generally in the activities of the Association, but also. The Italy OES Chapter could make a great contribution to the Society's activities due to the great interest that Italy is showing both in the field of research but also in the field of legislation and industrial development regarding the typical topics of the OES such as monitoring of the seas, underwater acoustics, production and use of energy from the sea.

Many results are being obtained in scientific production as well as experimentation and my activity could help to implement them.

Considering also the geographical position of Italy within the basin of the Mediterranean Sea where there are many small islands with energy characteristics similar to those of other small islands in the world, and where there are numerous countries where the sea represents a reality and could represent an important resource, my presence at the service of the Committee could be very useful.

STEPHEN M. HOLT (M'00-SM'01) received his B.S. in Mathematical Physics from Wilmington College (Wilmington, Ohio, USA), and his B.S. in Electronic Engineering from Franklin University (Columbus, Ohio. USA). He also completed his M.S. in Engineering (with emphasis in Ocean Engineering and Underwater Acoustics) from The Catholic University of America (Washington, DC, USA) and Graduate Certificates in Engineering Management from The Catholic University of America (Washington, DC, USA) and Project Management from The George Mason University (Fairfax, Virginia, USA).

Steve is currently employed with SGT/KBR, Inc. of Greenbelt, Maryland, USA as a Senior Systems Engineer working with National Aeronautics and Space Administration (NASA). He has also supported the National Oceanic and Atmospheric Administration (NOAA) with many meteorological and oceanic programs. He joined the IEEE Oceanic Engineering Society (OES) and was first elected to its Administrative Committee in 2000. He was later elected to the grade of Senior Member to the IEEE in 2001. He was also one of three Executive Co-Chairs for the MTS/IEEE OCEANS 2005 Conference in Washington, DC and was the Secretary for the MTS/IEEE OCEANS'15 Conference in Washington, DC. Steve was the elected member to the OES Executive Committee as its Secretary for ten years, from the beginning of 2001 to the end of 2010. In 2007, he was awarded the IEEE OES Distinguished Service Award (DSA).

Steve presently serves as the IEEE OES Webmaster, where he maintains the integrity of and implements new technology initiatives related to the web site. Additionally, Steve is the Chair for the OES Promotions Committee and he serves as a member of the MTS/IEEE Recon Committee. His technical interests include image, radar, and sonar signal processing, optical systems engineering, as well as the remote sensing of the atmosphere and oceanic environments.

Statement: If elected, my goal is to stay engaged with OES activities as a Member of the Administrative Committee. As the OES Webmaster, I will continue to strive to make our web site a strong and effective tool for conducting our business efforts, as well as conveying the importance of our Society to the global oceans community. With our web site, I would like to expand our promotional activities to more effectively advertise and sell our brand and increase our membership. I would also like us to more effectively use the latest tools in social media to expand our message to a more diverse, younger and international audience. I am especially interested in expanding our outreach activities whereby we become even more effectively engaged with educators and students alike. In addition, I would like continue to expand our efforts in the area of Promotions with a variety of oceanic engineering magazines that I interface with on a wide range of oceans related topics.

In addition, I have been interested for a long time in the educational activities already used by many of the other IEEE Societies and Councils who have utilized the services and tools of the IEEE Learning Network (ILN) and the IEEE Resource Center (IRC). These resources have yet to be utilized by our Society and I would strive to encompass these capabilities into our web site. These resources include interactive courses, tutorials, lectures, research papers, etc. which could then be available to IEEE members directly from our web site.

Thus, if elected, again my hope is to continue these efforts for the Society to strengthen the activities of the OES Administrative Committee in any way I can!

MICHAEL LAMOUREUX (S'95-M'99-SM'09) Michael Lamoureux is Spend Matters Consulting Lead Analyst on Strategic Procurement Technologies and Advanced Technology Applications. As an expert in Algorithms, Analytics, Optimization, and Logistics [which depends heavily on ocean freight and] for Global Supply Chains [which include F&B supply chains that depend heavily on sustainable oceans], he's

primed to evaluate, and advise on, the most advanced and innovative software applications on the market today.

He's also a scholar, researcher, solution engineer, optimization guru, writer, leader, futurist, anti-prophet, and "the doctor" of Sourcing Innovation -- one of only two blogs that had been covering the Sourcing and Procurement Supply Chain subspace for over a decade when he paused to take on the Lead Analyst role on Spend Matters.

He's been leading innovation in web technologies, e-Commerce, e-Procurement, Optimization, Analytics, and even AI for the last two decades in various roles which have included Chief Architect, Chief Research Scientist, CTO, Assistant Professor, Blogger, and Technology Analyst. His PhD in Computer Science combined with his deep industry background and extensive knowledge about Supply Management gives him unique insights into not only what is driving innovation today but what will be driving innovation tomorrow, which have allowed him to write foundational white papers on the core technologies in his area, usability, and AI.

He currently lives on the east coast of the Great White North (which is what is officially called Canada), in a place call Halifax that sits smack dab in between the West Coast of the US and the UK (and lives in a time zone that seems to be foreign to the rest of the world that thinks time jumps from North American Eastern Time to Greenwich Mean Time).

Statement: We all know that when it comes to volunteer support, societies have gotten the short end of the stick for decades in IEEE. I want to change that. As a volunteer who fought for years for better tools to support volunteers and guided their creation (vTools, OU Analytics, Event Finder) when I finally had the chance as a past MGA Board Member, I want to see that the IEEE does more for society volunteers and members. Now that we have some relatively modern platforms in place and lots of web-based modern tools available to us, with the right support, we can do better for everyone!

As a professional who is also very interested in the advancement of key disciplines relevant to my work - mathematical modelling (for finance chains), information science (for information chains), and, most importantly, oceanic science (as the vast majority of supply chains are powered by the oceans) - it's imperative that our societies be able to operate as efficiently as possible so we can spend less time on overhead and more on the advancement of sustainable oceanic science below and above the surface.

As a key, but often under-supported, society to IEEE's mission and vision, my goal is to capture the operational needs of the Oceanic Engineering Society, determine how existing IEEE processes and platforms could be improved to support our needs, and work with the appropriate parts of IEEE to make it happen. Now that we will be increasingly asked to work virtual, it's more important than ever that we get the right tools and process to support us. I will use my experience working with IEEE HQ to not only convey these needs but do what I can to see that they are addressed, with the appropriate priority and funding, over time. And in doing so help support the Oceanic Engineering Society in growth, great conferences, and the advancement of new initiatives.

LIAN LIAN (M'98-SM'13) is the Vice Dean of Institute of Oceanography, Shanghai Jiao Tong University. She received her Bachelor's degree and Master's degree in Naval Architecture & Ocean Engineering, and the PhD Degree in Technology Management from Shanghai Jiao Tong University. She has become a full professor of Shanghai Jiao Tong University since 1998, and served as a member of Expert Group of National Hi-Tech Program (863 Program) from 1999–2011, a member of Expert Group of National Science Foundation of China from 2008-2011, a member of Expert Group of National Key Research and Development Program since 2016 the Deputy Director of Marine Equipment Technology Committee of Chinese Society of Oceanography since 2017.

As a senior member and Shanghai Chapter Chair (since 2011), Lian served as a member of IEEE OES Administrative Committee from 2015-2019, the General Chair of OCEANS'16 Shanghai. Now she is a member of RECON Committee.

Dr. Lian's research mainly focuses on underwater vehicles, marine observation. She has been leading her team concentrating their efforts on Underwater Vehicles, such as ROVs, Deep-Sea Towing Systems, Underwater Gliders, Multimodal Vehicles, underwater sampling and tooling systems, and has built the first series of Chinese brand Working-class ROVs including HAIMA-4500, the China's first Working-class ROV capable of operating at a depth of 4,500 meters. By using these ROV systems, scientific progress and discoveries have been achieved, such as the discovery of "HAIMA Cold Seep".

Statement: I have been an active member of OES for more then 20 years, and have been serving as the Chair of IEEE OES Shanghai Chapter since 2011. The experiences of serving the society have gave me a deep understanding of the fundament goal of the society and the role we should play as the society leaders. With the various new challenges the world is having today, I am fully aware that as a premier professional oceanic society, the importance of the work the AdCom does. I believe It is important to keep strong commitment working with our volunteers, but more importantly, to develop opportunities for people with different backgrounds all over the world and bringing them together. Thereby I decided to apply serving another term on the AdCom committee.

As a candidate from the People's Republic of China, if elected, I will continue to work on broadening the participation from individuals with diverse backgrounds, to improve the student participation, to build up the connections and cooperation with local societies, to promote volunteering services, and to expand the influence and international presence of IEEE OES in China. I believe that my sustained service to OES would be an asset to the society, and as always, I feel honored to be an OES AdCom member.

ANDREAS MAROUCHOS (M'10) Andreas is a Principal Research Engineer and Research Group Leader in the Commonwealth Scientific and Industrial Research Organisation (CSIRO) National Collections and Marine Infrastructure (NCMI) business unit. Andreas provides engineering and technical support to scientists and industry working the marine and atmospheric domains. In addition to providing technical guidance in the deployment of projects, Andreas and his group specialise in the design of bespoke science systems and platforms. This includes the design and manufacture of ship-based systems and instrumentation, autonomous platforms, and oceanographic moorings. In addition, Andreas is involved the development of novel technologies and methods to meet present and future engineering challenges. The Engineering and Technology program has a strong track record for delivering technical solutions to address challenging science problems in the field. Andreas also leads domestic and international collaborative efforts on technology development with a variety of research partners specifically targeted towards addressing fundamental technical and operational challenges in the advancement of ocean observing science platforms. The fields of study include ocean science and monitoring, mooring development, advanced materials, system autonomy and environmental technology to support aquaculture science and industry. Andreas' technical background includes a broad range of engineering fields including aerospace, aero-structures, technologies for the environment, audio-visual engineering, optics, ocean engineering, autonomous systems and engineering systems modelling and simulation.

Andreas is active in both the IEEE Ocean Engineering Society and was recent appointed to the OES AdCom. Andreas is the Tasmanian sub-section chair in the Australian Chapter of the IEEE Ocean Engineering Society and actively engages the extensive marine technology community in Tasmania with talks and supporting visits from field experts. Andreas is also the Chair of the OES Polar Oceans Technical committee and has been active in the planning and execution in a series of technical workshops on polar technology development. The third event in the series, the Antarctic and Southern Ocean Forum for Science and Technology (ASOF-Fest) workshop is scheduled for August 2021 and will bring together researchers across both science and technology domains to discuss emerging challenges in conducting southern-ocean research. Over his twelve years working in the marine industry Andreas has also regularly attended and presented papers at IEEE Oceans conferences (over 18 in 12 years).

Statement: As we move into the next decade designated by the UN as the Decade of the Oceans we are poised to see significant change in the method and technologies being deployed in our oceans. The operational challenges of localisation, persistence and scale faced by the marine sector will become more acute as operations of all sorts venture into more remote regions, deeper waters and further off-shore. Autonomy is the future of ocean operations. Advanced unmanned platforms working both at the surface of the oceans and below, combined with advances in machine learning and sensor technology will change the way ocean operations are conducted in support of both research and commercial activities. These technology drivers will demand new engineering skills, legal and regularity frameworks, business models and standards and the next generation of marine and ocean engineers will need to embrace a new set of skills to succeed.

The Ocean Engineering Society (OES) has the opportunity to play a central role in helping enable and lead this change but not without challenge. Engineering activities in the sector will become increasingly multi-disciplinary and requiring a more diverse set of skills. Interactions between disciplines are also likely to become more nuanced and require the creation of new sub-disciplines in engineering curricula. This presents an opportunity for OES is to help engage with students and emerging engineers in the field helping to provide a framework (and subsequently a home) for new members who may increasingly find their new skills at odds with traditional marine engineering curricula. Continued investment in student engagement though workshop and conferences is critical in this regard.

As part of the IEEE, OES in in the unique opportunity to provide guidance on setting of standards and contribute to the development of best practice and subsequent discussions informing regulatory frameworks. This is particularly necessary in the context of autonomous or unmanned systems. Outside of the engineering discipline, OES has an opportunity to engage with the broader science community to create strong working groups around key science theme areas; helping break free the constraints of siloed expertise in particular domain areas and encourage interaction and idea sharing across disciplines. An example of this is the Antarctic and Southern Ocean Forum which mixed science presentations with engineering discussions around the challenges faced by conducting science operations in the Southern Ocean. Is it envisioned that along with it's sister conference (the Arctic and Northern Ocean Forum) that bridges could be formed by specialist groups working at opposite poles to address often similar technical challenges.

MAURIZIO MIGLIACCIO (M'91-SM'00-F'17) is Full professor of Electromagnetics at Università di Napoli Parthenope (Italy). He was Affiliated Full Professor at NOVA Southeastern University, Fort Lauderdale, FL (USA) and now is affiliated to the Istituto Nazionale di Geofisica e Vulcanologia (INGV), Roma (Italy). He has been teaching Microwave Remote Sensing since 1994. He was visiting scientist at Deutsche Forschungsanstalt fur Lüft und Raumfahrt (DLR), Oberpfaffenhofen, Germany. He was member of the Italian Space Agency (ASI) scientific committee. He was member of the ASI CosmoSkyMed second generation panel. He was e-geos AdCom member. He was Italian delegate of the ESA PB-EO board. He was Member of South Africa Expert Review Panel for Space Exploration. He has been

serving for the University AdCom for four terms. He serves as reviewer for the UE, Italian Research Ministry (MIUR), NCST, Kazakhstan and Hong Kong Research board. He lectured in USA, Canada, Brazil, China, Hong Kong, South Korea, Ecuador, Germany, Spain, Czech Republic, Switzerland and Italy. He was Italian delegate at UE COST SMOS Mode Action. He is listed in the Italian Top Scientists. He is an IEEE Trans. Geoscience and Remote Sensing AE, International Journal of Remote Sensing AE, and was IEEE Journal of Oceanic Engineering AE Special Issue on Radar for Marine and Maritime Remote Sensing, IEEE JSTARS AE of the Special Issue on CosmoSKyMed, Member of the Indian Journal of Radio & Space Physics Editorial board. His main current scientific interests cover SAR sea oil slick and man-made target monitoring, remote sensing for marine and coastal applications, remote sensing for agriculture monitoring, polarimetry, inverse problems for resolution enhancement, reverberating chambers. He published about 160 peer-reviewed journal papers on remote sensing and applied electromagnetics.

Statement: The IEEE OE Society deals with the technologies for marine environment, a large set of challenging and leading-edge multidisciplinary activities. Activities that are undertaken a large body of people with very different background and affiliation. It is therefore very important to promote the Society within the professionals and academic people working on marine ICT. An action that could be sustained by small topical meetings. The advance of the IEEE OE Society will take great benefit by the flagship OE journal promoting special issues on brand new scientific topics and by involving young and motivated Associate Editors. New geographical opportunities of the OE Society should be sustained by a larger number of Chapters that can take benefit of the online opportunities even during the pandemia. It also very important to support the young professional activities and the sense of community by some awards regarding the Journal and the main Conference.

In summary, a set of mentoring actions taking benefit of the expert leaders in our Society to involve more and more young professionals and researchers.

In my view the greatest opportunities and challenges are given by the forthcoming green technologies that will revolutionize our future and the way we move in the sea, we produce energy at sea and we observe and contribute through the sea of the Earth environment. New scientific and technological challenges that must see our Society at the center by exploiting at the best the tools we have and by visionary contributes.

In my vision OES can have a prominent role in the green future.

HARUMI SUGIMATSU (AM'04-M'08-SM'12) Harumi Sugimatsu has been contributing to the society as the Editor-in-Chief of the OES BEACON Newsletter since 2015, delivering the latest OES news to all members of the network four times a year. She has contributed to the expansion of the International Symposium on Underwater Technology (UT) around the Asia-Pacific Rim, with 10 symposia held since 1998 in Japan, Taiwan (2004), China (2009), India (2015), Korea (2017), Taiwan (2019), with UT21 Online (Japan) scheduled in March 2021. In particular, UT21 was reorganized as an Online Event and introduced new initiatives such as the Underwater Video Competition that can be safely delivered during the COVID-19 pandemic. Harumi was one of the key organizers of OCEANS '04, '08 and '18 in Kobe and helped bring the OCEANS conference in Asian Countries such as Korea (2012), Taiwan (2014), and China (2016) as a member of the OCEANS reconnaissance team. In addition, her work promoting AUV competitions in Japan have led to their significant expansion, and she was secretariat for the highly successful AUV2016 workshop in Tokyo. Her efforts have contributed to foundation of the OES Japan Chapter in 1998, which has led to the creation of a network of OES Chapters in Korea, China, Taiwan, and India. She is Senior Member of the IEEE Oceanic Engineering Society, and has served two terms as an elected member of the OES Administrative Committee. Her contribution to international conferences and workshops was recognized through her being awarded the 1st OES Presidential Award in 2014, and the prestigious OES distinguished Service Award in 2016.

Harumi Sugimatsu is a Research Fellow at the Institute of Industrial Science of the University of Tokyo, Japan, specializing in whale and dolphin echolocation with application to cetacean observation systems, and seabed mineral resource survey using AUVs. Her work in international collaborative projects to monitor Ganges River dolphins was featured in the May 2016 issue of IEEE Spectrum. She was awarded the Fujisankei Communications Group Award of the 25th Grand Prize for the Global Environment Awards in 2016 for her contribution to conservation of the endangered freshwater dolphins through the use of acoustic monitoring using advanced underwater technologies.

Harumi Sugimatsu earned a Master's degree from the Graduate School of Humanities, Gakushuin University, Japan. She is a member of the Marine Technology Society, the Japan Art History Society. She is also an accomplished artist credited with numerous exhibitions (http://sugimatsu-artgallery.world.coocan.jp/).

Statement: The activities of academic societies, organizing conferences and symposia, gathering participants, and attending these events are key to the formation and growth of research communities. Face-to-face contact with researchers with differing backgrounds is as important to advance a research field as publishing research papers in journals. While it is important to leverage the recent phenomenon of Social Networking Services (SNS) to bring our community closer together, it is more critical than ever for researchers to meet face-to-face and communicate in order to understand our different backgrounds and cultures. What is "face-to-face" communication during the restriction of a pandemic? As the Editor-in-Chief of the BEACON Newsletter, I had several opportunities to get in touch with OES members from different backgrounds and the various activities are involved in. Perhaps in normal times, we wouldn't choose to "get in touch" through an internet call, but in fact, with the right attitude and motivation, we can still feel close

even though we are far away. Recently, many conferences, symposia and chapter activities are operated in virtual or hybrid modes, but there are many lessons to learn from this and use to form new visions about how we manage academic societies during and after a pandemic. The OES Japan Chapter has played a central role in organizing the Symposium on Underwater Technology (UT), which was established to strengthen the network of ocean researchers especially in Asia. COVID-19 changed the situation, however reorganizing the UT21 symposium as an online event, making us think about new way and opportunities to present and communicate at the conference leading to initiatives like the Underwater Video Competition. These OES activities will continue to provide a stage for both face-to-face (of course we like it) and virtual communication, and through its continuing growth and development contribute to strengthening and expanding all OES members network on a global scale.

Instead of being "close but far away", I believe there is a path for us to be "far away but close" through networks like OES, where ever we are in the world!

ROBERT L. WERNLI (M'97-SM'06) received the B.S. degree in mechanical engineering from the University of California Santa Barbara in 1973 and the M.S. degree in engineering design from San Diego State University, San Diego, CA in 1985. He retired in 2005 from his career at a navy laboratory in San Diego where he specialized in the field of underwater robotics research and development. As president of First Centurion Enterprises, he has begun his second career as an underwater technology consultant and a writer. His most recent technical publication is *The ROV Manual, 2nd edition*; in fiction, he has published three novels. He has over 30 technical publications and was also editor and co-author of the book *Operational Effectiveness of Unmanned Underwater Systems*, published on CD-ROM in 1999 by MTS.

He has been actively engaged in promoting the oceans, including the use of remotely operated vehicles, by creating and chairing the first 10 Remotely Operated Vehicle conferences (ROV '83-ROV '92), and co-chairing the following: OCEANS MTS/IEEE '95, '03, '13 and '21, all in San Diego, and Underwater Technology '04 (Taiwan), '07 (Tokyo), '09 (Wuxi, China), '11 (Hawaii with OCEANS), '13 (Tokyo), '15 (Chennai, India), '17 (Busan, S. Korea), '19 (Kaohsiung, Taipei) and '21 (Tokyo—virtual).

Mr. Wernli is a member of the American Society of Mechanical Engineers, the Institute of Electrical and Electronics Engineers' Oceanic Engineering Society, and a member and fellow of the Marine Technology Society (MTS). He is a recipient of the MTS Special Commendation and Award and the MTS ROV Committee's Chairman Award and the OES Distinguished Service Award. During his career with the government he received the Exemplary Service Award, the Navy Meritorious Civilian Service Award and the prestigious Lauritsen-Bennett award for Excellence in Engineering.

Statement: My involvement within the professional societies has been driven by a desire to excel, especially in the international conference circuit. I've had the pleasure to chair 23 international MTS and IEEE/OES conferences where we initiated the first conference tutorials, web page, CD ROM proceedings, CD ROM Advance Program, DVD Proceedings and also took the ROV conference to three international locations (Aberdeen, Scotland; Bergen, Norway; Vancouver, BC). As a member and chair of the OES Reconnaissance (RECON) committee for over 15 years, my goal was to create a process that allows a group of society volunteers to effectively and efficiently plan and run OCEANS conferences around the world. This process was successful, resulting in OCEANS conferences in Germany, Australia, Spain, Korea, Italy, Norway, Taiwan, China, France, Canada and Scotland. During my two terms on the OES Executive Committee as VP for Conference Development, I worked with other society members to create documentation and refine the process of initiating and running future conferences. Most recently, I completed two terms as VP for Professional Activities where I was responsible for membership, chapters and the promotion of the society, which includes the website and Beacon newsletter. I feel my experience in these positions will help IEEE/OES fulfill its strategic goals of continuing to develop a successful international conference program that not only showcases the breadth of our technologies but also encourages and promotes future international networking and cooperation. As a prior AdCom member ('03-'08, '10-'12 and '18-'20), I welcome the opportunity to again join the AdCom and offer my experience in advancing the goals of the Oceanic Engineering Society.

GLENN A. WILSON (M'15-SM'16) received the B.App.Sc. degree in physics from Central Queensland University, Rockhampton, Australia, in 2000, and the Ph.D. degree in microelectronic engineering from Griffith University, Brisbane, Australia, in 2003. He is currently Product Manager—Subsea Solutions with Halliburton in Houston, Texas, USA; and recently led the launch of Halliburton's OdasseaTM Subsea Fiber Optic Sensing Solution for topside distributed acoustic sensing of subsea wells. He previously held technical and managerial roles at TechnoImaging, Rock Solid Images, BP, CSIRO, and The University of Utah. Between 2014 and 2018, he was an adjunct associate professor of petroleum engineering with The National University of Singapore's Faculty of Engineering. He is an Associate Editor—Rock Physics and Borehole Geophysics for the journal GEOPHYSICS, is a member of the SEAFOMTM steering committee that promotes the growth of fiber optic solutions in the upstream oil and gas industry, is a senior member of the IEEE, and is member of the AGU, EAGE, OSA, SEG, SPE, and SPWLA.

Statement: The IEEE Oceanic Engineering Society occupies a unique space in the greater oceans and related technical communities. Ocean engineering has significant relevance to the energy transition, whether in offshore energy generation and transmission, carbon transport and storage, and oil and gas production. This will occur upon in an environment of heightened environmental, social and governance (ESG) scrutiny. Our professional response to the transition will require collaborations across multiple societies internal and external of the IEEE, but our society can have a significant role in driving the broad ocean engineering agenda to ensure technical knowledge generation, capture, and transfer. My motivation to serve on the AdCom is to increase the society's exposure, engagement, and responsibilities within the energy transition.

If you have any questions about the IEEE Oceanic Engineering Society voting process, please contact **ieee-oevote@ieee.org** or +1 732 562 3904.

Welcome New and Reinstated Members

Canada
Ali M Bassam
Charles R Gallant
Shannon Hill
Alex Slonimer
Erin Louise Wetter

Chile
Victor D Pino

China
Mingyu Fu
Jianping Li
Qiang Li
Jiang Zhu

Colombia
Jhon Bermudez

France
Xavier Demoulin

Hong Kong
Lok Tim Pang

India
Malarkodi Amirthalingam
Supriya M Hariharan
Tony K P
Rohitha M
Koena Mukherjee
Sravan Kumar Padala
Panneer Selvam Rajamanickam
Suresh Rajendran

Israel
Barak Or

Italy
Benedetto Allotta
Edoardo Pasta

Japan
Shigeyoshi Goka
Yingyi Liu

Kenya
Lucy Patricia Onundo

Mexico
Christopher Michael Albert

Norway
Houxiang Zhang

Oman
Bekir Sahin

Romania
Andreea Mihailescu

Singapore
Anton Nigg

Switzerland
Jean F. Farjon

Tunisia
Roudayna Dehech
Dorra Hamrouni
Habib M Kammoun
Benkhalifa Mariam Mariam
Gharbi Nadine
Anis Watouti Anis

Turkey
Huseyin Ugur Yildiz

United Kingdom
Javier Contreras
Jade McMorland
Julian Douglas St Michael Porter
Kaiser Saeed
Navanna Shine

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Hugo Avila
Joseph Bell
Christian H Bellew
Brendon Bonner
Gaemus Collins
Donald T Darling
Joseph Dumont
Miguel Flores
Darnell Gadberry
Rosalena Gathers
Gerd Glang
James M Glynn Jr.
Rami Jabari
Jim Jacob
Sophie Jaro
Daniel Kim
Simone Marie Laveau
Richard P Lehner
Robert Ryan McClary
David McKean
James William McMahon
Ryan Miyamoto
Thomas John Morgan
Morgan O'Brien
Craig Martin Oxendine
Rodney Roberts
Nicholas Rahardiyan Rypkema
John F Vesecky
Neil R Weston
Candace Hope Wong
Steven Paul Yeager
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Strathclyde SBC Talks at NAOME—Amazon Web Services

Jake Walker & Iliya Valchev

The IEEE OES Strathclyde SBC (Student Branch Chapter) was delighted to invite Michele Sancricca—*Head of WW Technology* for Transportation and Logistics at Amazon Web Services (AWS)—to present his take on the next data revolution awaiting the Maritime Industry.

At the Strathclyde SBC, we have taken advantage of the new status quo for event planning and moved our presentation series *Talks at NAOME* (which is now in its 3rd year) fully online. The Naval Architecture, Ocean & Marine Engineering Department at the University of Strathclyde has previously hosted speakers from more than 20 organizations and academic institutions, including BMT on the Application of the Digital Twin and ABS International on Cybersecurity and Big Data in the Maritime Industry.

This time around, Michele—a retired Lieutenant Commander with 12 years in the Italian Navy—is our first guest from the USA. He was keen to present his opinions on technology innovation from the perspective of the world's most comprehensive and broadly adopted cloud platform.

His presentation "*How Cloud Technology can transform the Maritime Industry, reduce costs and cut emissions*" outlined one of the biggest problems currently facing the industry and how AWS is leveraging state-of-the-art cloud computing to reduce operational costs in shipping.

Michele quickly emphasized the benefits already experienced by maritime companies who already embraced the service-based economy in which AWS thrives. By serving a multitude of clients, operating at both a national and multi-national level, AWS allows more companies to benefit from an '*Economy of Scale.*' This principle enables AWS to offer faster technology, more secure networks, and better analytics than even the largest shipping companies could organize internally. Put simply, Maritime companies' time and resources are best spent on transportation of goods, not data processing, storage, and analytics.

"Maritime companies are sitting on a goldmine of data."

Data storage was outlined as one of the critical reasons why the industry is falling behind with data. The explosion in low-cost sensors now means that Maritime companies are sitting on a goldmine of data. However, many internal databases rely on fully structured *Data Silos*, which are disconnected and often overlap in purpose. The traditional silos are an expensive method to store data and are usually not designed to process the volume of data generated from shipping (often in the petabytes).

In contrast, AWS is pioneering *Data Lakes*—which are large, unstructured, and cheap storage platforms for all the data streams generated in the supply chain. This platform paves the way for more advanced data warehouses to sit on top of the data lakes and smaller databases that facilitate the analytics. Michele explains that by collating the data, Artificial Intelligence (AI), and analytics together on the cloud, shipping operators can gain a holistic view of their business without high costs.

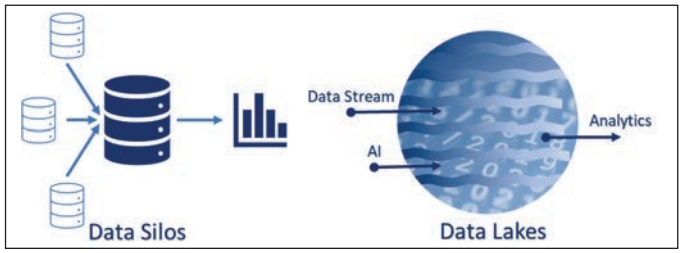


Figure 1.Traditional Data Silos vs New Data Lakes.

This platform's advantages have already become apparent to the early adopters, as what was once a business-to-business environment is now closer to a business-to-consumer world. Business clients desire the same experience as, for example, your day-to-day buying experience using e-commerce. They want to know exactly where their shipment is, when they can expect it, and their delivery driver's first name.

Channeling this information in a timely and secure manner is dependent on real-time analytics powered by AI. The predictive models that fuel the analytics platforms require a subset of AI called Machine Learning (ML). Specifically, Deep Learning (which is a type of ML) uses deep neural networks trained on large volumes of data to untangle the complex interactions hidden within the data and extract the knowledge.

Businesses have become interested in the broad applicability of Machine Learning and are now asking questions about what they can do with ML.

"Can I predict the time of arrival of a vessel so I can plan my landside logistics more efficiently?"

"Can I predict the time of arrival of a ship at the doorstep of my customer?"

"Can I predict the number of containers that I need to process in a port so I can plan my human resources efficiently?"

The answer to all these questions is yes. However, it depends on the available data. There are ML implementations in many fields (including logistics and transportation), but the key is good data—otherwise, there is no point. Above all, having data that is as close to real-time as possible enables a very good alignment between what the models are predicting and what is *actually happening* on the business side.

ML went from an aspirational technology to mainstream very fast, especially in the maritime industry. This transformation

was made possible by adopting cloud-based services, which increased access to computing power and the data for ML projects. ML is now impacting every industry because it is easy to use, whereas companies previously struggled to acquire enough IT power or storage to run big projects. Today 63% of global enterprises are investing to catch up with ML competitors, and total spending in AI is estimated at around $50 billion for 2021.

Michele closed his presentation with a "call to action" for the audience:

> *"Become a solution builder! Learn, be curious and start becoming familiar with cloud computing because this is probably the best thing to do to really strengthen your résumé!"*

This call offered the 50 enthusiastic participants who attended the talk a great way to get involved with cloud technology and was an impactful way to end the 2020 *Talks at NAOME* series.

The Strathclyde SBC would like to extend their thanks to Michele for his presentation, and we look forward to continuing the series in 2021!

For further information about this topic, or the IEEE OES Strathclyde SBC, please contact Jake Walker or Iliya Valchev {jake.walker}{iliya.valchev}@strath.ac.uk.

IEEE OES UNIZG SBC Activities

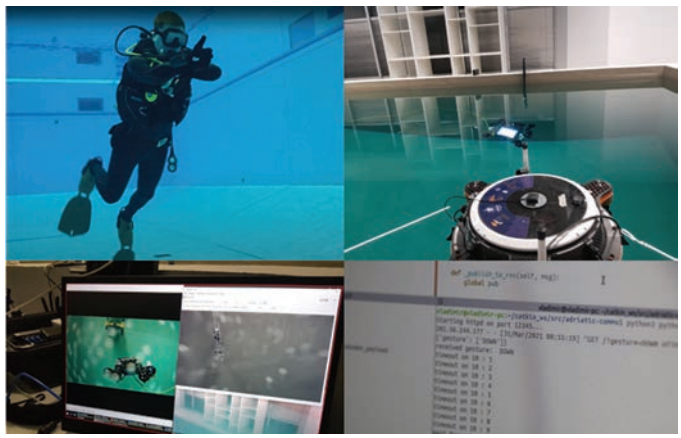
Nadir Kapetanović, Igor Kvasić, Anja Babić, Ivan Lončar

Despite the challenging time that we're faced with, IEEE OES University of Zagreb Student Branch Chapter (UNIZG SBC) members are giving their best to continue with the usual research activities. One of the essential parts of these activities are periodic tests of the equipment, marine vehicles and various algorithms developed for those vehicles. At the beginning of April, our members participated in diver-robot interaction trials at our soon-to-be-opened research pool in the newly renovated Laboratory for Underwater Systems and Technologies space. The end of April was marked with our trials regarding underwater communication and localization in Split, Croatia. During those trials, our members also participated in a webinar organized by Blueye company from Norway to show the integration of their Blueye Pro ROV with our newly developed autonomous catamaran. Dissemination of our knowledge and experience and promotion of our SBC are also very important for us, so we participated in two such events in May. On May 13 our members presented their research on underwater human-robot interaction modalities on the seventh in the series of events "Coffee with EUMR"—EUMarineRobots—Marine robotics research infrastructure networks, this time hosted by the University of Zagreb. As every year our research activities, underwater vehicles and ongoing projects were presented at the 2021 Croatian Science Festival with the goal of making the public eye more aware of the areas of our work and research laboratories.

Adriatic Project Remote Trials (March 29th to April 8th)

Marine robotics is one of the research fields that largely depends on experimental work. COVID restrictions and lockdown measures in 2020 brought physical collaboration possibilities, joint experiments, equipment sharing and field trials close to impossible. 2020 was the year that coincided with long-term LABUST plans for expanding and upgrading its laboratory facilities. With most of the people stuck working from home and project partners unable to travel abroad, a lot of initial concerns in designing a new experiment workspace went into addressing these challenges. One of the solutions aimed at enabling more work to be done remotely is equipping the indoor pool with underwater cameras, ceiling cameras and ultra-wideband localization systems. The idea of implementing such a setup is streaming as much data as possible and providing situational awareness to a remote user.

The first remote trials that put the described setup in the new laboratory to the test took place in late March and the beginning of April 2021. These trials were performed in collaboration with the Auckland Bioengineering Institute (ABI) from the University of Auckland, New Zealand. The goal of the



First remote trials in the new LABUST facilities—a diver in a pool in Auckland on the top left, the D2 AUV on the top right, a control and camera streaming PC on the bottom left and right.

trials was to test novel diver-robot interaction modalities developed through ONR-G project Adriatic. The scenario consisted of a diver equipped with sensors embedded in the diving suit and a gesture recognizing diving glove in a pool in Auckland, and the D2 AUV in the LABUST pool in Zagreb collaborating together. The diver used the smart diving glove to recognize gestures and send them acoustically to a poolside PC. The commands are then sent over a *http* server to a poolside PC in Zagreb and again translated to acoustic commands transmitted to the underwater vehicle. The vehicle executed simple movement actions mapped to these commands. The underwater cameras, as well as the cameras mounted on the vehicle, were streamed to Auckland to provide situational awareness, and the diver received a haptic feedback through the glove when a gesture was recognized and sent successfully.

Considering the distance between ABI and LABUST laboratories and the current travel and collaboration restrictions in force, it was practically impossible to do a joint experiment in person. Introducing existing and new technologies towards enabling such remote collaboration experiences promotes equipment and infrastructure sharing and helps crossing barriers standing in the way of science.

CUV-ME Trials (April 19th to 24th)

One of the significant challenges of underwater robotics is underwater localization on which many high-level functionalities such as mission/path planning and following rely. Trials that were organized from the 19th to 24th of April, 2021, in Split, Croatia, had inter-vehicle underwater localization and communication testing as the main objective. Degaussian station at Marjan peninsula, managed by the Republic of Croatia Armed Forces (OSRH), was a great location to work at with a full logistical support (location, work tent, divers, boats, etc.) provided by OSRH.

Degaussian station at Marjan peninsula, Split, Croatia.

Logistical support provided by the OSRH with boats and divers.

Morning briefing at the Degaussian station.

ASV Proteus with mounted SeaTrac USBL and downward looking camera.

These trials were organized in the scope of the CUV-ME project (Cooperative Unmanned Vehicles in the Maritime Environment). Sea trials were a great opportunity for all vehicles to be deployed at the same time and to work cooperatively. The primary objective was to assess the current navigational accuracy of all the mentioned underwater platforms, and the ability to communicate between surface and underwater platforms.

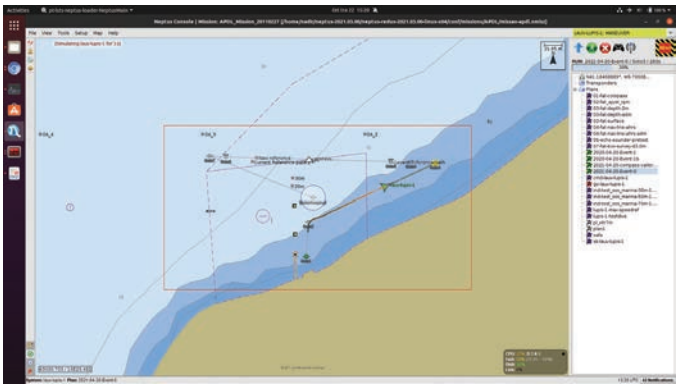
It was planned that the ASV would track the AUVs in its downward looking camera as a ground truth, but also provide a USBL beacon for acoustic underwater localization of those vehicles. A firehose was spread along a 200m long transect along which LAUV Lupis traversed and detected the firehose in its downward looking camera and in its side-scan sonar.

The D2 AUV was used to detect and track LAUV Lupis in its forward looking sonar imagery. All these data will be post-processed by a sensor fusion method in order to quantify how

much localization precision improvement does each and every additional sensor bring compared to the initial dead reckoning (with a DVL in the case of LAUV Lupis) navigation.

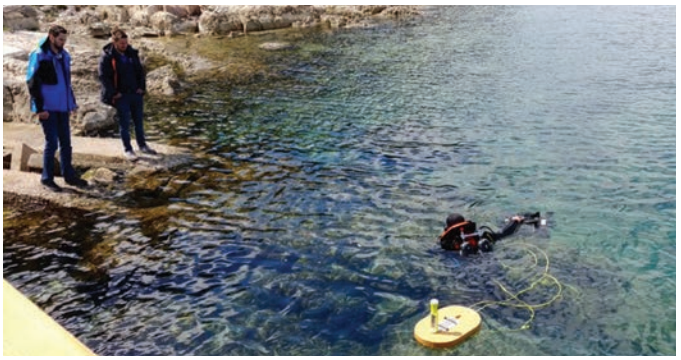
Another objective of these trials was to record datasets for diver detection in forward looking sonar imagery and for the detection of diver presence by detecting diver breathing/bubbles sounds recorded by a hydrophone.

The trials were successful at providing a proof of concept for cross-country USV-AUV communication and data exchange. Data collection was completed successfully with shown



Screenshot from Neptus mission planning and analysis software used for controlling LAUV Lupis and ASV Proteus.

Deployment of AUV D2 with an integrated forward looking sonar.



Experiment setup for recording the dataset of diver detection in forward looking sonar.

Deployment of LAUV Lupis from the side of a boat.

Experiment setup for diver breathing/bubbles detection recorded by a simple hydrophone.

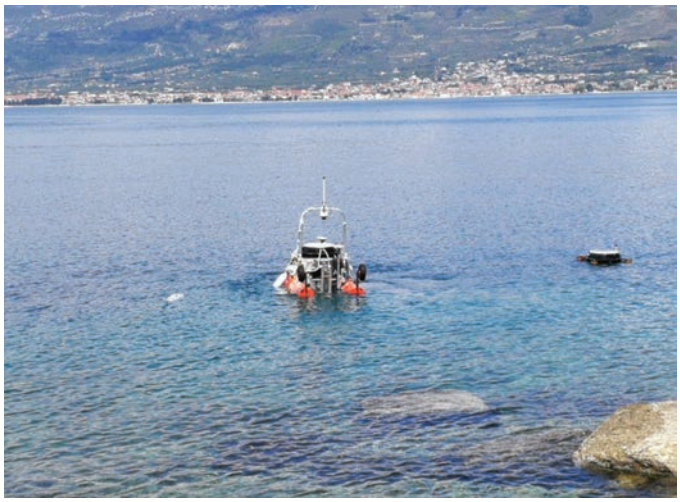
Group photo of all participants of the trials and the equipment.

reproducibility and repeatability. Additionally, capability to exchange underwater mapping data formats between the University of Zagreb and OSRH was validated.

Potential future testing should focus on research in fully autonomous detection, acquisition and tracking of AUV targets in sonar imaging. Autonomous visual tracking from the surface would provide ground truth for evaluating navigation precision of AUVs. Including OSRH autonomous vehicles into this framework would be beneficial for showing easy transfer of technology between different vehicles and to evaluate the current readiness and navigation precision of OSRH vehicles.

HEKTOR Project Field Tests (April 21st)

In the scope of the HEKTOR project (Heterogeneous autonomous robotic system in viticulture and mariculture, http://hektor.fer.hr/) our SBC members got a chance to acquire a Blueye Pro ROV from the Norwegian robotics company of the same name (https://www.blueyerobotics.com/).



Left: Blueye ROV, middle: ASV Korkyra, right: ASV Proteus.

Maiden voyage of the ASV Korkyra on the 21st of April, 2021, deployed at sea together with the Blueye ROV integrated with it.

HEKTOR is conceived as a modular and autonomous robotic system, adapted for various missions in viticulture and mariculture with the anticipated possibility of human intervention while performing various work, inspection and intervention tasks. The main objective of the HEKTOR project is to provide a systematic solution for the coordination of smart heterogeneous robots/vehicles (marine, land and air) capable of autonomously collaborating and distributing tasks in open unstructured space/waters.

One of the tasks of the HEKTOR project is to develop an autonomous surface vehicle (ASV) that could also be a docking station for the ROV, as well as provide a landing platform for an unmanned aerial vehicle (UAV). Because of these significant payload requirements, our previously developed ASV model (e.g., ASV Proteus mentioned above) had to be redesigned into a larger catamaran-shape ASV.

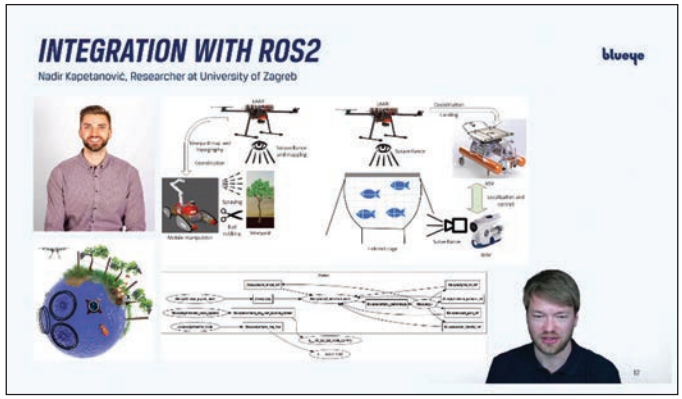
Since our members were already in at the Degaussian station, they also took time to launch the ASV Korkyra on its maiden voyage on the 21st of April, 2021, and test its manual and automatic controls and integration of the surveillance IP camera. Also, the ROS2 package that was developed by our members, which interfaces Blueye's SDK with ROS2 for future autonomy tasks, was tested, i.e., data sending between the ROV and the operator's PC with the ASV acting as a data relay in between the two.

Blueye Webinar (April 22nd)

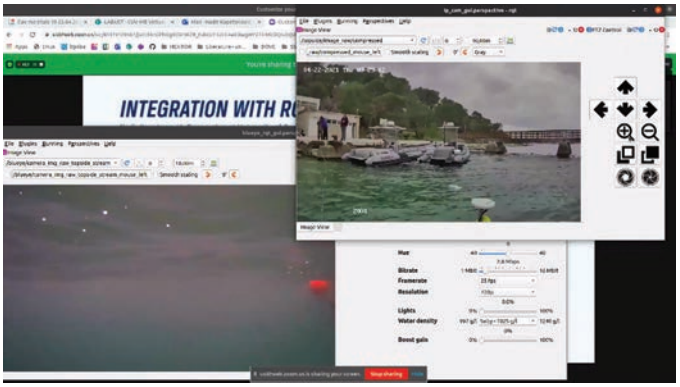
On the 22nd of April, 2021 the Blueye company organized a one-hour webinar named "Customize your setup with the Blueye SDK and API"

(https://www.blueyerobotics.com/webinar/customize-your-setup-with-the-blueye-sdk-and-api) hosted by Andreas Viggen, company's Senior Software Engineer. Blue ROVs are normally controlled by the Blueye app running on either iOS or Android devices. However, some of their customers have unique use-cases where they want to control the drones with their own software. Therefore, the Blueye company has developed the Blueye SDK—a python library that allows you to control the drone programmatically within minutes.

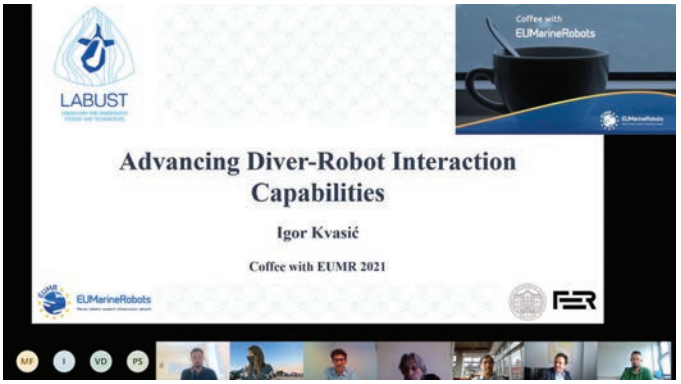
During the webinar, Andreas Viggen and Nadir Kapetanović (IEEE OES UNIZG SBC) have shown how to get started with the SDK. Andreas presented some stories from their customers



Screen capture of the webinar's presentation.



Screen capture of the live demo. Left: Blueye ROV-ROS2 graphical user interface used for video streaming and controlling the ROV. Right: Video stream from ASV Korkyra's surveillance IP pan-tilt-zoom camera showing the ROV in front of it.



Screen capture of the "Coffee with EUMR" webinar.

who have utilized the SDK for controlling multiple drones simultaneously and others that have improved their post-processing sequence of the media and log files via the API.

Nadir presented the HEKTOR project use case for the Blueye ROV, and described the Blueye SDK-ROS2 integration as a necessary functionality for any kind of future autonomous inspection tasks. Also, the guests of the webinar had the chance to watch a live demo of the ASV Korkyra and Blueye Pro ROV deployment and manual control, where the ASV was basically a data relay between operator's PC and the ROV. The complete recording of the webinar can be found on https://youtu.be/243JWUpxBY8.

Coffee With EUMR Webinar (May 13th)

As partners in the European Union's Horizon 2020 project EUMarineRobots (EUMR), the Faculty of Electrical Engineering and Computing, University of Zagreb, hosted the Seventh Coffee with EUMR webinar series, an online educational and training session with invited talks, exhibits and TNA experiments.

The scope of the EUMR project is to provide an access-infrastructure for the deployment of a full-range of aerial, surface, and subsurface marine robotic assets. UNIZG is part of the consortium that comprises 15 partners from 10 European countries who, collectively, can deploy a comprehensive portfolio of marine robotic assets with required associated support assets and expertise with a capital value well in-excess of €500M. Igor Kvasić presented LABUST's approach on underwater human-robot interaction capabilities. Part of the presentation was dedicated to acquainting the audience with the soon to be opened laboratory facilities and subsystems that enable remote access work, as well as the latest joint remote experiment results with TNA partners.

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