OES BEACON

Newsletter of the Oceanic Engineering Society

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

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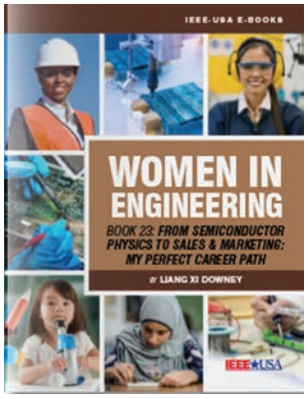


Members: $0.00
Author Liang Xi Downey shares with readers the varied set of life and professional experiences on her path.
https://connect.ieee.org/gC0K1U30f30PPH0aG000rfp

From the OES BEACON Editors

Harumi Sugimatsu and Robert Wernli

Welcome to the March 2021 issue of the Beacon. Hopefully you are enjoying this issue in a comfortable chair with a nice beverage, and not on your computer. It seems like our lives now revolve around a computer screen to communicate, hold meetings, and actually see a few friends. Hopefully, this is coming to a close and we will soon be able to hold in-person meetings and enjoy each other's company afterwards. The Global OCEANS 2021: San Diego—Porto committees, as this issue's ads and article show, are working hard to provide a virtual event that will have exhibitors and in-person technical programs this September. All technical papers, whether virtual or in-person, will be uploaded so that all registrants can access them in this Global hybrid conference. Keep our fingers crossed.

On a more positive note, a major thrust of the society has been to recruit younger members and get them actively involved in the society's goals. Our success in this area is evident since several have been elected to the AdCom. And, as our VPPA reports show, there is much activity on the YP and WIE fronts and the Earthzine is becoming very active. An excellent article is also included from our new liaison for the YP BOOST program. And we also have reports from the University of Zagreb Student Branch Chapter, the University of Florence Student Branch Chapter and the results of a poster competition from our Student Branch Chapter at the University of Strathclyde.

Our members have been active around the world as detailed in the reports from Hong Kong, Providence, Malaysia and our newest Chapter in Norway. A detailed report on the Underwater Robot Convention in JAMSTEC in 2020, supported by IEEE/OES Japan Chapter, is included.

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 how you can get involved. This includes a report on the OES technology committee on Data Analytics, Integration and Modeling. Also included is a call for Distinguished Lecturer nominees for 2022–2025. And, we'll soon be holding the election for our 2022–2024 AdCom members and we're also soliciting nominees for our OES awards.

This issue also has reports from our VP for OCEANS and our VP for Workshops and Symposia that give you the latest on the status of our upcoming events.

We also take pride in our members. For you clam lovers, be sure to see the latest Member Highlights and also "Who's Who in the OES" that showcases another one of our most active members, our Earthzine editor-in-chief. And we also honor our newest IEEE Fellow.

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.

2019.11 *2021.12*

Almost one year passed. Any changes?

2020 *2021*

Well, 2020 could have been a better year. Hopefully 2021 won't be as "hairy." Hope to see everyone in person at Global OCEANS 2021 in San Diego.

From the President

Christopher Whitt, OES President

I hope you are doing well during these interesting times.

We are entering an exciting period of challenges and opportunities. January of 2021 marked the start of the UN Decade of Ocean Science for Sustainable Development[1]. The Ocean Decade is an unparalleled effort to bring together all areas of science and technology, business, and governance. Not only do we seek to better coordinate existing ocean research, but also to inspire the next generation of ocean engineers and scientists as well as raise awareness within public policy communities, business and industry, and society at large.

There are a multitude of organizations supporting the Ocean Decade. Within OES, we expect to have sessions at OCEANS conferences, emphasis within our publications[2], connections to workshops and symposia where practical, and more. We have formed an *ad hoc* committee to coordinate all OES Ocean Decade efforts, and our volunteers have already engaged with the Ocean Decade planning process. We expect healthy communication between the Society, the Ocean Decade, and other supporting organizations. Contact me if you have ideas for how the Society can support the goals of the Ocean Decade.

Of course, all this new activity is occurring in the context of the pandemic. We saw most of our activities switch to a virtual format in 2020, and through the incredible dedication of our volunteers, our first ever virtual Global OCEANS 2020 was successful. While many of our 2021 activities will continue to be virtual or hybrid, we are watching carefully and hoping that we can welcome you in person to the San Diego portion of the Global OCEANS 2021: San Diego—Porto conference in September. If you cannot attend in person, there will be a virtual option, which is being handled by the Porto committee, so that you can still participate in the conference, wherever you are.

I'd like to introduce to you several new volunteer leaders. As is typical, you elected six new AdCom members last year to serve a three-year term from January 1, 2021 to December 31, 2023. AdCom is the administrative and governing body of the IEEE Oceanic Engineering Society, responsible for representing you, our members, in all areas of decision-making for the long-term health of the Society, including conferences, publications, finances, technical activities, and member and student activities. The AdCom class of 2021 is Gerardo Acosta, Farheen Fauziya, Fausto Ferreira, Malcolm Heron, Katsuyoshi Kawaguchi, and Venugopalan Pallayil.

In December, AdCom elected new officers to ExCom. I was elected President, Venugopalan Pallayil was elected VP-Technical Activities, Fausto Ferreira was elected VP-Workshops and Symposia, and Marinna Martini was elected Secretary. Since the new ExCom officers were existing or newly elected AdCom members, this led to several appointments to AdCom: the appointed AdCom members are Rosmiwati Mohd-Mohktar, Michael Lamoureux, and Andreas Marouchos.

Speaking of elections, nominations are now open for the AdCom class of 2022 (nominations are due by March 31)[3].

We look forward to connecting with you soon, as we keep working to bring together the ocean engineering, science, and technology communities.

[1]www.oceandecade.org
[2]https://earthzine.org/category/ocean-decade/
[3]https://ieeeoes.org/menu/request-for-oes-adcom-nominations-class-of-2022/

VPTA Column

Venugopalan Pallayil, Vice President for Technical Activities, IEEE OES

This is my first report after assuming charge as the Vice-President of Technical Activities (VPTA) for IEEE OES. My term of appointment is for two years, starting from 01 Jan 2021 to 31 Dec 2022. With support from Dr. Malcolm Heron, the previous VPTA, I was able to get started with my duties without much delay. My assertion is that most of the technical activities are still going to be virtual for this year. The return to normalcy (or herd immunity) from the virus looks uncertain in many countries either due to the lack of enough supply of vaccines or ineffectiveness of some vaccines against variants of the virus. Resumption of regular international travel hence looks very remote at this point in time. Even if some travel is permitted, there may be less takers and some airlines even insist mandatory vaccination for its passengers. And don't forget that OES is not able to support any travel this year for activities under VPTA due to the current financial crunch arising from cancellation of many conferences, workshops and symposia. Below is an overview of what has been happening in the different areas under VPTA.

Technology Committees (TC)

Dr. Shyam Madhusudhana (Shyam) will continue as the coordinator for the TC until 2023. His appointment was confirmed by the AdCom during its virtual meeting held in Dec 2020. Thanks for his continued support. With the dissolution of the Standards Technology Committee (STC), we now have 11 Technology Committees. The objectives of the STC will now be progressed under the OES Standing Committee on Standards established with Dr. Christoph Waldmann as the Chairman. This committee will operate under the watch of the OES President. Another exciting development has been that many of our members, including student members, have signed up for the various TCs. This has been possible largely by the effort of the previous VPTA. It really opens up opportunities for the TC Chairs for a better engagement of OES members in the technical activities of the Society.

We had the first TC Chairs meeting on 11 Feb 2021 under the coordination of Shyam. The level of commitment from TC Chairs was evident from the fact that the meeting was very well attended, even though some of them had to wake up before 5am to make it to the meeting while others had to be awake beyond 10pm. It was more than a meet and greet virtual meeting, and many ideas have been discussed on how to step up the TC activities. There was a suggestion to make use of the OES YouTube channel for the TC activities such as webinars, panel discussions and workshops. I would like to request as many members as possible to sign up for the channel. The link to the channel is here: https://www.youtube.com/channel/UC6wjVn-DY2-BmzdS8LzxrdHQ?feature=emb_ch_name_ex. We will be looking at streaming some of our activities and webinars in the coming months over this channel. There is also a plan to host recorded versions of the talks and some special events from OES sponsored conferences, workshops and symposia, etc., on this channel. One of the priorities for the TCs would be to complete setting up of their respective websites. TCs can now take advantage of the members, who have signed up as TC committee member, for this task. So far, only three TCs have setup their websites even though the guidelines and tools for setting up the websites have already been shared with TC Chairs a few months back. Please get in touch with Shyam or me if you need further help on this. We would like to see this completed in the next couple of months. Details of the TC activities, such as webinars, workshops and symposia, etc., will be shared with the OES members, and we have some exciting talks and webinars lined up in the coming weeks and months. TC Chairs have also been requested to contribute to the Beacon, and I am glad that a couple of articles will be appearing in this edition. Yet another area that the TCs could help with is on review of papers arising from OES co-sponsored workshops and symposia.

Chapter Activities

Dr Gerardo Acosta (Gerry) will continue as the Chapter Coordinator for another 3 years from 01 Jan 2021. Two new joint chapters have been formed this year; one under the Russia IEEE Section and the other under the IEEE Indonesia Section. The Indonesia joint chapter is formed between IEEE OES and the Technology and Engineering Management Society (TEMS). The Russian joint chapter comprise members from 7 different societies. The details of these joint chapters and their proposed activities will be covered by the chapter coordinator in a separate article. Most of the chapter activities, such as technical talks and student competitions, are also going to be over virtual platforms this year. As per the current information, there is no financial support available for chapter activities in 2021. We are also updating the information about new chapter chairs on the OES website. I would like the current chapter chairs to bring in young and energetic volunteers to serve on their committees, including its chairmanship. This would give them a sense of responsibility and contribute more towards chapter activities and also help to bring in new members. Those who have been serving as chapter chairs for the past few years could still continue to serve on the executive committee and provide necessary guidance and advice to the new committee.

Distinguished Lecturers (DL)

The appointment of Dr. James Candy and Dr. Ken Foote for another term has been confirmed after their acceptance. Thanks to their continued support, and also all the DLs, who

have been contributing to this programme over years. The first DL for this year will be delivered by Dr. James Candy in collaboration with the University of New Orleans (UNO). The talk will be on "Ocean Acoustic Signal Processing—a Bayesian Approach" and is scheduled for early March 2021. The link to this virtual presentation will be shared once the date and time are confirmed so that anyone who has an interest can attend the talk. Two of the current DLs, Dr. Sandy Williams and Dr. Marcia Isakson, have expressed their inability to continue in their post due to a change in their professional careers. Their terms as DLs have been terminated with immediate effect. A call for nominations for DLs for a new term of 4 years commencing from Jan 2022 have been announced and is published in this newsletter. The call will also be posted on the OES website as well as on our social media outlets. I request the TC coordinator to work with the TC Chairs to find suitable candidates for further actions. The nominations close on 31 July 2021.

First 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.

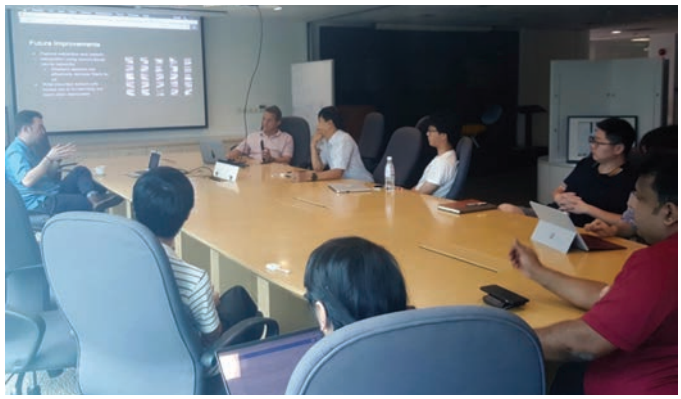
Requirements

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

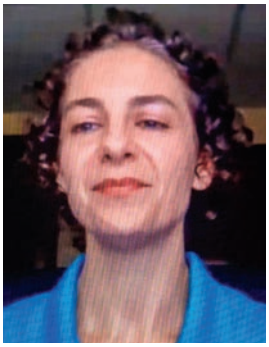
The Distinguished Lecturers will start their four-year term in January 2022. Each Lecturer should submit topics in his/her field of expertise that will be posted on the Society Website. The Distinguished Lectures should be readily available to travel within their geographical area upon contact by the 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



Certainly 2020 was a tough year for all of us, including IEEE Oceanic Engineering Society volunteers. Does my picture look grainy? It's because it's a virtual screen shot from Global OCEANS 2020 caught by our photographer Stan!

As part of the Local Organizing Committee for the first virtual Global OCEANS conference, which had the tough task of pivoting to go virtual, I was very happy with how our expanded Young Professionals (YP) and Women in Engineering Programs (WIE) turned out. If you missed it, keep an eye out for the panels to be released later this year by subscribing to our IEEE OES YouTube channel.

I have spent the first part of 2021 updating the VP Professional Activities processes and procedures, building my team, and successfully conversing with motivated members who will continue or join roles in the standing professional activities committees.

Membership Development Committee

In our Membership Development (MD) committee, Farheen Fauziya will continue her role as the OES liaison to Women in Engineering (WIE) and Roberto Petroccia (YP Boost 2019–2021) will join us as the OES liaison to Young Professionals (YP). I have also secured a Membership Development Committee chair (MDC) who is awaiting appointment approval. This member is enthusiastic about supporting our members and has lots of new ideas on how to do that. A clue, it's one of our YP Boost awardees. Find out who in the next update…

Now in its fourth year, the Young Professionals (YP) Boost program continues to be a resounding success! Our YP awardee alumni continue to move into leadership positions, including the Administrative Committee, Executive Committee and chairing standing and technical committees. We did not select new awardees in 2020 due to the global pandemic, and instead extended all YP Boost awardees terms for one year. Get Ready, the program resumes this fall!

While last year was rough budget-wise and stalled some of our ambitious goals, we continue working on developing a similar program to support OES WIE members.

You'll want to watch and share the WIE testimonial video which features four of our outstanding IEEE OES WIE members and their thoughts on what makes IEEE OES Home.

Student Activities Committee

Jeff Dusek (YP Boost 2020–2022) continues as our Student Activities Committee Chair. Last year was a tough year for engagement, but Jeff has some great ideas on how to increase participation and grow our student membership in real life and the virtual world.

Despite lack of use, we still remember the passwords for those tablets we used to sign up students on the spot, and hope to put them to good use at the next Global OCEANS live in San Diego. While opportunities to attend OCEANS in person weren't possible in 2020, many students attended virtually and both the Singapore and Gulf Coast virtual Student Poster Competitions were a success. The number of active OES Student Branch Chapters continues to grow with the new UNIFI-UNIPI Joint Student Branch Chapter in Florence, Italy.

Promotion Committee

Steve Holt continues as our Webmaster and Promotions Committee chair. Here's your annual reminder: If you haven't visited lately, please take a look at https://ieeeoes.org/ and give us feedback on what you'd like to see.

Stephanie Kemna (YP Boost 2019) is keeping our calendar up to date, which was no small feat in 2020 with almost continuous cancellations and changes.

Harumi Sugimatsu and Robert Wernli are doing a great job engaging members to contribute to our Society newsletter, the Beacon. The articles in html format available on the OES webpage make it easy to share opportunities and information with our members, and make a virtual connection.

Hari Vishnu (YP Boost 2019–2021), Editor in Chief (EIC) of Earthzine, is working hard with the Earthzine editorial team to bring a wider audience to the work the OES is doing. Rajat Mishra (YP Boost 2020–2022) continues to ensure the Earthzine site and submission portal are running smoothly and the

Left to Right: Jeff Dusek (Student Activities Chair), Brandy Armstrong (VPPA), Farheen Fauziya (WIE Liaison), Roberto Petroccia (YP Boost 2019-2020, YP Liaison), Hari Vishnu (Earthzine EIC, YP Boost 2019-2020), Shyam Madhusudhana (YP Boost alumni, Administrative Committee, Technology Committee Chair).

search engine is optimized to serve our members and editorial staff. Student volunteers have cleaned up some broken links and other issues left over from the move to the new site. Earthzine's audience continues to grow. Please reach out to Hari to get involved or publish with Earthzine!

In its fourth year, our social media initiative continues to be an effective avenue to share information and opportunities with our members and to reach potential new members. Our online following continues to grow on Facebook, Twitter, LinkedIn, Instagram and YouTube.

This year's initiative, which combines the skill and creativity of social media coordinator Manu Ignatius and YP Boost Awardee Rajat Mishra, will focus on opportunities to collaborate with members to create video and audio content, including testimonials and podcasts, which will reach a larger audience. We hope to attract new members who can benefit from OES opportunities and technical expertise.

As part of last year's initiative to collaborate with publicationswhose audiences share common interests, several of our members participated and reached a wider IEEE audience. Krista Beardy was featured in IEEE Transmitter for her work on understanding how plastic is negatively affecting the waters we depend on. Senior members Roberto Petroccia, Fausto Ferreira and Gabriele Ferri were also featured by the IEEE Transmitter discussing the valuable role autonomous underwater vehicles play in the maintenance and observance of our oceans, seas, rivers and lakes. Hari Vishnu and I were interviewed by IEEE TryEngineering for the first TryEngineering Tuesday webinar of 2020 and helped create a TryEngineering Ocean Engineering profile, both aimed at introducing more students to Ocean Engineering.

Manu and Rajat collaborated with several of our members, focusing on YP and WIE, to create testimonials, which can be viewed now on our YouTube channel. If you would like to be part of the next testimonial, please reach out to me at vp-professional-activities@ieeeoes.org .

See You at OCEANS!

I hope to see you all this fall in San Diego or virtually from Porto and around the world. Last year Manu Ignatius and Rajat Mishra helped me organize our first ever virtual booth. We continue to create and update content that can be used for our virtual booths at OCEANS and OTC. Please be sure to get involved at the next Global OCEANS or OTC meeting and look for me at the real life or virtual Society booths!

From the Vice President for Workshops & Symposia—A Transition Year

Fausto Ferreira, Vice President for W&S

In December 2020, I was elected VP for W&S to complete the mandate of Philippe Courmontagne until the end of 2021. First of all, I ought to thank the previous VP for W&S and recognize his work in raising the level of our workshops and conferences, including navigating the waters of the complex pandemic year of 2020.

Philippe oversaw the transformation of some conferences to virtual events (e.g., AUV 2020), the cancellation of others and the postponement of several conferences from 2020 to 2021.

With the COVID-19 pandemic still affecting the world, 2021 will be a transition year. While some of the conferences are moving to a full virtual event, others are considering hybrid or potentially face-to-face meetings.

Remembering those times of face-to-face meetings (OCEANS'18 Kobe).

By the time this newsletter is published, we will already have run (successfully I am confident) Underwater Technology 2021. This symposium took an innovative approach in these unprecedented times. Recognizing the value of a full face-to-face meeting, the organizers decided to postpone the conference to 2023 and implement a new concept of a virtual event. In 2021, an underwater video contest is taking place instead of a traditional conference with paper presentations. Attendees can vote on the best video (that can be technical or not) and a final event will present the winners. Videos do not need to be related to a technical presentation, thus promoting creative forms of presenting research work. A special award for the best student video will also be given in the final award ceremony. Affordable registration fees ensure wide participation. This novel approach keeps the community engaged and allows for the presentation of the latest developments without the constraints of setting up a full virtual conference.

For the remainder of the year, there are several workshops/conferences in preparation. These include among others, the Antarctic and Southern Ocean Forum (ASOF) 2021, the China Ocean Acoustics (COA) 2021 and the Underwater Communications and Networking (UCOMMS) 2021. All these conferences were initially forecast for 2020 but have been postponed to 2021, hoping for better times. These conferences are scheduled for the second semester of 2021, and while there may be a possibility of having attendees on-site, all conferences are considering having a virtual component. I encourage you to regularly visit each conference website for updates on the mode and schedule of events. As VPWS, I have started having calls with the Local Organizing Committees (LOC) to ensure planning is under way and contingency plans have been made to quickly adjust to the global situation. While there is still a lot to learn, we can leverage on the experience of other LOCs that organized full virtual events in 2020.

My priority for this year will then be two-fold. On one side, work with the LOCs of planned conferences to ensure that these events will explore the best option according to their ambitions, resources, and health and safety concerns. On the other side, I will look into the future and lay ground for future conferences that may need to include a virtual component for the time being and in the near future. This priority will be materialized in the update of the current Guidelines for the organization of Workshops & Symposia to reflect the virtual/hybrid world and the proliferation of smaller, topic online meetings.

Online meetings have become more and more popular and are an opportunity to keep our membership engaged and provide high quality technical information to our members and the wider audience while waiting for the return to the so-wished face-to-face meetings. I will work with Vice President for Technical Activities and all the members of the Executive Committee, Administrative Committee and any interested volunteer to help organize online events and define guidelines for the implementation of such events, taking into account the recent guides and tips from IEEE for hybrid and virtual events.

Collectively, we would like to take the opportunity to create more conferences in emerging topics and addressing regional areas less represented in the past, taking advantage of the virtual world and leveraging on our Chapters and Technical Committees. Similarly, collaborations with other societies and co-sponsorships reflecting mutual benefits will keep being explored and possibly expanded. If you have suggestions on how to improve current workshops or proposals to introduce new ones, please contact me at vp-workshops-symposia@ieeeoes.org.

OCEANS Conferences 2021—Where are We Now?

John Watson, OES Vice-President for OCEANS

Your VP OCEANS staying at home.

Well, here we are into February 2021 and we are still very much reeling from the effect of the COVID-19 virus. The impact is still being felt across all our OCEANS Conferences. After much discussion, heart-searching and crossing of fingers, I am happy to let you know that the two LOCs of Porto and San Diego, scheduled for 2021, have decided to join forces and go for a single Global **OCEANS 2021: San Diego—Porto** event. However, unlike last year's Global OCEANS 2020, the hope is that this will feature both in-person and virtual components; in fact, it will be the first hybrid OCEANS. The San Diego component will be predominantly in-person and will be held in the San Diego Town & Country Resort complex and the Porto component will focus on virtual activities.

Although joining forces, the two teams will maintain their distinct identities and promote their own Conference themes of "*Sustaining our Oceans… Sustaining our Future*" (San Diego) and "O***pening the Ocean Frontier: A New Age of Discoveries***" (Porto). In addition, there will be a joint kick-off with the United Nations of its IOC "*Decade of Ocean Science for Sustainable Development*."

I particularly was looking forward to attending Porto for the first time and returning to San Diego for the third (at least!) time, but unfortunately, it's not to be. However, I think I speak for all when I extend support to the Porto Chairs (Antonio Pascoal, Joao Soares, Eduardo da Silva) and the San Diego Chairs (Alan Kenny and Bob Wernli) and wish them well in their drive to maintain the traditional standard of OCEANS and make this another memorable conference.

All the latest information on what you should do and how to attend is on the web site at https://global21.oceansconference.org. The dates are 20–23 September 2021—put them in your diary now.

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:

- Y.C. Lin; C.J. Earls, "Validation Experiment of a Single-View Image-Sequence Algorithm to Identify Scale and Sea-State Characteristics."
- M. Goldschmidt; J. Horn; M. Jonson; R. Medvitz, "Modeling of a Marine Hydrokinetic Cycloturbine Vehicle."
- M.J. Kuhlman; D. Jones; D.A. Sofge; G.A. Hollinger; S.K. Gupta, "Collaborating Underwater Vehicles Conducting Large-Scale Geospatial Tasks."
- Y. Miao; Y.V. Zakharov; H. Sun; J. Li; J. Wang, "Underwater Acoustic Signal Classification Based on Sparse Time-Frequency Representation and Deep Learning."
- I.R. Urazghildiiev; B. Martin; D.E. Hannay, "The Accuracy of Bearing Estimates of Wideband Signals Produced by Marine Animals."
- Z. Xu; M. Haroutunian; A.J. Murphy; J. Neasham; R. Norman, "An Integrated Visual Odometry System for Underwater Vehicles."
- S. Wang; M. Yang; Y. Wang; S. Yang; S. Lan; X. Zhang, "Optimization of Flight Parameters for Petrel-L Underwater Glider."
- T.I.B. Lønmo; A. Austeng; R.E. Hansen, "Data-Driven Autocalibration for Swath Sonars."

- G.C. Eastland; P.L. Marston, "Time Evolution of Bistatic Acoustic Scattering: Mechanism Loci Identification for Broadside Cylinder Near a Flat Interface."
- Y. Wang; Y. Ji; H. Woo; Y. Tamura; H. Tsuchiya; A. Yamashita; H. Asama, "Acoustic Camera-Based Pose Graph SLAM for Dense 3-D Mapping in Underwater Environments."
- X. Yi; X. Wu; X. Yue; L. Zhang; Z. Chen; B. Wan, "Ocean Surface Current Inversion With Anchored Floating High-Frequency Radar: Yaw Compensation."
- G. Chua; M. Chitre; G.B. Deane, "Long-Lived Bubbles and Their Impact on Underwater Acoustic Communication."
- S.M. Murphy; L.M. Zurk; M.E.W. Coffin, "Processing Continuous Active Sonar Transmissions to Achieve an Arbitrarily Fast Update Rate With Full Instantaneous Bandwidth."
- X. Tian; L. Zhang; H. Zhang; Y. Wang; Y. Liu; Y. Yang; L. Song, "The Optimal Lift-Drag Ratio of Underwater Glider for Improving Sailing Efficiency."
- D. Chwa, "Adaptive Neural Output Feedback Tracking Control of Underactuated Ships Against Uncertainties in Kinematics and System Matrices."
- J.T. Klamo; K.I Yeager; C.Y. Cool; T.M. Turner; Y.W. Kwon, "The Effects of Cross-Sectional Geometry on Wave-Induced Loads for Underwater Vehicles."

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/

Dana Yoerger—Elevation to IEEE Fellow in 2020

Jay Pearlman, OES AdCom Member

We would like to congratulate Dana Yoerger on his elevation to IEEE Fellow in 2020. This elevation recognizes his exemplary contributions to ocean science and engineering. Dr. Yoerger is a legendary figure in marine robotics who played a key role in creating and operating major "facility class" ROVs (Jason) and UAVs (ABE, Sentry) used by scientists from around the world, with another now coming online (Mesobot). ABE led the way for UAVs that map unique deep sea environments, in particular spreading centers on the Mid Ocean Ridge. Sentry has carried out over 500 dives under the National Deep Submergence Facility (NDSF). Sentry surveyed challenging seafloor environments including underwater volcanoes, hydrothermal vent sites, and detachment faults. After the Gulf oil spill, Sentry made detailed maps of the mid-water hydrocarbon plume and assessed deep water coral sites. Later, Sentry aided in the search for the

Voyage Data Recorder from the lost vessel *El Faro*. Dana made key contributions to NDSF vehicles, including the vehicle conceptual designs, contributing to their navigation and control systems as well as their mapping capabilities, and serving as ABE and Sentry expedition leader on dozens of expeditions. Dana Yoerger is an author peer-reviewed papers with some 10,000 citations. The Fellow elevation recognizes Dr. Yoerger "for the development of autonomous underwater vehicles that provide powerful tools for deep ocean science."

Again, our congratulations to Dana Yoerger.

A New OES Liaison for the Young Professionals BOOST Program

Roberto Petroccia, IEEE Senior Member, OES Liaison for the Young Professionals BOOST Program

When I was asked to write a story about myself, my first thought was "Oh boy!" Don't get me wrong, I am very social but I do not like to talk that much about myself, however, I am happy to embark in this journey with you.

Here I am.

The first thing I would like to share is how I became a scientist working on underwater communications and networking. I am a small-town boy and when I say small town, I mean very small … about 4000 people on the hills in the central part of Italy … far from the sea. In high school I studied Latin, Ancient Greek, philosophy, literature with very limited math, science and nothing related to computers. However, after high school, I decided to study Computer Science because I liked the topic (why not?). I moved to Rome to study at La Sapienza University. I did not know anything about programming languages and never sent an e-mail or had an e-mail account before my first year at University (something crazy nowadays). It was hard but I managed to get my Master's Degree (summa cum laude) in 2006. I never thought about doing a Ph.D. but since it was an interesting challenge I said, "why not?" and I applied to the Computer Science Department at La Sapienza University. My main focus was terrestrial wireless ad hoc networks and I never heard about underwater networks at that time. During my Ph.D., I had the opportunity (thanks to my advisor Prof. Chiara Petrioli) to spend some time in USA as visiting researcher at the Sandia National Laboratory in Albuquerque (NM) and at the Northeastern University in Boston (MA).

At that time, my English ranged from poor to none, but it was a fun experience. While in Boston, I had the honor and pleasure of meeting Prof. Milica Stojanovic, a prominent figure in the domain of underwater acoustic communications and networking (I am sure all of you know her). This was a key moment in my life. I became fascinated by this research topic and I decided to start diving into this new area. I was particularly happy because, although I grew up on the hills, I was (and still am) in love with the sea, always willing to get a diving license and start exploring under the sea surface. At the beginning it was hard, well it was very hard, since I did not have any background in acoustics or engineering-related fields. I have to thank Milica for her patience (also with my poor English) and for much more. In the end, I did part of my Ph.D. in Boston (at MIT and Northeastern University) and part in Rome, traveling back and forth. Unfortunately, this did not help in completing the course to get my diving license. In 2010, I finally got the diving license and also completed my Ph.D., with a thesis on terrestrial and underwater networks. I then started working as a Researcher at La Sapienza the University, focusing on underwater networks and applied research. Working on simulation and analytical studies was okay, but I always wanted to test and validate the networking protocols and strategies I was designing and developing in the field. I had my first at-sea experimentation in 2010 at the Woods Hole Oceanographic Institution (WHOI) with the team of Lee Freitag (thanks Lee and the team

While diving in the Mediterranean.

for the great opportunity) and then at the NATO Centre for Maritime Research and Experimentation (CMRE), at the time called the NATO Undersea Research Centre (NURC). That was only the beginning, in the following years I started traveling around the world, performing several sea-trials per year in cooperation with research centers, industry and academia. I was spending seven to eight months per year away from home. During this time, I also managed to improve my English and obtain two additional diving licenses (Advanced and Master level). In 2012, together with colleagues from the University, we set up a spin-off company called WSENSE, which was a great experience for me. Finally, in 2015, I left the University and the company and joined CMRE, where I am currently working. At CMRE, I had the chance to significantly improve my expertise and take advantage of incredible opportunities: conducting cutting-edge research, leading sea-trials and joining landmark initiatives like JANUS, just to cite a few. It has been an absolutely amazing journey so far.

During a sea trial in the Trondheim fjord (Norway) in 2013.

Although I joined the IEEE Society in 2010, I only joined OES in 2019. That year, I was selected as one of the two young professionals (YP) for the OES YP-BOOST Program. I have to admit that I regret not joining OES earlier and I encourage all of you to be part of this Society. OES has expanded my network and given me so many opportunities, and now I feel it is my time to give something back. I started being more and more involved in the OES activities and I am now the OES liaison for the YP-BOOST Program. My plan is to engage as much as possible with students and young researchers, thus having the possibility to work together and share new opportunities and challenges.

With my two ladies during our wedding in 2018.

I apologize for the long journey through my professional career (I hope you did not get too bored), but I did it for a reason. A lot of choices I made were purely driven by my passions without looking at the challenges, thus reaching the point where I am so fortunate to be able to say "I love my job." I am sure that if I made it, you can do it too, so … "Follow your passions and don't be afraid of the challenges."

The second thing I would like to share with you is related to my personal life and other passions. I promise, it is going to be short this time. Apart from loving to dive, I like to practice sports, in particular: running, soccer and badminton. In regards to badminton, I was competing at the national level during my teens and I have so many great memories. I also like motorbikes and the adrenaline they give you during a nice ride on the hills with friends.

I am married to Sara, who was my girlfriend during my Ph.D. and traveling time. Sara was (is) very patient with me, when I was travelling we did not see each other that often … this is probably the reason why we were together back then. Sara is so amazing that I decided to marry her twice (or she decided), first time in 2015 (civil wedding) and second time in 2018 (religious wedding). I am not sure if we will go for a third one, but if so, it will be another big YES from me. We now have a beautiful daughter (Carla). She is five years old but already acts like an 18 year old … hope things with her will improve in the coming years, or at least this is what I keep repeating to myself. We love traveling and seeing new places but COVID has changed our lives in that respect. I am sure all of us are waiting for the pandemic to release its grip in order to be able to go back to some level of normality, start traveling and spending some time together again. Let us hope this will happen soon.

If you are interested in my story and YP program, please visit the OES YP program website: https://ieeeoes.org/young-professionals/

We are currently updating the webpage. The plan is to receive applications for the YP-BOOST Program by Sept-Oct 2021 in order to have the selected candidates starting the 1st of January 2022 with the support to participate in future OCEANS Conferences in 2022 and 2023.

From Your Chapter Coordinator

Gerardo "Gerry" Acosta, OES Chapter Coordinator

Gerardo Acosta, Chapter Coordinator

2020 has gone, with plenty of new experiences for everybody. Different situations in our lives, and our works, yielded different flavors, and surely different lessons for all of us. Nonetheless, the activity within OES chapters all along the planet was maintained in a high standard. A chapter was created, in the last part of last year, in Norway. John Potter is the interim chair of this Norwegian Chapter. Even in this short period of 2021, Russia Section counts with a new joint Chapter with OES included, and the new chair is Igor Shirokov. Indonesia IEEE Section, for its part, has a new joint Chapter (OES + TEMS), with Marina Frederik as the chapter chair. Welcome to all of them!! They all have great plans for the near future. John Potter is describing an excellent view of this in a separate article. The Indonesia chapter is planning to organize exciting activities like webinars on acoustic tomography technology and Safe Ocean, tsunami early warning, a virtual conference, OETCON (IEEE Ocean Engineering and Technology conference) in October in Jakarta, among others. Near there, the Malaysia chapter is planning to organize and support a Technical Workshop on Underwater Technology, the National Seminar on Underwater System Technology, the Malaysia AUV Challenge and the Int. Conference on Underwater System Technology: Theory & Applications—USYS 2021, among other very interesting activities.

We will not be able to provide financial support for chapters during this year, due to the pandemic crisis that decreased our revenues as our new VPTA, Venugopalan Pallayil, explains in an article elsewhere in this Newsletter. As you may know, new volunteers were elected during last December and "Venu," from Singapore, will lead the Technical Activities for a period of two years. Best luck for him in this new position! We would like to thank also the great labor of our previous VPTA, Mal Heron from Australia.

And finally, please remember to submit L31 report to inform your activities in IEEE OES and a brief article in the BEACON Newsletter. Try to include an outreach element that promotes the Society and its membership in your chapter activities.

Stay upbeat and healthy!

The Vikings are Rising Again! The Establishment of a New Norway OES Chapter

John R. Potter, Interim Chair, Norway OES Chapter

The Vikings have a long and venerable history of maritime excellence and competency, tested in harsh conditions. They may even have 'discovered' and opened trade with North America, long before Columbus.

In more recent times, OES and MTS supported an OCEANS conference in the historic city of Bergen, but since then, OES activity in Norway has waned, and the OES Chapter disbanded. This is a great pity, because Norway has so much to offer the international ocean engineering community, and currently finds itself in at a special juncture in time and place. Let me explain.

50 years ago, Norway was an unassuming, quiet country, where its ~4 million citizens enjoyed their mountains, glaciers and deep coastal fjords in relative isolation from the rest of Europe and, indeed, one might even say the world. Then they discovered oil and gas in their offshore economic zone, and things were never the same again. In 1994 Norway joined the European Economic Area and Norway has since played an increasingly important role on the world stage.

Fast forward to 2021 and Norway is prosperous, with offshore hydrocarbon production its biggest export, followed by aquaculture. So to say that Norway is deeply involved in ocean engineering would be an understatement; the ocean is inextricably woven into the fabric of its history, geography, culture and economic fundamentals.

Trondheim, Norway's third largest city, hosts the Norwegian University of Science and Technology (NTNU), which has as one of its strategic focus areas, the Oceans. Then there is the Foundation for Scientific and Industrial Research (SINTEF), one of the largest independent research organisations in Europe, which of course has an Oceans division (with some 2000 employees). Surrounding NTNU and SINTEF in Trondheim are several hundred small-to-medium-sized enterprises involved in marine technology and engineering, developing everything from innovative ROVs to autonomous ships.

Trondheim has also been chosen to become the ocean technology hub for the nation, with extensive state investment in

3D elevation map of the southern part of Norway, from a 1914 original, shaded according to modern elevation data. Image credit: J.J. Serrano (instagram.com/the.itinerarium)

Norway is famous for its picturesque mountains, glaciers and fjords, with a small population, currently ~5 million, spread over a huge country with over 100,000 km of coastline, exceeded only by Canada. Image credit: Caroline Durville.

the OceanSpace Centre (OSC), which includes FjordLab, and OceanLab. OceanLab is supported by the Norwegian Research Council, SINTEF and NTNU and will become a world-leading full-scale Ocean Laboratory, designed to meet requirements for sustainable technologies in the ocean sector in support of education, research and innovation. The first Nodes in this

SINTEF's vision for a connected OceanSpace, comprising networked operations above, on and under the sea surface, including offshore energy, aquaculture, autonomous ships and satellites. Image credit: SINTEF Ocean.

infrastructure will be available to collaborating partners from academia, research organisations and/or industry in 2023. The OceanLab infrastructure will become an integrated part of the future OSC.

Looking further afield, the University of Bergen (in Norway's second largest city) has a strong maritime focus, and Bergen also hosts the Institute of Marine Research, one of the biggest marine research institutes in Europe, with about 1,000 employees. Add to this the Universities of Oslo and Tromsø, the Forsvarets Forskningsinstitutt (FFI) and many other vibrant ocean science, research, technology and engineering enterprises and it becomes abundantly clear that there is no excuse for NOT having a vibrant OES Chapter in Norway.

I mentioned how Norway finds itself in a special position in time and place, and I promised to explain. So here we come to a blunt and brutal truth; the offshore hydrocarbon industry (producing oil and gas), the mainstay of the Norwegian economy and export GDP, ***will not exist as we know it now in two decades' time***.

The Norwegians are traditionally very caring and sensitive to the environment, so it is no surprise that they have been among the first to face up to the challenges of our changing world and the urgent need to cut CO_2 emissions, for which burning hydrocarbons is a major contributor. They have taken the tough step of deciding to pivot their core ocean businesses and have already begun a staggering programme of investment in new maritime research and technology development to bring innovative new commercial opportunities to the maritime engineering sector, leveraging existing strong competencies in geophysics, aquaculture and seismology to create business opportunities in the New Blue Economy.

One example is their investment in the Carbon Capture and Sequestration (CCS) value chain, essential if Europe is to achieve its carbon neutrality targets, including 'Northern Lights' a project that is projected to cost over 600 MEuro alone. In parallel, there are dozens of other initiatives, backed by industry, academia and government, establishing many new research and innovation centres focused on the maritime environment. Thus, Norway is arguably at the forefront of both

existing maritime engineering competence and spearheading an investment wave into the future Blue Economy.

Given this rich context, which I have only recently come to fully appreciate since I moved to Norway in 2019, I realised that there was tremendous untapped value for both OES and the Norwegian ocean engineering community. Together with a handful of active OES members in Norway we petitioned IEEE and were successful in restarting the OES Norway Chapter. Our aim is to work together to grow OES membership in Norway, accessing the extensive OES professional network and IEEE benefits, connecting and nurturing the large and growing ocean engineering competence that is flourishing in Norway.

I am honoured to be the first interim chairman of this new Chapter, pending elections, and to offer my energies to make sure it takes root and grows. It is my hope and vision that we might win a bid to bring the prestigious OCEANS conference and exhibition back to Norway within the decade, hosting it in the beautiful city of Trondheim.

If you would like to be involved in this new OES Chapter, or have colleagues in Norway who might be interested, please have them join IEEE OES and register their connection with Norway so that they appear on the IEEE OES register as eligible to vote and stand for election. We are, of course, now looking for nominations (self-nominations accepted) for officers to be elected onto the first governing board of this new Chapter. Please contact me at John.R.Potter@ieee.org if you would like to know more.

Trondheim is a beautiful city on a river opening out to a major fjord in central Norway. Seen here are some of the old wooden merchant warehouse buildings along the river, viewed from a kayak. Image credit: Caroline Durville.

Chapter News

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

Hong Kong Chapter

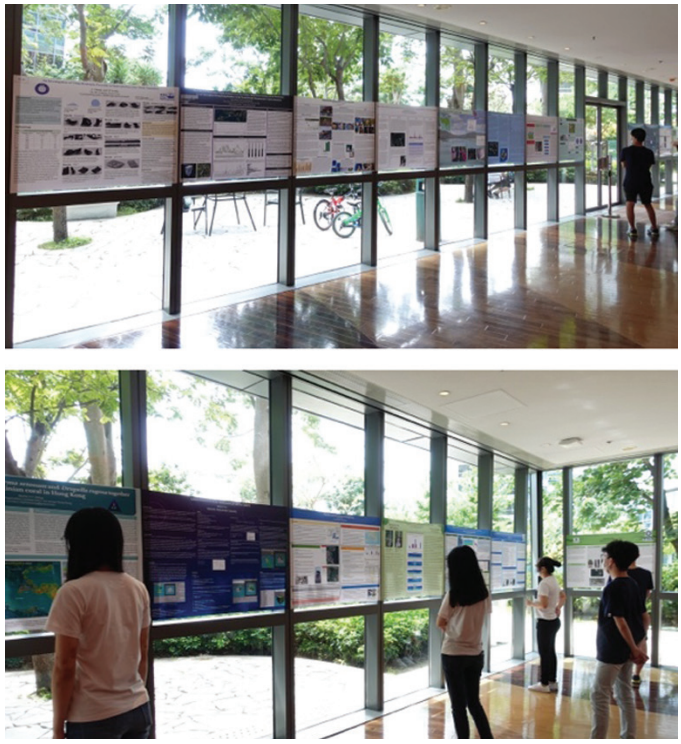
Hong Kong IEEE CE/OES Joint Chapter holds the YE20 Conference for students

Reported by Paul Hodgson (MIEE) and Robin Bradbeer (Life SMIEE)

On the 13th September 2020, the Hong Kong IEEE CT/OES Joint Chapter held the first IEEE Young Engineers 2020 Conference (YE-20) to showcase suitable project work of secondary school and undergraduate university students. A total of 16 student papers were accepted for presentation to let the chapter know what they were doing. The on-line event was coordinated from the Cyberport facility in Hong Kong. The COVID-19 situation made the event an on-line conference with help and support from the Hong Kong CityU OES Student Chapter on the day.

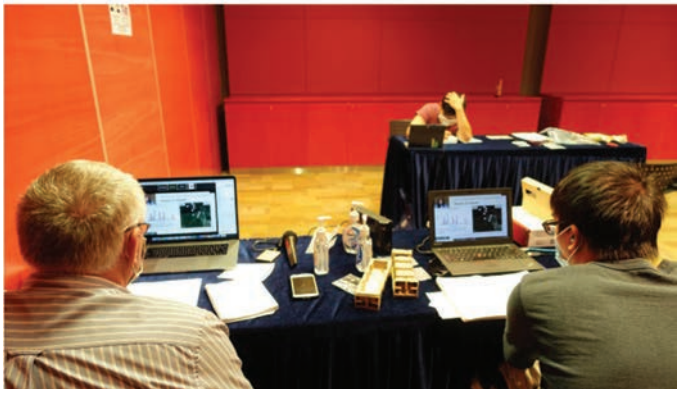
Projects covered a diverse range of topics and all had the added theme that there should be a potential consumer product, the project data was collected by consumer electronics or that there was a marine engineering aspect to it. Macau, a partner region to the Hong Kong (SAR), also participated. All students exhibited a very high standard of work. Details of all of the projects presented can be found on https://hkye2019.com.

Topics as diverse as particulate monitoring, marine surveys, area soundscaping, wildlife camera trap surveys, mud collection by ROV, were complemented by technical posters



Posters were printed and displayed at the entrance to the conference command center.

The CityU team of Helpers. Photo at rest (left) and at panic stations (right).



The Command Center. (Oh…Yes…We are still on-line….Good!).

on coatings for nanowires, CAN Bus for ROV and ROV simulation using specialized software. Projects involving micro plastic in marine areas and recyclable bicycle helmets were also on display. The conference requires all presenters to produce a project poster, present the project and produce a student paper.

One highlight of the event was that all of the student posters were printed and displayed. Even though only the video conference organizers were there to fully appreciate this, it allowed photographs and video to be sent to the presenters and conference attendees to help show the full impact of the student's work. It looked very impressive.

This was the first time the HK CT/OES has run a virtual conference. Apart from some hiccups at the start, things smoothed out and became more predictable after the early morning session. Let's say it was a fast learning curve. Are we still on line? And is the sound working? Were probably the two most asked questions of the day.

The conference opened with a talk from Dr. Ray Cheung, the Secretary of the HK IEEE Section, talking about paths for young engineers to proceed. This was followed by a talk from Dr. K. F. Tsang, the Chairman of the HK CT/OES Joint Chapter. His talk was about the objectives of the conference. After the lunch break, Prof. Robin Bradbeer shared her experiences and recommendations concerning STEM and teaching STEM in schools. All talks were well received.

We even distributed conference souvenirs.

Given the current COVID-19 issues and the pressure placed on the education system as it adapts to these difficult times, it is important not to forget the problems students are having coping with this situation. Quite apart from the social isolation expected of them now, currently it is exceptionally difficult for students to highlight their abilities for selection into the system of further education. IEEE events like these can help students meet new people and peers as well as show what they can do.

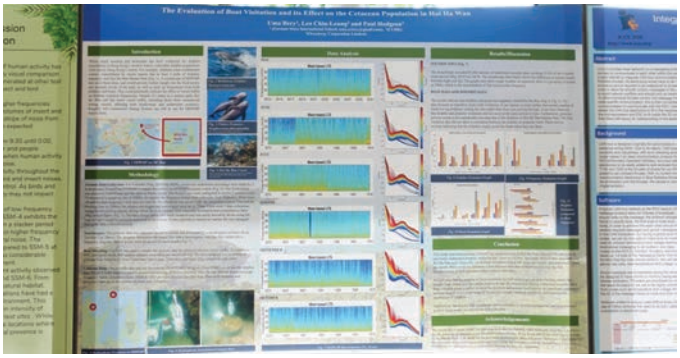
The overwhelming support for this conference was very much appreciated. Cyberport Hong Kong went out of their way to provide and sponsor the venue. The CityU students gave up a weekend to help get things running smoothly before and during the great day.

The organizers would like to thank the generous support given by Cyberport for the venue and internet service. MATE II was the technical sponsor with Oceanway Corporation Limited and Oceanway Labs helping make the day special for everyone who participated. Special thanks to the CityU OES Student Chapter for their help on the day. We could not have done this without you all.

The Result of the Poster Judging:

First prize: Ms. Uma Bery

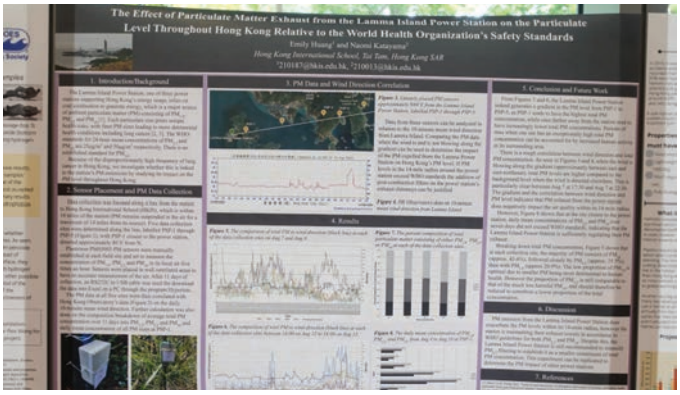
The Evaluation of Boat Visitation and its Effect on the Cetacean Population in Hoi Ha Wan.



Second prize: Ms. Emily Huang & Ms. Naomi Katayama

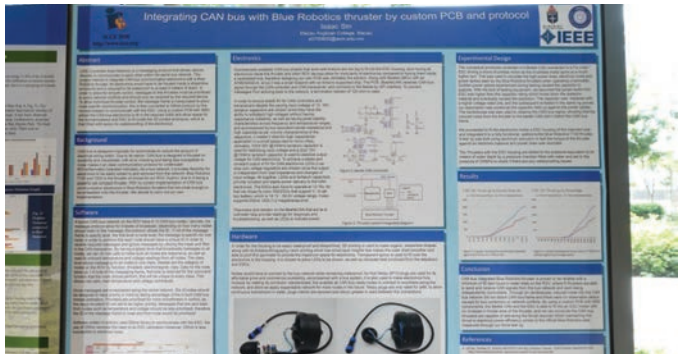
The Effect of Particulate Matter Exhaust from the Lamma Island Power Station on the Particulate

Level throughout Hong Kong Relative to the World Health Organization's Safety Standards



Third prize: Mr. Isaac Sin

Integrating CAN Bus with Blue Robotics Thruster by Custom PCB and Protocol



Providence Chapter

Reported by **David Leslie, Providence Chapter Secretary**

On October 20, 2020, the Providence Section, OE22 Chapter hosted its third Technical Talk of the year. Due to the continuing COVID-19 pandemic and local guidelines for public gatherings, this talk was conducted remotely using Zoom. Three speakers from the MIT-Woods Hole Oceanographic Institution Joint Program came together virtually to talk to us about their research and their participation in the ICEX 2020 Exercise, which is part of the U.S. Navy Submarine Arctic Warfare Program. All three speakers are graduate students in the Laboratory for Autonomous Marine Sensing Systems (LAMSS) led by Professor Henrik Schmidt at MIT.

Bradli Howard, EeShan Bhatt and Rui Chen spoke about their research involved in the multinational exercise organized by the United States Navy in the Arctic Beaufort Sea region carried out in March of 2020. During ICEX, LAMSS deployed four acoustic communications buoys to link with the Autonomous Undersea Vehicle *Macrura* under sea ice.

LT Bradli Howard is a Submarine Officer and Master of Engineering student in Applied Ocean Science & Engineering (WHOI-AOPE) and Mechanical Engineering (MIT-ME) focusing on novel underwater acoustic communication performance metrics.

EeShan Bhatt is a PhD Candidate in AOPE/ME. His research focus is on anticipating the physically driven and stochastic uncertainty behind vertical sound speed structure that predicates autonomous underwater vehicle communication, navigation and

Figure 1. ICEX 2020 MIT/WHOI crew on location in the Artic.

Figure 2. LT Bradli Howard.

Figure 3. Mr. EeShan Bhatt.

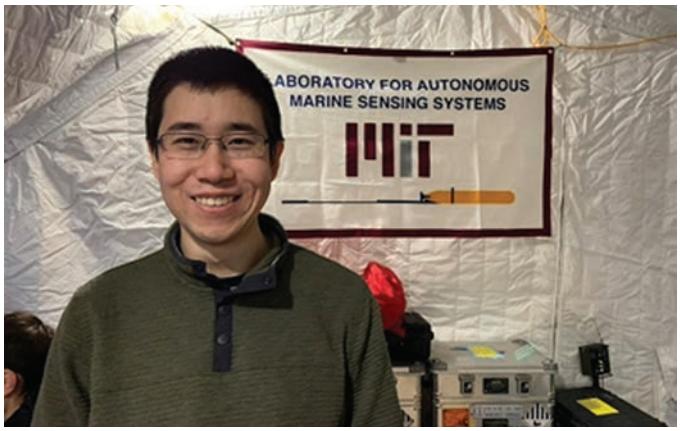


Figure 4. Mr. Rui Chen.

sampling. Part of his thesis work has involved the design of tools and interactive data visualizations to share this uncertainty.

Rui Chen is a PhD Candidate in AOPE/ME. His thesis work focuses on applying acoustical modeling, signal processing and machine learning techniques to characterize changes in Arctic Ocean underwater ambient noise that may be attributed to the region's changing environment. In particular, he has been interested in the effect of the Beaufort Sea sound speed profile on noise, as well as the spectral and temporal features of ice-generated transients.

The purpose of ICEX2020 was to demonstrate submarine operations under the ice in the Arctic region for national defense, but the associated operations also supported a lot of science. Camp Sea Dragon was established on the sea-ice, with logistical support provided by the Royal Canadian Airforce. Climate change is drastically impacting how the Navy sees and operates in the arctic. The "Beaufort warm lens" comes from warm water upwelling out of the Pacific. This leads to a deep acoustical shadow zone within operational depths and ranges during AUV deployments. This shadow zone affects digital communication and passive sensing.

Rui Chen examined the environmental effects on ambient noise using data collected in the previous ICEX16 experiment. In that experiment a vertical array of 32 elements collected data at various array-center depths between 38–238 m. Beamformed data was used to determine noise vertical directionality. Environmentally induced changes were two-fold—those associated with sound speed profile (SSP), and those associated with noise generation in the ice cover. Noise generation was modelled using a uniformly distributed source model and combined with ray-tracing to demonstrate the effect of SSP and ice cover on noise distribution in the ocean volume. The effect of the Beaufort Lens on noise level vs depth is clearly visible. The SSP was responsible for notches in the sound profile near horizontal propagation at some depths. Previously, noise generation had been more uniform at the surface. Now, younger, thinner ice cover is generating noise along discrete ice ridges. The Beaufort SSP combined with discrete surface noise sources along ridges better explains the observed peak noise depths and elevation angles.

EeShan Bhatt explained aspects of the "human-in-the-loop" (user-informed) environmental updates provided for *A/V Macrura*, and the active acoustics governing the modem setup and vehicle communications. The "Virtual Ocean Framework" anticipates variability in the vertical structure for a given spatial-temporal area using Empirical Orthogonal Functions (EOF) with global and local updates. A tuned EOF dataset was chosen for the 2020 experiment. Cost functions were based on depth dependent errors from CTD casts and EOF estimates. Transmission loss and signal-to-noise ratio (SNR) were used as performance metrics.

Bradli Howard concluded the presentations by looking beyond the traditional use of SNR alone as a performance metric. MPP, "multi-path penalty," has been proposed as a new metric to complement signal level. Multipath propagation can lead to echo problems for communication with modems, and it is useful to penalize certain operational depths because of the potential for multipath interference. Calculations of SNR and MPP were made both top side and on the vehicle. Simulations were performed using NetSim (Schneider, Toby and Henrik Schmidt, "NETSIM: A Realtime Virtual Ocean Hardware-in-the-loop Acoustic Modem Network Simulator." Fourth Underwater Communications and Networking Conference, August 2018, Lerici, Italy, Institute of Electrical and Electronics Engineers, October 2018.)

The technical content of these presentations along with the stunning video and audio files, which accompanied the talks, provided our Chapter with a glimpse of the excellent and exciting scientific work being performed by the Navy and its academic collaborators in one of the harshest environments on earth.

Malaysia Chapter

The 12th National Technical Seminar on Unmanned System Technology 2020 (NUSYS'20)

Reported by Khalid Isa & Herdawatie Abdul Kadir

On 24–25 November 2020, the IEEE Ocean Engineering Society (OES) Malaysia Chapter organized The 12th National

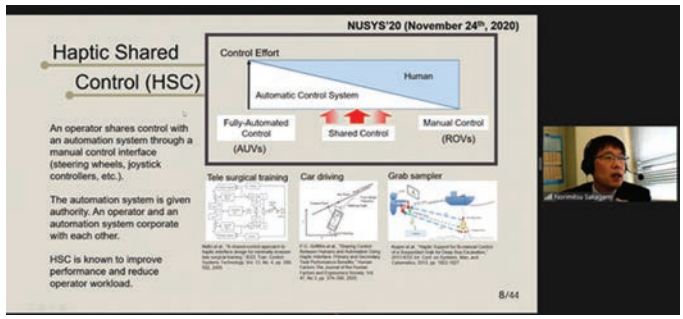
Photo during NUSYS'20 Opening.

Technical Seminar on Unmanned System Technology 2020 (NUSYS'20) via virtual platform. The goal of the conference was to present current research being carried out in the area described. This seminar aims to present ongoing research activities to scientists, academics, engineers, and students from universities in Malaysia and industry, thus fostering research links between universities and industries. The seminar offers delegates the opportunity to share new ideas and implementation experiences, develop business or research partnerships, and find global partners for future collaboration. The seminar offers a number of invited lectures from renowned speakers all over the country. NUSYS'20 is the premier interdisciplinary platform for presenting new advances and research results in the fields of Unmanned System Technology. The seminar will bring together leading scientists, researchers, engineers, scholars, and students in the domain of interest worldwide.

Talk on Negative Pressure Effect Plate (NPEP) and Haptic Shared Control (HSC) for Underwater Vehicles

Reported by Khalid Isa & Herdawatie Abdul Kadir

Prof. Dr. Norimitsu Sakagami is with the Department of Navigation and Ocean Engineering, Tokai University, Japan. In 2003, he received the Ph.D. degree from Ritsumeikan University, specializing in motion analysis and underwater robotic manipulators' control. His current research interests are in the design and control of underwater robots, robotic handling systems, and autonomous surface vehicles. In 2014–2015, he was a visiting researcher at the University of Hawaii at Manoa. He is a visiting researcher at Ritsumeikan University, Japan.

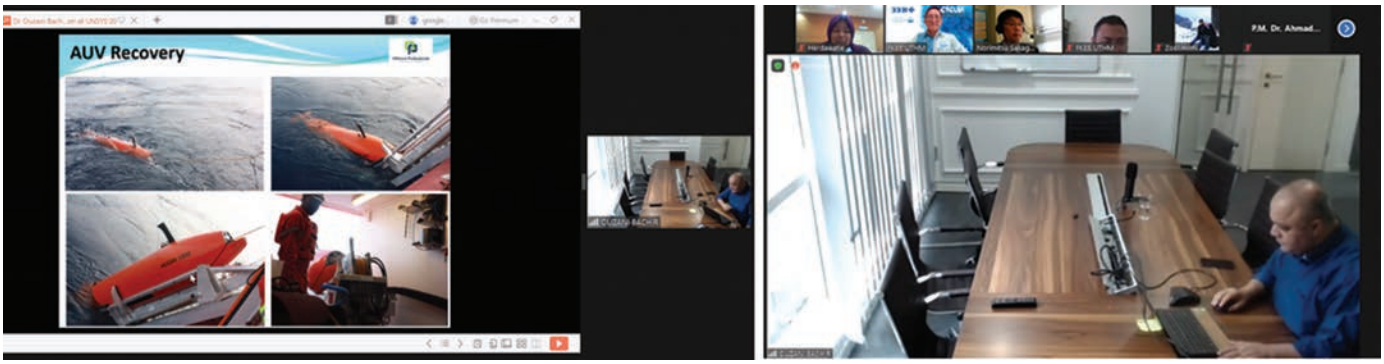


Talk by Norimitsu Sakagami.

Autonomous Underwater Vehicle Technology In Gallops

Reported by Herdawatie Abdul Kadir & Khalid Isa

Dr. Ouzani Bachir is a geoscientist and has obtained his first degree in geology from the USTHB University of Algiers, MSc and Ph.D. in petroleum geology from the University of Malaya, Malaysia. He has worked for the past 20 years in the oil and gas industry services and grown from a senior geophysicist at Thales Geosolutions to project manager and Chief Operating Officer leading geophysical and geotechnical divisions of Java Offshore. As a senior geophysicist, he was in charge of seismic data quality control, interpretation, reporting, and geohazards assessments for drilling locations, pipeline installations, platform construction, and anchor planning and handling. Dr. Ouzani Bachir has experienced working onshore/offshore on seismic survey projects in many parts of the world, such as Malaysia, Indonesia, Vietnam, the Philippines, Brunei, Myanmar, the Caspian Sea, Qatar, Oman, India, and Sakhalin (Russia).

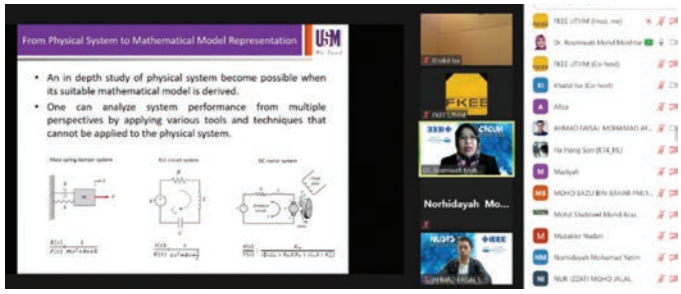


Talk by Ouzani Bachir.

Talk On Model Order Reduction Techniques

Reported by Herdawatie Abdul Kadir & Khalid Isa

Rosmiwati Mohd-Mokhtar is an Associate Professor and a Mechatronic Program Chairman at the School of Electrical & Electronic Engineering, USM. She is also a Chartered Engineer (C.Eng.) of the Institution of Engineering and Technology (IET), Professional Engineer (Ir.) of the Board of Engineers Malaysia (BEM), a Senior Member to the Institution of Electrical and Electronics Engineers (IEEE) and a Member to Institution of Engineers Malaysia (IEM). Her research interests include system identification, advanced control system design, process modeling, process optimization, mechatronics applications, and underwater system applications. Rosmiwati is an IEEE member for 17 years. This talk discussed an approach to a stable and unstable dynamical system from basic to applications. This talk was attended by 65 attendees, which include academicians, students, and industrial people.



Talk by Rosmiwati Mohd-Mokhtar.

Application of Machine Learning on Ocean Science

Gopu R Potty, Chair, Technology Committee on Data Analytics, Integration and Modeling

The focus of the Technology Committee on Data Analytics, Integration and Modeling encompasses all aspects of data processing including data assimilation, data presentation, database design, filtering, modeling, and analysis. Additional focus areas associated with this committee include all activities and products associated with computer-oriented modeling, simulation, and databases within ocean engineering and science. Key research topics of focus for this committee include data fusion, computational intelligence, artificial intelligence and machine learning and visualization tools, among many others.

The field of Machine Learning (ML) has grown explosively during the past decade and has found applications in a large number of fields. This growth was fueled in part by the availability of large amounts of data and increases in computational capability. The power of ML algorithms come from their ability to learn from the data. This learning process can be supervised or un-supervised (or semi-supervised).

ML approaches are generally divided into two categories: supervised and un-supervised learning. Supervised learning uses labelled data (input-output pairs) to train ML algorithms. A properly trained ML algorithm can then be used to predict the output using new inputs. Care must be taken to use un-biased and reliable training data in order to avoid introducing bias to the learning due to the supervision. A simple example of supervised learning is regression. In unsupervised learning the ML algorithm is trained using unlabelled data to recognize patterns and structures within the data. To find patterns and structures within the data, techniques such as clustering and dimensionality reduction (Principal Component Analysis for example) are used. Recent ML advancements include Generative Adversarial Networks (GANs) and Reinforcement Learning.

ML has transformed data rich fields, such as the commercial sectors, and has a relatively late entry into scientific disciplines. Data, especially in ocean related fields, are highly resource intensive to collect and therefore costly, often difficult to measure and hence are scarce compared to commercial fields. Moreover, the physical variables often exhibit complex non-stationary patterns that change with time. A large training data set is then required for the learning process. Another limitation of application of ML approaches to physical sciences is it's 'black-box' nature, which prevents the discovery of physical cause-effect relationships between variables and of understanding the underlying processes.

Theory based models perform well in scientific problems that are conceptually well understood using known scientific principles. These models will perform poorly in complex problems where the underlying processes are not well understood or when the models involve too many simplifying assumptions. On the other hand, ML algorithms mainly depend on the information contained in the data without relying on any scientific principles. Data scarcity will be the limiting factor in the case of complex scientific problems for these algorithms. Attempts to marry these two contrasting approaches by using theory and data in a synergistic manner has recently gained momentum, which led to the development of "theory guided data science" approaches. This idea is also often referred to as "physics guided ML," "physics informed ML," or "physics aware ML."

ML has been applied (often in combination with physics based models) to a variety of problems in marine science such as the discovery of climate patterns, habitat modelling, forecasting sea level fluctuations, wind and wave modelling, automatic detection and tracking of objects underwater, coastal water monitoring, detection of oil spill and pollution, geoacoustic parameter estimation, etc.

The Technical Committee on Data Analytics, Integration and Modeling is planning a series of webinars on the application of ML techniques to various ocean-related problems this year. We hope that these webinars will spur the use of this powerful tool in your research and other applications.

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

OEANS 2022 Chennai
February 21–24, 2022
Chennai, India

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

OES Sponsored

UT21 Online
Virtual, March 2, 2021
http://www.ut2021.org

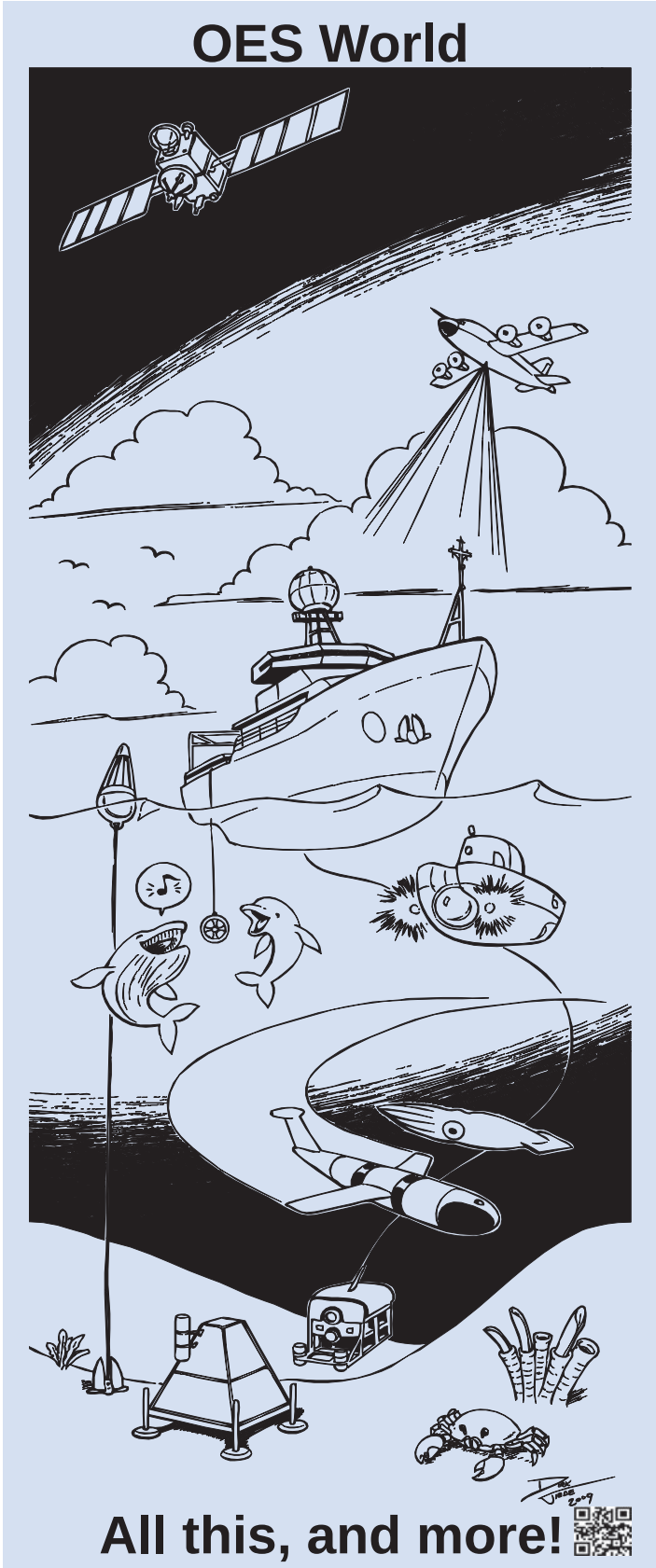
COA 2021
July 14–17, 2021
Harbin, China
http://www.chinaoceanacoustics.cn/COA2021/

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

ASOF 2021
TBD 2021
Hobart, Australia
https://asof2020.ieee.org

Non OES

Please contact us if you have any information about "Non OES events that some OES members are involved in."



A Blast from the Past! … San Diego, Here We Come!

Bob Wernli—Beacon Co-Editor-in-Chief, photos by Stan Chamberlain

OCEANS 2013 was held in the lovely city of San Diego. Now, 8 years later, Global OCEANS 2021: San Diego—Porto will return to the recently remodeled Town and Country Resort where we'll again be able to enjoy a face-to-face meeting as shown below.

USS Midway.

Kissing Sailor Statue.

Town and Country Resort.

Ice Breaker Reception.

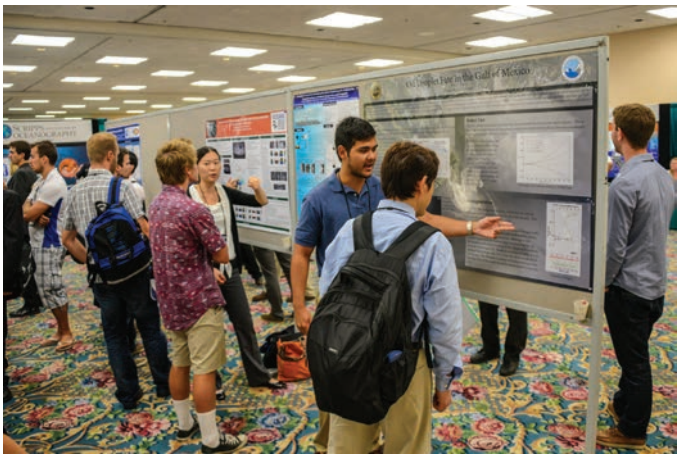
Speakers Breakfast.

Women in Engineering Reception.

Jim, Peggy, Bev and Bob at Leadership Reception.

Student Reception.

Main Exhibit Hall.



Student Poster Competition.

The LOC Will Return.

Welcome to Global OCEANS 2021: San Diego—Porto

San Diego Co-Chairs: Alan Kenny, Robert Wernli
Porto Co-Chairs: António Pascoal, Eduardo Silva, João Borges de Sousa

Welcome to Global OCEANS 2021 San Diego—Porto.

We're Going Hybrid!

Rooted in the success of previous OCEANS Conferences, OCEANS 2021 is poised to be an even stronger global event. With the European conference delayed due to the pandemic, the Porto, Portugal, OCEANS 2021 spring conference team has joined forces with the San Diego team to bring you Global OCEANS 2021: San Diego - Porto, a hybrid event with both an in-person and virtual presence possible. While we hope to see as many attendees as possible enjoy the in-person conference in San Diego, everyone who wishes to attend worldwide will have a virtual venue available to enjoy the significant benefits of the conference not found anywhere else in 2021 - technical innovation, scientific research, and high-level agency and commercial budget and investment briefings. In addition, come and enjoy the in-person joint kickoff with the United Nations of its IOC "Decade of Ocean Science for Sustainable Development."

For the benefit of all attendees, whether in-person or virtual, both San Diego and Porto will hold, or present, their plenaries, workshops, etc., during the standard OCEANS schedule and in their respective time zones. All technical papers and posters, whether virtual, or in-person, will be uploaded and on line access will be available to registrants for a month after the conference ends.

The San Diego website has been updated to reflect the new hybrid conference (https://global21.oceansconference.org). This also includes an updated exhibitor floor plan that provides a more efficient interaction between the exhibitors and attendees. Our call for papers has also been issued. The technical program will provide in-person presentations, which are also uploaded to the virtual program site, for those who can attend in San Diego; for those authors who cannot attend in San Diego, they will also have the ability to upload their presentations to the virtual program site. All registered attendees will have access to all technical papers and events that have been uploaded.

Global OCEANS 2021 Porto

The Global OCEANS 2021: San Diego—Porto virtual conference will provide lively presentations and discussions on oceans-related issues and the ability to experience the magic of the oceans spanning centuries of maritime history. The Porto virtual conference will complement the in-person San Diego portion of this hybrid event, providing a method for everyone to participate regardless of any travel issues. Our Porto themes are:

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

The innovative Global OCEANS 2021 Porto program will include technical sessions, invited sessions on specialized topics, plenary sessions, a student poster competition, outreach and media sessions, discussion panels, live feeds, and virtual exhibits. Global OCEANS 2021 Porto is all about connecting the world-wide community with the goals of opening the ocean frontier at the dawn of a new age of discoveries for the benefit of mankind. There will be new forms of participation, namely of young students and researchers from distant communities bordering the world's oceans, thus reinforcing the global dimension of the event.

Global OCEANS 2021 San Diego

For those attending the in-person portion of the hybrid conference, the Global OCEANS 2021 San Diego committee invites you to beautiful San Diego to participate in the world's most prestigious, comprehensive, and diverse conference and exposition regarding our most critical resource—the oceans. Coordinated with the kickoff of the United Nations "Decade of Ocean Science (2021–2030), this will be the 8th time the OCEANS conference has come to San Diego, a venue that has consistently provided the largest and most successful OCEANS conferences ever.

Global OCEANS 2021 San Diego will be an in-person event and will expand significantly in scope, bringing together key international industry and government stakeholders, focusing on investment plans/strategies during the upcoming five years as well as emerging technologies, new science and research initiatives, and the latest in commercial products.

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.

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. New Technical tracks will include Artificial Intelligence (AI), the great challenge of Data Management, Arctic and Antarctic exploration, and will present emerging technologies for ocean stewardship, food supply production and management, national defense, energy production, and overall management of the oceans and waterways. Assuring a successful conference will be committee members from the highly successful 2013 and 2003 San Diego OCEANS conferences along with new, influential and highly capable technical, academic and business leaders. Your Global OCEANS committee is working diligently to bring together influential buyers, investors, stakeholders, industry experts, and innovators from government agencies, industry, and academia.

The OCEANS conferences, jointly sponsored by the IEEE Oceanic Engineering Society (IEEE/OES) and the Marine Technology Society (MTS), attract thousands of attendees and hundreds of exhibitors every year. These international conferences are 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. In addition, the in-person Global OCEANS 2021 San Diego event will include a two-night film festival and weekend golf tourney to kick-off the week's activities that will also include additional educational sessions and a gala banquet. For a photographic taste of the OCEANS 2012 San Diego conference, visit the Blast from the Past in this issue of the Beacon.

Whether joining the Global OCEANS 2021: San Diego—Porto conference virtually, or in-person, we look forward to once again giving you access to the world's latest technology. See you in September.

OCEANS

CONFERENCE & EXPOSITION

The Global OCEANS 2021 San Diego - Porto Conference will give you the tools and knowledge to advance...

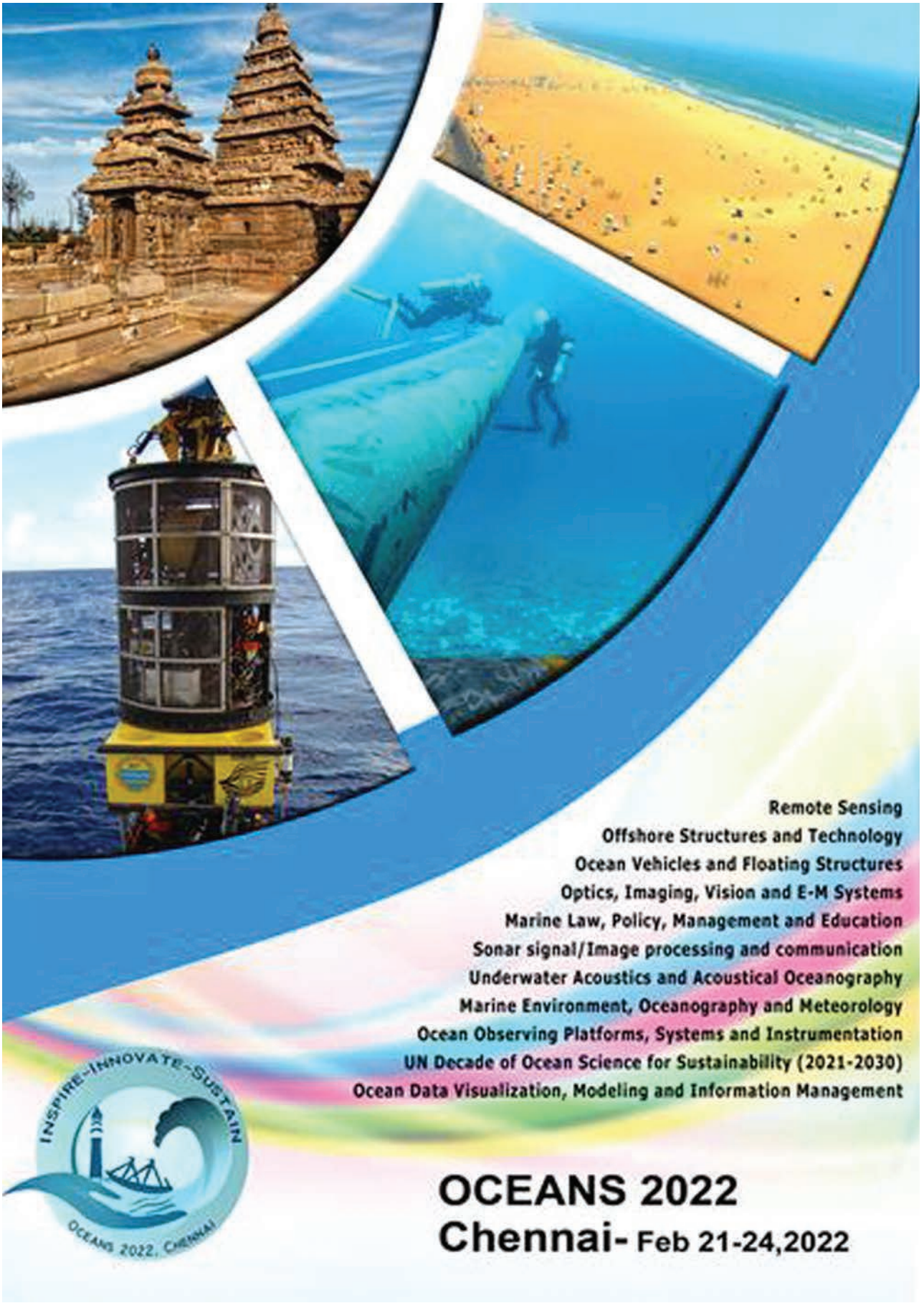
SPECIAL SAN DIEGO TOPICS

Artificial Intelligence: New opportunities
Big Data: Generation, Management, and Exploitation
Autonomy: Yesterday, Today, and Tomorrow
Ocean Clean Up: Micro to Macro
Alternative Energy from the Sea
Sustainable Blue Economy
Ocean Acidification: Causes and Mitigation
Ocean Inspirations for STEM
Government / Industry / Academia Synergy

SPECIAL PORTO TOPICS

Deep sea exploration and parallels to outer space
Extreme environments: science and technology
Affordable ocean systems and technologies
Artificial Intelligence in ocean science and technology
Drones in marine applications
Sustained presence at sea
Natural hazards and early warning systems
Ship automation and green propulsion systems
Ocean health monitoring
Extension of the continental shelves
Offshore aquaculture
Non-living resources: exploration and exploitation
Sustainable exploration of ocean resources
Azores: the sentinel of the Atlantic
Ocean literacy and outreach
Cultural heritage and underwater archeology

https://global21.oceansconference.org/


Remote Sensing
Offshore Structures and Technology
Ocean Vehicles and Floating Structures
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

IEEE Oceanic Engineering Society

IEEE

NIOT

Who's who in the IEEE OES

Hari Vishnu, Editor-in-Chief of Earthzine

With my wife Sharadha at Seattle after the conference.

Some of you know me as the Editor-in-Chief of Earthzine (earthzine.org), or as one of the YP-BOOST awardees for 2019–2020, an organizer at Singapore AUV challenge, or simply as the curious guy who hangs around chitchatting and making horrible puns at OCEANS conferences. Indeed, I swear by puns—my Whatsapp status reads "*A pun is mightier than the sword*". My twitter profile reads "*Acoustics Researcher, National Univ. of Singapore. Visiting researcher, Scripps. Chief Editor, Earthzine. Big appetite, broad tastes: Sci|Tech|Env, & nowadays, Covid.*", and is usually a feed of Earth news, OES updates, climate change advocacy and science communication from my lab (Acoustic Research Lab—ARL). My Instagram avatar shows a very different guy who posts on his gardening adventures. My Facebook is, well, a mishmash of all of the above.

TLDR: ARL, Acoustics, Singapore, Signal processing, Machine Learning, Earthzine, SAUVC, Social media, Climate advocacy, Puns, Food, Movies and Anime, Gardening.

I've always wanted to be into science (probably research) and teaching, thanks to my Mom. But like many others, I didn't know that Ocean science and engineering is where I'd end up. During the final years of my Bachelors at National Institute of Technology, Calicut in India (2004–08), I enjoying doing some successful projects. So I decided to look into postgraduate study/research options, when a Ph.D opportunity in Ocean acoustic signal processing came up, with a Prof. in Singapore's Nanyang Technological University. That's when I decided to do some digging. We had been taught some signal processing courses in our Bachelors, but nothing really tuned to underwater environments.

On the other hand, it looked obvious that the Oceans which cover 71% of Earth's surface could do with some more exploration. But it wasn't clear to me why ocean exploration seemed to be happening at a slower pace than, say, space exploration, and why oceanic engineering was not given much space even at a bachelors level. Perhaps it was these questions that led me to take up that Ph.D, and from then on, embark on a research career in underwater signal processing.

By the time I landed in ARL, the breadth of ocean sciences and engineering blew my mind. This was a good combo with my FOMO—fear of missing out (as my friends have diagnosed me). Before I knew it, I was dabbling in all sorts of projects at ARL—I went from signal processing to propagation modeling to passive sonar to mineral exploration to machine learning to active sonar to dolphin biological sonar to Arctic cryo-acoustics to passive-acoustic-monitoring. Looking back, the rides have been snaky, but I appreciate the broad domain knowledge it has given me. It put me in touch with many different collaborators from many different fields, and gave me more confidence to operate in this already vast field. And it gave me opportunity to travel, which I loved (though that has reduced in the past few years).

From 2019–2020, I also got an opportunity to be at the Scripps Institution of Oceanography as a Visiting scholar. Scripps has always been one of my dream institutions. San Diego and its calm ocean beauty did not fail to impress, and neither did my times working with Dr. Grant Deane on the problem of the noisy melting glaciers in polar regions, and processing the sound they produce to understand their melting. It was a good change, and helped me get a good perspective on my postdoc years at Singapore (which are still not over yet). And San Diego beer.. lovely!

Ofcourse, OES is a big part of my life. I got involved in OES in Singapore, where we always had some activity or the other happening (in the pre-covid era, that is). The Singapore AUV challenge (sauvc.org), in particular, was a big part of our lives, and we have spent a good many meetings and time strategizing how to put together a good competition while not forgetting to have fun. And all those events have been very fun and satisfying experiences, putting us in touch with a large student community that was obviously in need of mentoring. If you attend one of these events and catch the spirits of those kids making their robot do unbelievable things, you will see what I mean! So, I heavily encourage you to get involved in OES and its several outreach, leadership, mentoring and scicomm activities.

Compering at Singapore AUV challenge 2019.

Me (left) and (some of my) homies at the OCEANS promotion booth at Seattle.

I was already exploring science communication and forming my social media strategy, when the opportunity to do social media management for OES came up. Obviously, I took it with both hands! The deeper I got into OES, Earthzine became more appealing as a vehicle of scicomm, and I happily took up its editorship in 2019. For me, it filled a huge gap—the common public simply needed to know how important Oceans were to their lives, and that Oceans were really under-explored. Oceanic exploration has had few or no Moon-landing moments (the closest might be James Cameron's foray into the Mariana trench). This was a lack of awareness which needed fixing. I feel my entry into Earthzine coincided well with the UN's decision to make this the Decade of Ocean sciences, and I really hope to contribute to expanding awareness on how important Oceans are to human existence.

Apart from my life in science, scicomm and OES, I also spend time in gardening, watching movies and anime (and going all geeky on them) and playing the flute. Gardening is one of my favorite outlets—it goes well with my environmentalist leanings. So, that's me! If you want to know more about me, you can check out my page at https://arl.nus.edu.sg/twiki6/bin/view/ARL/HariVishnu!

I also tweet at @harivn.

Member Highlights

Contact the Editors if you have Items of Interest for the Society

Mercenaria Mercenaria (not mercenaries)
Diane DiMassa, Ph.D.

So there I was, rake in hand, basket by my side, and then it happened. I didn't see it at first because the sun was in my eyes. I never use sunglasses because they somehow always fall off when I look down. I hadn't seen it coming, but I saw it then. There it was, not far from me at all. I looked at Kathy and she saw it too. We both smiled, taking mental notes of its path. We simply watched and waited. Soon, it would be ours. Some today. Some tomorrow. Maybe even some on Wednesday. No one else was around . . . at least for a while.

After it left, we made our way over to the site. Jackpot! We worked quickly and deliberately. It was almost too easy. It felt like we were cheating. But, as they say, timing is everything.

"Hello there!" a voice said. "License please."

"Right here on my hat" I said. "You can read the number." It may have felt like cheating, but we were perfectly legal—tools, time, location—all on the up-and-up.

"You measuring?"

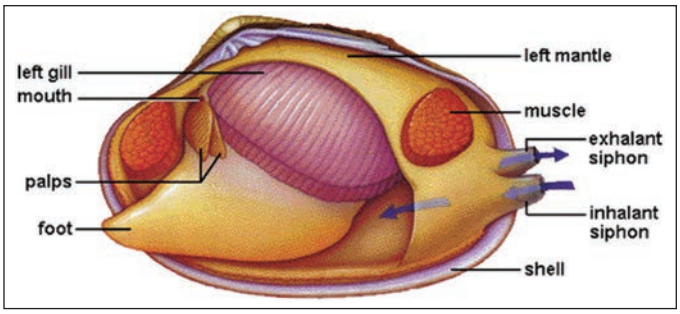
"Yes we are. We always do."

"Enjoy your weekend. Great day for it."

"Oh, we will thanks. You too."

That's how it goes; that's what happens; but there is so much more that goes on behind the scenes.

Mercenaria mercenaria, the hard clam, the northern quahog (pronounced CO-hog), aka the quahaug, is native to the eastern shores of North America. This bivalve—a mollusk that has a shell consisting of two hinged valves—has two adductor muscles that are used to control the shell, an open circulatory system, and a simple nervous system. It has no particular head, but the foot is used to dig, so that the clam can live ***in*** rather than ***on*** the sediment. Quahogs prefer salt water and survive best at a salinity of 20–25 parts per thousand. Common names for *Mercenaria mercenaria,* such as littlenecks or cherrystones, are dependent on size. As a rough guide, clams 1–2 inches in thickness are littlenecks, whereas clams 2–3 inches in thickness are cherrystones. Clams larger than 3 inches are referred to as



Clam anatomy.
(from www.biologyjunction.com/clam_dissection.htm)

chowder clams or simply quahogs. Anything smaller than 1 inch is considered a "seed clam" and should not be harvested; in fact, in most places is it illegal. Hard shell clams are filter feeders that extract nutrients from the organic matter in the surrounding water. Fortunately, all of the clam, except the shell, is edible, and people eat a lot of clams. A LOT of clams. Nature can't keep up.

Shellfish farming on Cape Cod, Massachusetts, is big business. Grants are available for qualified individuals and regulated sites. Commercial shell-fishing throughout public waters is also big business, but this article is about recreational shellfishing—exercise, fun, outdoors, COVID-safe, and you get dinner. So, you want some clams, do you? Here is what you'll need to do:

1) Get a license. Like a fishing license, recreational shell-fishers need a license. A shellfish license will allow you to take limited quantities of clams, oysters, scallops, etc., but a separate license is needed if you want lobster. While lobster licenses are issued by the state, recreational shellfish licenses are town-specific, so you can only take clams from the town in which you bought the license. You can buy a license for more than one town, but once you've found your "honey hole," why bother? Licenses typically last for one year. The money you pay for your license supports the local Department of Natural Resources (DNR). As I said above, nature cannot keep up with the demand for shellfish. Everybody wants to visit Cape Cod, and everybody wants to eat clams (and lobsters) when they are there. The locals want fresh seafood too! The DNR collects and cultivates clam spawn and grows the clams until they are of legal size. This takes place in local hatcheries and nurseries. Every few weeks throughout the summer, when the clams are large enough, they are taken to select locations by small boat and are then thrown overboard, to supplement what nature can provide and give clam diggers a continuous supply. The DNR publishes maps of legal areas to clam, some of which are only open part of the year, but they don't tell you *when* they seed. However, if you time it right, you can watch where the boat goes and see exactly where they are dumped. Grin.
2) Get the right equipment. You will need a strong clamming rake, a clamming basket, and a measuring tool. For hard shell clamming you will want a long-handled rake; for soft shell clamming you will want a different kind of rake. The size of your metal clamming basket is 1 peck, which is about 10 quarts. Your shellfish license will allow you to take 1 level peck each week. A week is defined as starting on Sunday and ending on Saturday. You are permitted to clam on only Sundays, Wednesdays, and Saturdays. You can split your take throughout those 3 days, but the total catch cannot exceed 1 level peck in a week. You will want some kind of flotation for your basket so it doesn't sink, and a leash so that it doesn't float away. You can buy a flotation ring or simply attach pool noodles with wire ties. A rope of any kind tied to the handle of your basket and around your waist will keep your catch close at hand. You will need a measuring tool that

My license for 2020.

Me and my gear.

is essentially a small rectangular piece of sheet metal with a rectangular hole. The width of the rectangle is 1 inch—the minimum thickness of a legal clam. When you measure your clam, if it fits through the hole, then it's too small and you should throw it back. Most people like the littlenecks the best as they are the sweetest, but if you keep one that is too small and get caught there is a hefty fine *per clam.* You won't need a flashlight or a headlamp as clamming hours are from ½ hour before sunrise to sunset. The best time to go is low tide, so that it is easier to dig and you can walk out further from shore.

3) So, you've got your basket full of clams, now what? Clean them—inside and out. Inside? Yes, inside. It will take a few hours, but clean them. Hours? Yes, hours. Don't worry, it's not as bad as you think. Clams are filter feeders meaning that they siphon in water, extract nutrients and then expel the water. Sometimes sand and grit come in with the water and since you probably don't want a sandy meal for yourself, you'll want to get rid of that. Actually, you'll want the clam to prepare itself to be eaten. Sounds a little funny, but that's the way it is. All you have to do is supply clean water. Fill a bucket with seawater, put in your clams, and over the course of a few hours they will clean themselves, siphoning in the clean seawater and purging the junk. But, as the clams like to live *in* the sediment, *you* will have to scrub the outside of the shells. They can't do that by themselves. Ha.

Clams preparing themselves for dinner.

Once your clams are clean you can open them with a knife and have them on the half shell or you can cook them any way you please. I like to steam them open and have them over pasta with olive oil and garlic. Guess what's for dinner tonight? Spaghetti alle vongole (Italian word for clams) and I will be happy as a clam. Buon appetito!!

Ready for pasta!

Cardinal in the Snow

Stan Chamberlain, BEACON Contributing Editor

The snow is deep in Barrington (Rhode Island, USA), but not too deep for the birds to come visiting.

Cardinal in the snow.

Request for OES AdCom Nominations Nominees for the Term 1 January 2022–31 December 2024

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

The IEEE OCEANIC ENGINEERING SOCIETY is governed by an Administrative Committee of 18 members. Six are elected each year to serve three-year terms. Members are limited to two consecutive terms, although they may be reelected after a lapse of one year. This will be the thirty-seventh election to be held to determine the membership of our Administrative Committee (AdCom).

This year, the Nominations and Appointments Committee is chaired by the Senior Past President. The committee is charged with proposing a slate of nominees each year. For this election, twelve members of the OES will be nominated to fill six positions on the AdCom for the three-year term 1 January 2022–31 December 2024.

Qualifications for Administrative Committee membership are membership in the IEEE and OES, and a willingness to serve the oceanic engineering profession. The Society wishes to have the Administrative Committee characteristics to reflect characteristics of the IEEE membership. I ask that each of you identify and nominate qualified candidates for the Administrative Committee. Self-nomination is encouraged.

The nomination Packet should include a Letter of Nomination accompanied by a one-page biographical sketch of the proposed candidate with picture and one-page statement from the proposed candidate giving his or her views of the opportunities and challenges facing the Society and steps to be taken to advance the IEEE Oceanographic Engineering Society.

The election will be conducted in accordance with our Bylaws. Follow this link to read the Bylaws:

https://ieeeoes.org/about-us/bylaws-of-the-ieee-oceanic-engineering-society/).

The Bylaws specify that general nominations close on *March 1*, and nominations by petition close by *April 15*.

Please submit nominations to the undersigned starting 1 January 2021. Please do not delay your efforts in finding and nominating qualified candidates. Send your nominations to:

Welcome New and Reinstated Members

Australia
Raymond H Kiefer

Brazil
Glauber Rodrigues Leite

Canada
Julie Angus
Taylor Deith
Andrew Dobbin
Vincent J Sieben
Timothy D Thompson

China
Feng Hong
Fantai Meng
Yanchao Sun
Yuanhui Wang
Gong Xiang
Shengwen Xu
Shaojian Yang
Yan Yongsheng
Zheng Zeng

Croatia
Damir Lujo
Vladimir Slosic

France
Charles-Antoine Guerin

Hong Kong
Hang Yuen Ho
Diana Lynne Ibarra
Cheuk Yiu Bryan Lam

India
Badri Narayan Subudhi

Indonesia
Yudi Adityawarman
Fauziah Alhasanah
Dhika Anbiya
Robby Arifandri
Ibnu Kahfi Bachtiar
Rizqi Budi Satriyo
Arief Darmawan
Winarno Hadie
Burhanuddin Halimi
Muhammad Dayuf Jusuf
Hayuning Titi Karsan
Indra Kurniawan
Azalea Eugenie Latuheru
Mega Novetriska
Cahyono Nugroho
Dany Pambudi
Teguh Arif Pianto
Firman Prawiradisast
Hari Priyadi Priyadi
Andri Purwandani
Ronal Ronal
Heri Sadmono
Hartanto Sanjaya
Dionysius Bryan Sencaki
Reni Sulistyowati
Lena Sumargana
Yusuf Surachman
Raden Muhammad Taufik Yuniantoro

Ireland
Ronan Boyle
Daniel J F Toal

Italy
Matteo Alparone
Vincenzo Franzitta
Giovanna Inserra
Francesco Stocco

Jamaica
Erica Simmons

Japan
Jonghyun Ahn
Riza Rae Aldecoa Pineda

Malaysia
Ali Farzamnia
Zulkifli Bin ZainalAbidin

Mexico
Agustin Leobardo Herrera May

Netherlands
M. J. H. Beikes
Robrecht Dr. Schmitz

New Zealand
Lorenzo Garcia

Norway
Martin Ludvigsen
Kristin Y Pettersen
Filippo Sanfilippo

Pakistan
Shahab Uddin Shaikh

Portugal
Antonio A Moreira

Singapore
Gregory V Tan

Tunisia
Farah Belhaj

United Kingdom
Tahmina Ajmal
Adham Sabra

USA
James Gladen Bellingham
James David Broesch
Katherine C Cameron
Kevin Michael Carr
Megan Carroll
Michael J Coryer
James E De Roo
Max Deffenbaugh
Jacob P DeFilippis
Pascual DeRojas
Sidney DuBinion
John E Dzielski
Mehmet Can Ertem
Brian P Howell
Jake Jones
William D Kerr
Vadim A Konradi
John A Lane
Katherine Lieber
Kyle A Luthy
Josephine R Maisano
Peter L Mladinich
Eric A Neulight
Wendy Newcomb
Loren W Nolte
Thomas C O'Reilly
Olaoluwa Michael Oderinde
Matthew J Palanza
Roy Porras
James St John
M.Umit Uyar
Eugene V Vogt

IEEE OES SBC NAOME Poster Competition

Roberto Ravenna (IEEE OES SBC Vice president), Marvin Wright (IEEE OES SBC Webmaster), Olena Karpenko (IEEE OES SBC Chair), Andrea Coraddu (IEEE OES SBC Advisor)

Introduction of Event

Above all, Covid19 is pushing researchers to harness the power of the internet and online communication tools. Building on the renewed confidence in organising online events, the IEEE Oceanic Engineering Society (OES) Student Branch Chapter (SBC) of the Naval Architecture, Ocean and Marine Engineering (NAOME) Department of the University of Strathclyde, hosted an online project presentation competition dedicated to outstanding final year students of the academic year. The IEEE OES Strathclyde SBC, founded in 2018 under the group of enthusiastic and dedicated PhD students and academic staff of NAOME department, is a thriving group of young and senior marine researchers with currently around 20 active members. Next to providing a community space for young researchers and students, it supports and organises various events across campus. The society is having great success in organising the workshops, giving an opportunity for students to learn and enlarge their knowledge on state-of-the-art topics. Despite the many activities held during the year and challenges all the world is facing, the OES organises the annual poster competition to provide a place for students to showcase their final year bachelor work and practice presentation skills while receiving feedback from professionals on their hard work at the end of the degree.

Forced by the COVID 19 pandemic, the format of the event was an online competition and presentation. Everyone adapted well to the situation and made full use of the online video conference. The virtual event organised at the end of the academic year proved to be popular with people joining from across the University. Out of 50 students, the senior members of society, led by SBC Advisor, Dr Andrea Coraddu, selected three participants based on their outstanding performance in the current year's graduate poster presentation at the NAOME department at the University of Strathclyde. Each of the selected students had to present their work within 15 minutes with additional

Panel members.

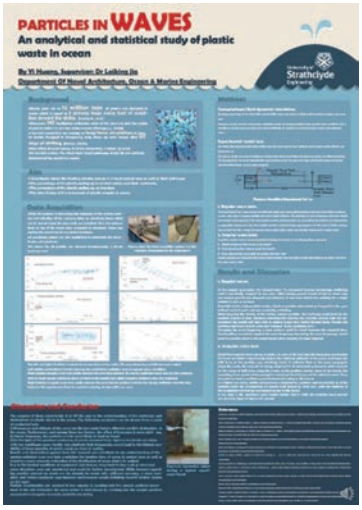
10 minutes time for Q&A. For this year's event Prof John Watson from the University of Aberdeen, the IEEE Oceanic Engineering Society (OES) Vice President for OCEANS conferences, kindly joined as a judge. He was joined in the jury by Dr James Irvine (IEEE SBC Councillor), Dr Andrea Coraddu (IEEE OES SBC Advisor) and Olena Karpenko (IEEE OES SBC Chair) from the University of Strathclyde.

It ran for half a day without any interruptions and has left organisers, judging panel and students with a happy feeling.

IEEE-OES is engaged in all aspects of science, engineering, and technology that address research, development, and operations pertaining to all bodies of water. This is fully reflected in the participating poster topics. The three presentations led to interesting discussions during each Q&A time. All students have shown outstanding efforts in their work and have impressed with the produced results in the given time. The panel had the difficult task to choose the winner and have decided for Yi Huang, who has shown particular detail in his results and presentation. He has since managed to publish his work at a conference (ISOPE-I-20-1207).

While the OES SBC Strathclyde hopes to hold this event in person again, the virtual event has shown that it can be completed successfully online. We would like to congratulate the three students on their excellent final year projects and graduating since the event. In the following you can find the abstracts of the three finalists:

Yi Huang (Supervisors: Dr Lai-Bing Jia, University of Strathclyde)
Topic: Plastic Debris in Waves an Experimental Study



Plastic waste in the ocean is one of the most consequential issues of humankind. Despite the horrifying situation, little knowledge has people acquired about the effect of local wave on plastic particle movement. In this study, the issue of local wave effect has been studied to investigate the trajectories and distribution of the plastic particles on the free water surface. A series of model tests have been performed using the old water tank in Henry Dyer building for the regular wave tests. Factors including a single and a flock plastic, different frequencies are considered, and for irregular wave tests, five different sea states are designed to be tested in the new water tank in the Kelvin Hydrodynamic Lab (KHL). The presented experimental results showed a correlation between the wave frequency and the final position of the plastic particles. Specifically speaking, under the circumstance of fixed altitude and regular wave, when the frequency is higher than 1.2 Hz, the majority of the particles will end up on shore, and a higher frequency will lead to a faster landing. Similar phenomenon was observed in the irregular wave test, where the possibility of landing at lower sea states are higher than that at higher sea states. Results and observations gained from this project can contribute to our understanding of the marine pollution issue and help predicting the landing time of waste in coastal area as well as creating a more accurate estimation of the distribution of ocean plastic in seabed.

Catalina-Georgiana Francu (Supervisors: Dr Maurizio Collu, University of Strathclyde)
Topic: Impact of the Non-Linear Viscous Drag Damping on the Optimisation of Floating Support Structures for Offshore Wind Turbines in the Frequency-Domain

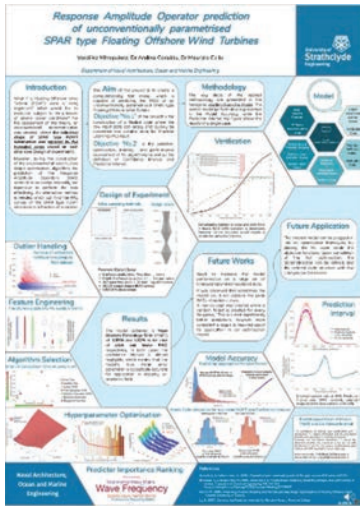
The floating offshore wind industry has consistently evolved during the past years. The society is now more aware of the damaging effects of climate change on the environment, so renewable and less polluting energy sources have become a common topic even in the political space.

The existing structures for offshore floating wind turbines were shaped by the oil and gas industry, so it is high time other options were explored. This report is a contribution to a larger project that aims to do just that. By carefully considering the difference between the two fields, the FEDORA Multidisciplinary Analysis and Optimisation Framework was developed by the supervisors and other researchers in order to discover unique configurations that would ideally have a reduced structural mass, leading to substantial cost savings. This code investigates only the hydrodynamic potential flow problem, but it may not describe the behaviour of the platform accurately in all sea states. Consequently, the non-linear viscous effects had to be included. A viscous damping matrix was created by linearising the drag damping term in Morison's Equation following the method that was introduced by Borgman. The water particles velocities induced by the wave were neglected. Thus, the linearised damping coefficients (surge-surge, surge-pitch/pitch-surge, pitch-pitch) were calculated as functions of the standard deviation of the body velocity. Simulations were conducted for two load cases, one of which was chosen to be more energetic. It was concluded that the addition of the drag damping leads to a 1% reduction in the structural mass in the harsher environmental condition and to a reduction of only 0.03% in the less severe one. However, the surge and pitch motions of the structure are always greatly impacted. In the more severe environmental conditions, the surge RAO at the natural frequency (0.05 rad/sec) was reduced by 71.1%

when the viscous effects were considered. The pitch RAO at 0.13 rad/sec was reduced by 79.5% leading to a shift in the pitch natural frequency. The absolute values of the surge-surge, pitch-pitch, surge-pitch/pitch-surge elements from the viscous damping matrix were found to be 125%, 118% and 121% greater in the first load case than in the second one. Therefore, the drag damping has a substantial influence on the motions of the platform in some extreme sea states.

Vaszilisz Mitropulosz (Supervisors: Dr Andrea Coraddu)
Topic: Response Amplitude Operator Prediction of unconventionally parametrised SPAR type Floating Offshore Wind Turbines

The floating offshore wind sector expected to expand in the coming years, but the technology applied in their substructure shapes are not matured yet. In recent years different platform configurations were designed. In most case, the configurations follow a conventional parametrisation which was inherited from the Oil and Gas industry. Therefore, their optimisation already inherited an ample bias and parametric constraints, which means that there is a significant margin for improvements in the FOWT system performance and cost, which can be done through substructure optimisation. An optimisation process



may need hundreds of thousands of iterations to find the optimum point successfully. For this purpose, an unconventional parametrisation was created, where the cylindrical shape of SPAR type Floating Offshore Wind Turbine (FOWT) substructure was replaced by five truncated cones placed on each other. However, during the construction of the optimisation algorithm, the prediction of the Response Amplitude Operators (RAO) of the floating system seemed to be computationally too expensive to perform the task effectively. An efficient way to minimise the computational overload, is to replace the costly simulation model with a cheaper-to-run metamodel. Therefore, this project deals with a potential metamodel generation, which can predict the RAOs of unconventionally parametrised SPAR type floating wind turbine.

Underwater Robot Convention in JAMSTEC 2020—All Hands on Deck! Online!!

Yuki Sekimori (The University of Tokyo) and Toshihiro Maki (Beacon Associate Editor, The University of Tokyo)

1. Introduction

The Underwater Robot Convention in JAMSTEC 2020 was held at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) on 5–6 December 2020 by NPO Japan Underwater Robot Network [1], [2]. The event aims to establish a forum for participants to exchange technical ideas and build networks through the presentations and the competition of the self-built underwater robots. At the same time, the underwater robot seminar aims to provide an opportunity for them to stipulate the interest and deepen the understanding of underwater robot and underwater technology. Although the event was held mainly online this year [Figure 1], it was a lively event, and we hosted a comparable number of participants to the previous years. It was our first time to hold the event online, but the event

Figure 1. The group photo of the online participants.

was smoothly organized. We earned a valuable experience that would be beneficial for the conventions in the future.

In this year's convention, we held two divisions of the competition: The General Competition (Free) Division and The Junior Division, and the underwater robot seminar [Table 1]. The Free Division is targeted towards university students and the public, and the contestant teams compete for technical aspects and originality. The Junior Division is targeted towards middle school, high school, and technical college students, and the teams compete for the strategy of picking up submerged cans within a time limit. Some of the contestant teams from the Free Division were given the opportunity to demonstrate their robot in the multipurpose pool at the Yokosuka Headquarters of the JAMSTEC [Figure 2]. The AUV Division was not held this year because the Techno-Ocean 2020 robot competition in October was cancelled due to the COVID-19 infection control measures. This year's AI Challenge Division was also cancelled for the same reason. Unlike the previous years, we did not provide subsidies to middle school and high school students participating from afar.

As aforementioned, we hosted 212 participants this year, which was comparable to 235 participants last year. The number of contestant teams decreased because the AI Challenge Division was cancelled. However, we expanded the underwater robotics community through hosting new contestant teams from afar, and we reconfirmed the benefits of an online event.

Table 1. Event schedule

Saturday December 5th	
10:10	Opening Ceremony
10:30	Underwater Robot Seminar
13:30	Workshop (Free Division)
16:00	Workshop (Junior Division)
Sunday December 6th	
10:00	Free Demo (Free Division)
13:00	Demo at JAMSTEC (Free Division), Avatar Demo
15:00	Review Session (Junior Division)
16:00	Awards and Closing Ceremony

Figure 2. The group photo taken in the multipurpose pool at the Yokosuka Headquarters of the JAMSTEC.

2. Free Division

13 teams contested in the Free Division this year compared to 10 teams last year. In the workshop on the first day, each contestant team presented the concept, the features, and the technical aspects of its project, followed by a question-and-answer (Q&A) session. In the demonstration on the second day, each team presented the maneuvering of the robot. The presentation videos are available to the public on the Japan Underwater Robot Network's YouTube Channel [3]. We saw many biomimicry robots of marine organism such as squids and rays [Figure 3, Figure 4]. As aforementioned, we had active discussions during the Q&A sessions of the workshop and the demonstration. Moreover, 4 contestant teams demonstrated the robots in the multipurpose pool at the Yokosuka Headquarter of the JAMSTEC [Figure 2]. As a COVID-19 infection control measure, we allowed the maximum of 3 members per team to enter the venue.

3. Junior Division

The Junior Division was held completely online. Unlike the previous years, we could not distribute the design kit this year

Table 2. Free Division evaluation criteria

Presentation: 50 points
Points given for the quality of the poster and the workshop presentation. Evaluated the layout of the poster, technical contents, visibility, diction, understandability, and Q&A of the presentation.
Competition: 50 points
Evaluated the contents of the demonstration comprehensively.

Table 3. Free Division results

Champion	Team Blue (Aichi Institute of Technology) [Figure 3]
Runner-up	Dolphin Creator (No affiliation) [Figure 4]
Second runner-up	Team Green (Aichi Institute of Technology)

Figure 3. The champion of the Free Division. "AIT-MR-III", a manta ray-inspired marine biomimicry robot of the Team Blue from the Aichi Institute of Technology.

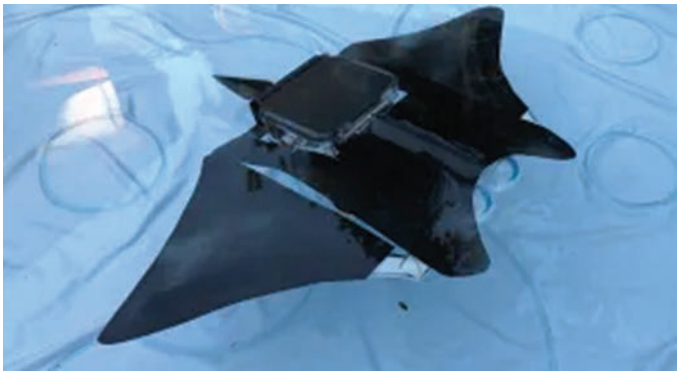


Figure 4. The runner-up of the Free Division. "Mattan", a manta ray-inspired robot of the Dolphin Creator.

due to the COVID-19 pandemic, so we asked the contestant teams to remodel the robot using the kit provided in the previous years. Although the design kits were not distributed, we shared an open-sourced method on how to build the robot. Thus, all the contestant teams were able to present with a physical robot. We set the presentation assignment: "The strategy that you would have implemented if the competition was held in person as usual", such that the contestant teams without the kit can participate. We ranked the presentations [3] by the level of achievement of the assignment [Table 4], and we awarded the Best Presentation Award and the Special Encouragement Award [Table 5]. We collected the votes from all participants for the Best Presentation Award so that the participants feel inclusive to the event. We received 28 questionnaire responses: 19 of them were mutual evaluation by the Junior Division contestants, and the rest was from the spectators. The Special Encouragement Award provided the new contestant teams with the advantage of the priority to receive the design kit next year. Like the Free Division, in the workshop on the first day, each team presented the project via online, followed by the Q&A session. We had a review session from the lecturers on the second day.

4. Online Seminar

In the morning of the first day, we held an online seminar comprised of 3 lectures. We had about 110 participants, which is more than the number of participants in the previous years. Below are the lecture series:

Table 4. Junior Division evaluation criteria

Strategy: 40 points
Evaluated the realizability of the robot based on the structural integrity. Extra points given to the teams without the design kit for the theoretical discussions of the realizability and the partial prototyping.
Mechanical study: 40 points
Evaluated the theoretical study of the maneuvering of the robot under the physical constraints.
Others: 20 points
Evaluated the motivation, teamwork, scheduling, and efforts.

Table 5. Junior Division results

Champion	Shinkai 6.0 (Shibaura Institute of Technology Senior High School) [Figure 5].
Runner-up	Minamata High School, Machinery Section, Engineering Department (Kumamoto Prefecture Minamata High School)
Best Presentation Award	Tokyo Tech High School of Science and Technology, Freshman Volunteers [Figure 6].
Special Encouragement Award	Tokyo Tech High School of Science and Technology, Freshman Volunteers [Figure 6] and Sagae Sakurambo (Yamagata Prefectural Sagae Technical High School)

1) New breakthrough in the polar science by the unmanned surveying technology. Presented by Prof. Yoshihumi Nogi (National Institute of Polar Research)
2) Meeting for the promotion of the social implementation of Ocean Avatars. Presented by Dr. Hiroshi Yoshida (JAMSTEC). Live from the Fukushima Robot Testing Field (RTF).
3) Real-time processing and robotics application of convolutional neural network for image processing. Presented by Mr. Yuichiro Niwa (Acquisition, Technology and Logistics Agency).

This year, we collaborated with "The second meeting for the promotion of the social implementation of Ocean Avatars" held at the Fukushima RTF by linking the two venues via the internet. During the demonstration session in the afternoon of the second day, an underwater robot in the multipurpose pool at the Yokosuka Headquarters of the JAMSTEC was remotely controlled from the Fukushima RTF via the internet. The transmission latency was marginal, and we did not feel like the robot was controlled online. Together, we were able to livestream a smooth maneuvering of the robot.

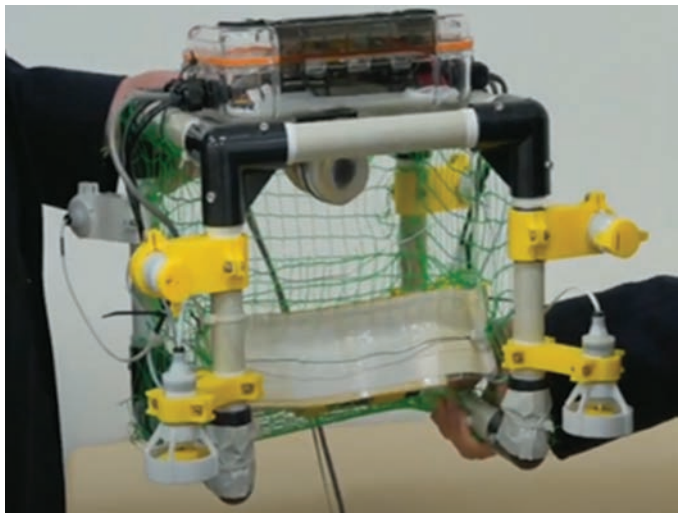


Figure 5. Champion of the Junior Division. "Shinkai 6.0" of the Shibaura Institute of Technology Senior High School.

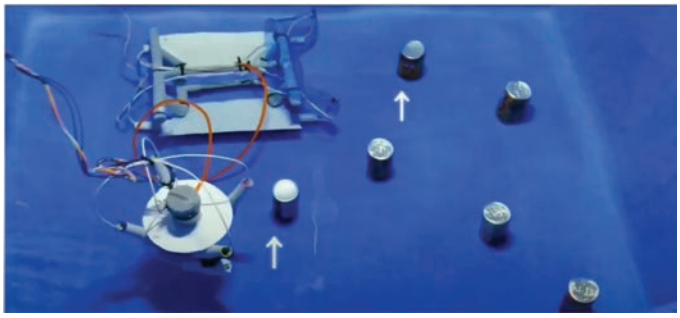


Figure 6. Best Presentation Award and Special Encouragement Award. Underwater robot of the Freshman Volunteers from the Tokyo Tech High School of Science and Technology.

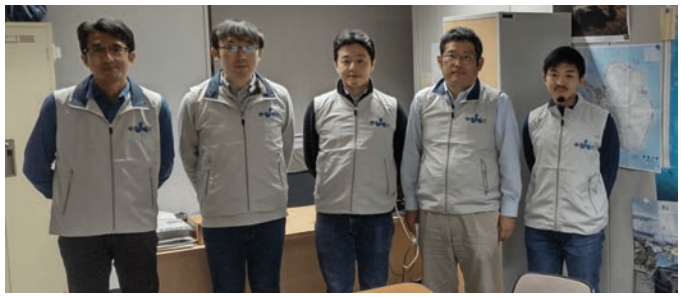


Figure 8. The group photo of the organizers at the Center for Integrated Underwater Observation Technology at Institute of Industrial Science, the University of Tokyo.

5. Benefits and Challenges of an Online Convention

The online form was venturous for a convention that includes a competition of physical robots, exchange of technical ideas, and networking. It was a new learning experience for both the participants and the organizers. We outlined some of the key benefits and challenges of hosting an online convention.

One of the benefits was that the participants actively asked questions during the workshops. It seemed like the participants found the online format easier to ask questions. The second benefit was the high degree of completeness. Most of the contestant teams presented a fully functioning robot. This is probably because the teams had to submit the demo video a week before the convention, so they could not improvise. In addition, we were able to host more participants from afar than the previous years.

Figure 7. The author of the article (Yuki Sekimori).

On the other hand, we encountered some challenges, too. Although we had more questions during the Q&A sessions, it was difficult to establish a platform for interpersonal interactions among the participants. The Q&A sessions were rather formal because all the participants were listening. In an online platform, it was challenging for us to provide an environment for free and casual discussions. Furthermore, the video demo could never be as exciting as the at-the-venue demo because only a limited amount of information was conveyed over a video clip.

6. Conclusion

The Underwater Robot Convention in JAMSTEC 2020 was successful. Overall, we were excited to see well-designed and high-quality robots from many of the contestant teams. In the Free Division, we were able expand the underwater robotics community through hosting contestants from afar. In the Junior Division, we were able to see a strong supportive network of the contestant teams. The contestants overcame many challenges that they faced due to the COVID-19 infection control measures. Under the restrictions due to the COVID-19 infection control measures, we had to hold the event online and postpone the event to December; however, the event was fruitful in various aspects. All the contestants put great effort into creating an ingenious underwater robot while adjusting to the online format. As a master's student involved in the competition organization, I (Yuki Sekimori) [Figure 7] was able to learn from observing how the executive members communicate effectively and make decisions to prepare for and carry though the event. In addition, I was inspired by many of the innovative underwater robot concepts presented during the convention. I look forward to seeing the contestants continue to innovate and be involved in underwater robotics, possibly working together with them in the future. Regardless of the circumstances, we will continue to promote, encourage, and support students and the public to fulfill one's intellectual curiosity and to demonstrate ingenuity through the underwater robotics convention.

Acknowledgments

The Underwater Robot Convention in JAMSTEC in 2020 was supported by IEEE/OES Japan Chapter, MTS Japan Section, Techno-Ocean Network, The Japan Society of Naval Architects and Ocean Engineers, JAMSTEC, The Nippon Foundation, Kanagawa Prefecture, Yokosuka City, Tokyo University of Marine Sciences and Technologies, Center for Integrated Underwater Observation Technology at Institute of Industrial Science, the University of Tokyo, Fukushima RTF, Aqua Modelers Meeting, and Matsuyama Industry Co., Ltd. We would like to express our sincere appreciation to the sponsors for their strong support and cooperation in realizing this competition.

References

[1] Japan Underwater Robot Network (in Japanese). [Online]. Available: http://underwaterrobonet.org/

[2] Underwater Robot Convention in JAMSTEC 2020 (in Japanese). [Online]. Available: http://jam20.underwaterrobonet.org/

[3] Underwater Robot Convention 2020 (in Japanese). Japan Underwater Robot Network YouTube Channel. [Online]. Available: https://www.youtube.com/playlist?list=PL7niPiAIqUjrsPu3okWw2If9ppS44WqED

The First UNIFI–UNIPI IEEE OES Joint Student Branch Chapter Workshop

Alessandro Bucci, Matteo Bresciani

The UNIFI–UNIPI IEEE OES Joint Student Branch Chapter is born in the first months of 2020 with the aim of increasing the cooperation between the Universities of Florence and Pisa, Italy, in the field of marine robotics. The Chapter is still young, but several Ph.D. students and undergraduates from both Universities have joined the Chapter since its creation.

The main activities performed during 2020 by the Chapter members were focused on fulfilling two main goals: to share the knowledge between the young research members of the groups belonging to the Universities of Florence and Pisa, e.g., performing common at-field experimental tests, and to involve new students through technical and informative presentations about marine robotics made by the Chapter members.

Firstly, several members of the Chapter participated as speakers to the IEEE OES Global OCEANS conference and the IEEE OES AUV Workshop. These conferences have been the first occasions for most of the Chapter members to take part in the most important and famous conferences regarding marine systems and robotics. During IEEE OES Global OCEANS 2020, some Chapter members took part in the Student Poster Competition (SPC). In particular, Francesco Ruscio proposed a strategy to geo-reference underwater visual data using audio for data synchronization. The results, obtained by elaborating a dataset acquired during a Posidonia Oceanica monitoring activity in front of the Ligurian coast (Italy), are very promising and can lead to accurate geo-referenced identification of the Posidonia Oceanica and the reconstruction of the surveyed area. This work has ranked at second place in the SPC Gulf Coast Section. Furthermore, the article presented at the SPC Singapore by Matteo Bresciani addresses the problem of determining a low-cost method to identify the dynamic parameters of the surge motion model for an Autonomous Underwater Vehicle utilizing experimental data coming from an acoustic tracking system composed of passive Direction of Arrival sensors.

Here is also reported a list of the Technical Program papers presented during IEEE OES Global OCEANS 2020:

- A. Bucci, A. Topini, L. Zacchini, et al., "Underwater Acoustic Image Enhancement by using Fast Super-Resolution with Generative Adversarial Network."
- E. Topini, A. Topini, A. Bucci, et al., "LSTM-based Dead Reckoning Navigation for Autonomous Underwater Vehicles."
- M. Bresciani, G. Peralta, D. S. Terracciano, et al., "Comparative analysis of EKF and Particle Filter performance for an acoustic tracking system for AUVs exploiting bearing-only measurements."
- D. S. Terracciano, et al., "Ship acoustic signature measurements by using an AUV mounted vector sensor."
- M. Alibani, et al., "Real time Optimal Allocation for I-AUV with Interacting Thrusters."

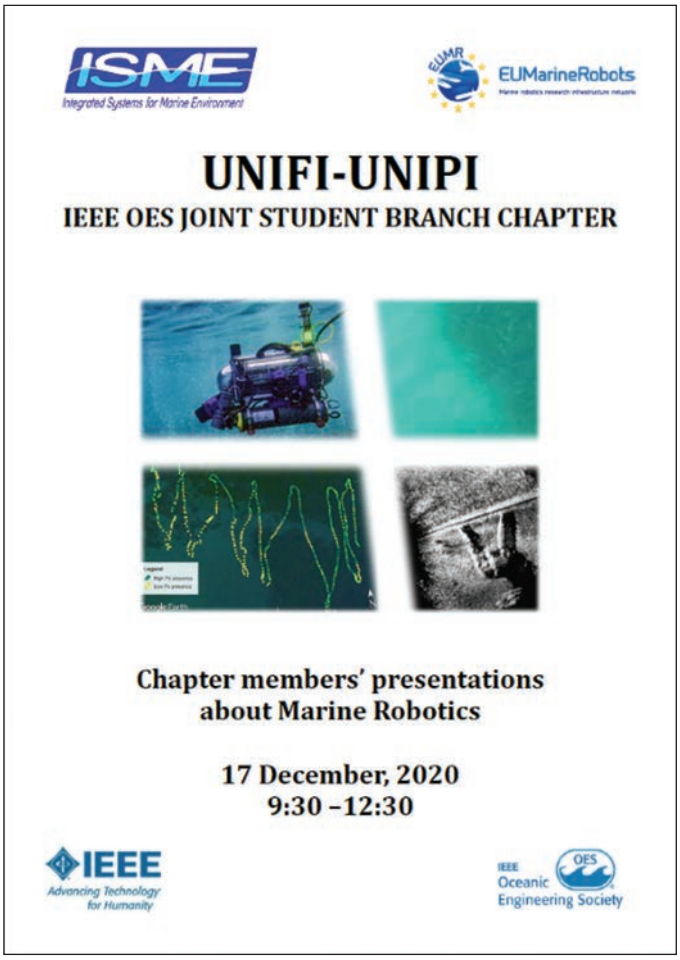
Furthermore, some papers have been presented during the 2020 IEEE OES Autonomous Underwater Vehicle Symposium (AUV 2020):

- L. Zacchini, et al., "Receding-horizon sampling-based sensor-driven coverage planning strategy for AUV seabed inspections."
- L. Zacchini, A. Topini, et al., "Forward-Looking Sonar CNN-based Automatic Target Recognition: an experimental campaign with FeelHippo AUV."
- M. Franchi, A. Bucci, L. Zacchini, E. Topini, et al., "A Probabilistic 3D Map Representation for Forward-Looking SONAR Reconstructions."

Following the guidelines we had proposed for the first year, the Chapter members have organized, in mid-December, an event, where each Ph.D. student of the Chapter has presented his research work performed during the last year. Thanks to the seven speeches, various areas of marine robotics and underwater systems have been touched during the workshop, ranging from navigation strategies to artificial intelligence and motion planning. Each presenter showed his research activity

Program of the first UNIFI-UNIPI IEEE OES Joint Student Branch Chapter workshop.

9:30–9:40	**Welcome**
9:40–10:00	**Alessandro Bucci:** Sensor fusion algorithms for Autonomous Underwater Vehicles navigation
10:00–10:20	**Matteo Bresciani:** Distributed localization and navigation of an Autonomous Underwater Vehicles swarm
10:20–10:40	**Alberto Topini:** AI for fully Autonomous Underwater Vehicles inspection and intervention tasks
10:40–11:00	**Francesco Ruscio:** Geolocation of underwater images for inspection and monitoring activities
11:00–11:10	**Break**
11:10–11:30	**Edoardo Topini:** Smart Reconfigurable Drones for survey, inspection and intervention
11:30–11:50	**Giovanni Peralta:** Underwater navigation through the perception of the environment
11:50–12:10	**Leonardo Zacchini:** Motion planning, replanning and perception for Autonomous Underwater Vehicles
12:10–12:30	**Discussion and Questions**



Flyer of the first UNIFI-UNIPI IEEE OES Joint Student Branch Chapter workshop.

Screenshot with the presenters and some participants during the workshop.

and shared the obtained results with the other presenters and to the participants, which were almost forty students during the whole workshop.

The event has been largely advertised to non-member students with interest in robotics themes to involve their participation and to let them know about the presence of the Chapter in their Universities. All the participants took an active part in the workshop, by asking questions and commenting on presentations.

Thanks to the received positive feedback from the attendees, we plan to repeat the workshop during 2021. We are thinking about adding some presentations from selected invited speakers to the ones made by the Chapter members, with the aim of increasing the network with IEEE and other communities of marine robotics researchers.

IEEE OES UNIZG SBC Activities

Nadir Kapetanović, Igor Kvasić, Kristijan Krčmar, Anja Babić

After the success of student-organized lectures and hands-on tutorials during the International Interdisciplinary Field Workshop of Maritime Robotics and Applications—Breaking the Surface in October 2020, IEEE OES University of Zagreb Student Branch Chapter (UNIZG SBC) has remained active and continued to emphasize the importance of professional experience and knowledge transfer not only among the SBC members but also to the wider IEEE community.

On November 26 and 27, 2020, our members formed a team to participate in the Smart shipping hackathon organized by De Vlaamse Waterweg nv, Antwerp Management School and EY (https://smartshipping-hackathon.com/). The hackathon was aimed at improving and finding innovative solutions for the inland waterway shipping sector, formed in four separate challenges: Crewless lock passage, Communication, Corridor management and Operations for the future. Our members, together with the other participants, had the chance to learn a lot about how the Belgian inland waterway system is organized and what the current state of the art is, as well as what the biggest issues currently are. The participants used their marine robotics background as well as problem solving skills and critical thinking to come up with innovative solutions. They had the chance to talk and discuss their ideas with leading experts and mentors from the field and to participate in very informative workshops such as Business Modeling and Pitching Workshop. They got excellent feedback from the organizers and did their part in finding better solutions towards automation, cost-effectiveness, safety and green energy transition to help unlock the enormous

The poster of prof. Singh's talk "Field Robotics: Where are we, where we came from and where we are going".

economic potential that lies in using our waterways. A great exercise for our members, encouraging teamwork, innovative thinking, entrepreneurship and inspiration!

Kristijan Krčmar giving a lecture on 3D printing.

On December 1st, 2020, Mr. Hanumant Singh, a Professor at Northeastern University and the chair of the Autonomous Marine Systems Technical Committee, gave a very interesting talk on the topic of "Field Robotics: Where are we, where we came from and where we are going." The talk was co-organized by IEEE OES UNIZG SBC, IEEE Young Professionals and IEEE Region 8 Societies. The recording of the talk is available at IEEE Region 8 Young Professionals FB page and their YouTube channel https://www.youtube.com/c/IEEER8YoungProfessionals.

This talk examined how field robotics has evolved over the last 25 years. Looking at examples from expeditions around the world in the pursuit of Marine Archaeology, Marine Geology, Fisheries Science, and Polar Studies, the arc of engineering research was traced in the context of what we have accomplished and several open problems that remain.

Kristijan Krčmar, a member of UNIZG SBC and an employee of H2O-Robotics company (https://h2o-robotics.com), held a tutorial on December 7th, 2020, titled "Getting Started with 3D Printing: Case Studies and Best Practices." The tutorial tackled many aspects of 3D printing, i.e., how to export a model from CAM/CAD program in good enough quality that after using 3D printing software the surface and mechanical properties of the printed model are of high quality. Various parameters such as "elephant foot," z-seem, printing temperature, and their effects on the printed model properties were discussed. The participants had the chance to touch 3D printed models of the same object of various quality levels as well as go step-by-step through the 3D printing software that Kristijan uses.

On December 14th 2020, Igor Kvasić, IEEE OES UNIZG SBC Vice-Chair, held a very engaging tutorial "Virtual Reality Diving Glove Workshop." The use of hand gestures is a natural form of communication among divers. As part of the ADRIATIC project, the Biomimetics lab of the University of Auckland is integrating wearable sensors into a dive glove to extend the capabilities of hand gestures. This could allow divers to interact regardless of orientation and visibility. In ADRIATIC project gesture recognition is implemented as a form of communication between a diver and underwater vehicles. Once recognized, a gesture is translated into a command and communicated through acoustic modems to an autonomous underwater vehicle (AUV).

The goal of this tutorial was to acquaint the audience with the latest prototypes of the gesture recognizing glove and the technology behind it, as well as give a hands-on experience in using the glove to control the underwater vehicle in an HTC Vive virtual reality simulator. The participants were presented

Igor Kvasić presenting the results of the ADRIATIC project and the technology behind the gesture recognition diving glove.

an in-depth overview of setting up the glove and the basic gesture command list, which is going to be used as a feedback of repeatability and user friendliness, which could be used for further development purposes.

The environment of the ocean floor is still almost completely mysterious, yet is only a few kilometers from our coasts. The oceans and seas are difficult to reach for direct observation. Only in the last 20 to 30 years have we succeeded in exploring and mapping the Earth's seabed, mainly through technological advances such as acoustic remote sensing, e.g., multibeam sonars. On this note, Nadir Kapetanović, the Secretary of the IEEE OES UNIZG SBC, organized a tutorial titled "Bathymetry Data Collection by an Autonomous Surface Vehicle and Post-Processing: Case studies" on January 11th, 2021. Two aspects of using multibeam sonar technology for bathymetric surveys were addressed: (1) bathymetric surveys of the seafloor and lake beds for hydrological/geological applications, and (2) bathymetric surveys of underwater cultural heritage sites. The attendees had a chance to go through the whole process of logistics planning for the survey missions, mission planning with respect to the sonar/vehicle/environment parameters, as well as post-processing of the collected data in WBMS and QPS Qimera software.

The last part of Nadir's bathymetry tutorial was related to merging acoustical point clouds from bathymetry with camera-based point clouds from photogrammetry at underwater cultural heritage sites to form multi-resolution fully textured 3D opto-acoustic models. Following this topic, Nadir held another tutorial titled "Photogrammetry: From Photos to Scaled 3D Models" on January 18th, 2021.

Photogrammetry is the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring, and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena. Photogrammetry is nearly as old as photography itself. Since its development approximately 150 years ago, photogrammetry has moved from a purely analog, optomechanical technique to digital photogrammetry based on digital imagery and computer vision. This tutorial addressed two domains of photogrammetry applications for generating 3D models and orthophotos: (1) land/air: based on hand-held camera or unmanned aerial vehicle's (UAV) camera, and (2) underwater: based on diver's hand-held camera, as well as a camera mounted onto a remotely operated vehicle (ROV) or an autonomous underwater vehicle (AUV). The attendees had a chance to go through the whole process of mission planning for the survey missions, with respect to the camera/vehicle/environment parameters, as well as post-processing of the collected data in Agisoft Metashape software.

Nadir Kapetanović giving a lecture about bathymetry.

Nadir Kapetanović presenting the pipeline of photogrammetric data collection and processing.

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