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Let's sea our future together



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

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Member Benefits—Did You know?

Your Action Required

This Could be Your Last Paper Copy of the BEACON!

As an OES Member, You Must “Opt-In” to Continue Receiving Your Paper Copy of the OES Beacon Newsletter

The OES Beacon newsletter is published on the OES website in both pdf and Html form. This will continue and you will be notified when each issue is on line. However, if you wish to **retain your paper copy of the Beacon you must take one of the following actions.**

- 1) When renewing your membership and to **“opt-in” to retain the print edition** of the OES Beacon, please select “Customize Options” in the Cart and check the box for print.
- 2) If you have **auto-renew** of your membership, it is suggested that you go on line and renew manually so that you can

access the publication options and **opt-in to the print version.** Or, you can follow the instruction in the third option below.

- 3) If you renewed and did not opt-in to retain the paper copy, or if you have a problem doing so, you can **call the contact center** and ask them to provide the print copy and they will do it. Below is the information for the contact center and support center.

<https://supportcenter.ieee.org/>

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From the OES BEACON Editors

Harumi Sugimatsu and Robert Wernli

Welcome to the March 2019 issue of the Beacon as we start a new year that includes many new AdCom and ExCom members. We also have new RECON and JOAB teams as reported in the article by our VP for OCEANS. The latest changes to all our committees and volunteers can be found on the inside of the front and back covers. Again, we'd like to thank all of the contributors to our quarterly newsletter. As you can see by the content, this is your newsletter, and we try to cover all aspects of the society activities from our workshops, symposia and conferences to what our individual members, chapters and committees are up to. And, don't forget, all issues of the Beacon are available on the OES website.

Of particular interest in this issue are the highlights of all the activities OES has ongoing to support our students and Young Professionals (YPs). Our Student Activities committee has been very active, especially in expanding our social media footprint. And our latest two YP-BOOST selections are introduced. There is plenty of opportunity to get involved with your society as a student or YP, much of it funded; take advantage of it. In addition, an excellent report is provided on our support to the First Flight High School and their research. And, to support our latest goals and membership outreach, we'll be unveiling our new OES website by the time you receive this issue. Check it out.

There is plenty going on in our chapters as reported in the articles from Singapore and Atlantic-Canada. And the report on our workshops and symposia highlights 9 events that OES has sponsored last year and early this year. The USYS '18 conference was recently held in China and the AUV '18 symposia held in Porto, Portugal; reports on both are in this issue. And coming up we have the CWTMA workshop in San Diego, CA, in March and the Underwater Technology symposium in Kaohsiung, Taiwan, in April. And, on a larger scale, we have our largest co-sponsored conference, the Offshore Technology Conference (OTC), coming up the first week of May which is celebrating its 50th anniversary.

We also take pride in our members. Be sure to see the latest articles on member awards, highlights and in "Who's Who" some interesting musical ability is unveiled.

For those of you who are technical experts and like to discuss your efforts with your peers, be sure to review the VPTA article on our Distinguished Lecturer program. Our DLs are always looking for speaking opportunities and we're always looking for future DLs. Get involved.

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



Harumi in India for Ganges river dolphin census using a balloon.



OCEANS 2018 Charleston wasn't the only winner last October. So was the excellent cuisine like these "sticky finger" ribs. Cheers!!

VPTA Report—Distinguished Lecturer Program

Malcolm Heron, OES Vice President for Technical Activities



We welcomed three newly appointed Distinguished Lecturers to the DL Roster on 1 January. DLs are appointed for a four-year term by AdCom with endorsement by one of the Technology Committees. At the end of their term DLs may nominate for re-appointment in response to a general call for nominations. It is significant that the three appointees were endorsed by Technology Committees that have not been previously represented on the DL roster.

Hanumat Singh is a Professor at Northeastern University and Director of the Center of Robotics and his nomination was endorsed by the Autonomous Marine Systems Technology Committee. He offers DL topics including Current and Future Issues in the Use of AUVs; Unmanned Aerial Systems for Polar and Oceanographic Applications; AUVs for research in the Arctic and Antarctic; Machine Learning for Underwater Imagery; High Resolution Optical and Acoustic Mapping with Underwater Vehicles; and The Role of Robotics in Fisheries Research.

Stefan Williams is Professor of Marine Robotics at the University of Sydney and Co-Director of Sydney Robotics at U. Sydney. His appointment as DL was endorsed by the Autonomous Marine Systems Technology Committee and he offers lectures on Autonomous Underwater Vehicles; Navigation and Mapping; Machine Learning; Planning and Applications in Ecology; and Geoscience and Archaeology.

Rick Spinrad is Senior Advisor to the Vice President for Research; Professor of Oceanography, Oregon State University and is President of the Marine Technology Society. He has held a wide range of positions in Technical Leadership; Program Management and Advocacy; Senior Administration; Research Innovation; and Teaching. His nomination was endorsed by the Ocean Observations and Environmental Sustainability Technology Committee. His Distinguished Lecture Topics include: Marine Technology (past, current, future); Ocean Policy; and Operational Oceanography (civil and military).

The DL Program has a modest budget that allows the Distinguished Lecturers to vary their schedules to provide technical talks to OES Chapters, IEEE Sections and other institutions as the opportunities arise. Look on the web site <ieeooes.org> for topics and biographies. Communication is a 2-way stream but the DLs do not know what your Chapter or Section would like until you contact them. The DL Program is there for you to use—and the ball is in your court.

The current DL Roster is:

Final Year	Distinguished Lecturer	Endorsing Technology Committee
2019	Paul Hines	Underwater Acoustics
2019	Mal Heron	Currents, Waves & Turbulence Measurement & Applications
2019	Vacant	
2020	Ken Foote	Underwater Acoustics
2020	Rene Garello	Ocean Remote Sensing
2020	Jim Candy	Signal Processing and Statistical Learning*
2021	Marcia Isakson	Underwater Acoustics
2021	Milica Stojanovic	Underwater Communications, Navigation & Positioning
2021	Sandy Williams	Currents, Waves & Turbulence Measurement & Applications
2022	Hanu Singh	Autonomous Marine Systems
2022	Stefan Williams	Autonomous Marine Systems
2022	Rick Spinrad	Ocean Observations & Environmental Sustainability

*The SPSL Technology Committee is being re-formed.

Call for Nominations:

Nominations are sought for three Distinguished Lecturers to commence their term on 1 January 2020. Nominations with brief CV and endorsement from one of the OES Technology Committees close on 31 July 2019 with the VP for Technical Activities. DLs who are seeking a new term should include their record of DL activity.

Contact e-mail address: mal.heron@ieee.org

From the Vice President for W&S

Philippe Courmontagne, Vice President for W&S

By the way of loans to support the startup of a conference/workshop/symposium, or grants to support student participation or to bring keynote speakers, IEEE OES has been, and is, involved in several events as a co-sponsor.

Thus, since the beginning of 2018, IEEE OES has been co-sponsor of 9 events taking place all over the world and allowing sharing knowledge about fields of interest linked to the ocean's understanding and exploration:

Baltic International Symposium—June 2018, Klaipeda, Lithuania



This 7th IEEE/OES Baltic Symposium “Clean and Safe Baltic Sea and Energy Security for the Baltic countries” has been hosted by Klaipeda University and Baltic Valley Association.

The program has included plenary talks by experienced lecturers, oral and poster presentations, round table discussions, and a field trip to the UNESCO Natural Heritage Site—Curonian Spit. Basic topics for the Symposium have been Energy Security and Independence, Hazard Planning and Mitigation, Handling of the Extensive Ammunition and Ordinance that have been disposed of in the Baltic Sea and Ecosystems and Socio-Economic Impacts.

International Symposium on Industrial Electronics (ISIE)—June 2018, Cairns, Australia



This 27th International Symposium on Industrial Electronics has provided a forum for discussions and presentations of advancements in knowledge, new methods and technologies relevant to industrial electronics, along with their applications and future developments.

Several current and upcoming frontier technologies, innovative solutions, research results, as well as enterprises related to industrial electronics and their applications, have been presented.

Offshore Energy and Storage (OSES 2018)—July 2018, University of Nottingham Ningbo, China

OSES2018 has expanded its lead in the sustainable advancement of integrated coastal/offshore energy systems. In its 5th and largest iteration, OSES2018 Ningbo has built on the well-known and expanding OSES Event legacy established in Windsor, Edinburgh, Malta, and Cape Cod. Leading industrial, policy, and academic professionals have converged to challenge convention. Offshore Energy Generation and Storage Technology, Environmental Integration, Policy, and Expanding Global Markets are a priority. Cleaner and



smarter energy systems mean sustainable economic growth. Offshore Energy and Storage capitalizes on the tremendous resource opportunities associated with coastal regions. Over half the world lives near the coast. Its energy should too. Such topics were the purpose of OSES, which has become, since its inception in 2014, the leading annual forum for the revelation and examination of new thinking in the space of offshore energy systems.

Ucomms—August 2018, Lerici, Italy



The mission of the UComms conference series is to promote the development of a deep understanding of the propagation of communication signals underwater and the performance of higher layer protocols with the objective of supporting the intelligent choice of network-wide standards, as a foundation for interoperability.

UComms'18 was the fourth conference of the series organized by the NATO Centre for Maritime Research and Experimentation (CMRE) and was open to scientists and engineers involved in research, development, implementation and use of underwater communication systems.

The conference topics have covered the full range of interests from physical understanding of the communication channels (acoustic optical, radio) through to network protocols and experimentation.

IEEE Antarctic and Southern Ocean Forum—for Engineering, Science and Technology (ASOF-fest)—August 2018, Hobart, Australia

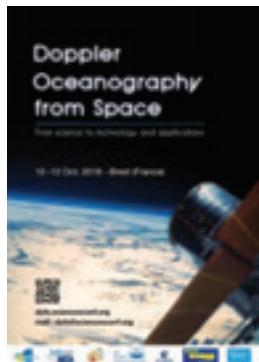
This forum, jointly organized by IEEE OES and IEEE GRSS, is an IEEE TAB initiative. ASOF has consisted of a single stream with encouragement for discussion and questions.



Autonomous Observing; Observation Technologies, Sustained measurements, Biology and Biomass; Data Science and Science challenges.

The topics, developed during this forum and related to the Extreme Conditions, have included Autonomous

Doppler Oceanography from Space (DOFS)—October 2018, Brest, France



This Doppler Oceanography from Space workshop has been hosted by the Laboratory for Ocean Physics and Satellite remote sensing in Brest, France and has been held during the Sea Tech Week 2018.

Satellite missions that measure surface velocities using **Doppler radars** are opening new perspectives for the monitoring and analysis of oceans, including sea ice, with a direct measurement of currents,

winds and waves. From past and existing missions (Envisat, Sentinel 1) that are limited to a fixed line of sight component and sparse/partial coverage of the oceans, to future at different stages of planning and proposal (SKIM, WaCM, SEASTAR), a vast variety of instrument designs and signal processing steps are possible.

This workshop has brought together instrument and processing experts with the ocean science community to address a wide range of topics that will feed into the processing and design of existing and future missions.

Technologies for Observing and Monitoring Plastics in the Oceans—November 2018, Brest, France



Plastics in the oceans pose a mounting existential threat to life in the oceans and on land, including human life, and technologies to observe, measure and monitor the flow of plastics into,

and within, the oceans are urgently needed in support of mitigating the threat.

This workshop has brought together stakeholders engaged in assessing and reducing the impacts of plastics in the ocean, experts assessing the sources of plastics in the ocean, and scientists and developers focusing on existing and new observation technologies to detect and quantify plastics in the ocean. The meeting has aimed for a joint understanding of the challenge, including the impacts of plastics on life in the ocean and on land. The plastics life-cycle, when in the ocean, has been at the center of the challenge for developing a conceptual model

which will then be used to look at different socio-economic and environmental scenarios.

Autonomous Underwater Vehicle Symposium (AUV)—November 2018, Porto, Portugal



Every two years the IEEE Oceanic Engineering Society (IEEE OES) sponsors a collaborative symposium

to bring together those working in the field of autonomous underwater vehicles.

In 2018, this diverse group from around the world has met in Porto, Portugal at the University of Porto for AUV 2018.

This symposium has covered topics from vehicles to extreme environments, exploring software development; multi-vehicle; mission planning; navigation, localization and control; applications (mapping, oceanography ...).

Underwater System Technology: Theory and Applications (USYS '18)—December 2018, Wuhan, China



This 8th international conference has been held in Wuhan, China in December 2018. This conference aims to provide a platform for researchers, scientists, engineers, academicians, as well as

industrial professionals from all over the world, to share, discuss and disseminate their current research and development activities and experiences related to the field of underwater system technology, including relevant theories as well as applications.

USYS '18 has focused on exploring new technologies and approaches utilizing the vast resources of the oceans, developing new engineering strategies for the preservation of the oceans eco-system, as well as providing a specialized forum for discussing the future of underwater system technology.

For the upcoming months, 3 workshops will be co-sponsored:

Currents, Waves, Turbulence Measurement and Applications Workshop (CWTMA)—March 10–13, 2019, San Diego, California

Objectives of this 12th CWTMA Workshop are to provide the ocean community with a forum for technical information exchange and to promote coordination among those concerned with measuring current, waves and turbulence. The goal is to ensure that the CWTMA Workshop remains the “go-to” forum for people who need to know how to measure ocean motions and how to translate those measurements into meaningful information.

The scopes of this workshop are: development of sensors for measuring currents, waves, turbulence; use of these sensors



such as radar remote sensing, correlation sonar, drifters, and satellite observation, are included.

It is too late to submit an abstract, but it is not too late to register!

Underwater Technology (UT '19)—April 16–19, 2019, Kaohsiung, Taiwan



UT '19 Kaohsiung, which will be hosted by five organizers and institutes: IEEE Oceanic Engineering Society (IEEE/OES), IEEE/OES Japan Chapter, IEEE/OES Taipei, Taiwan Chapter,

Taiwan Ocean Research Institute, and National Sun Yat-sen University. The symposium will be held from 16–19 April 2019 at National Sun Yat-sen University (NSYSU) in Kaohsiung, the third largest city in Taiwan.

The UT symposium has had a long history of success and has provided excellent networking opportunities for all involved and we warmly invite you to attend this future UT event, and possibly join a committee to host a future Underwater Technology workshop or symposium.

It is too late to submit an abstract, but it is not too late to register!

Offshore Energy and Storage (OSES 2019)—July 10–12, 2019, Brest, France



OSES 2019 heads west to Brest, France, for its 6th demonstration of

leading innovation in offshore energy systems integration. Building on the legacy that snowballed from Windsor, to Edinburgh, Malta, Cape Cod, and most recently, Ningbo; the

“OSES Effect” continues to expand its global sphere of influence. The OSES Community is a warmly-linked, international group that is expanding at an accelerating rate. Now partnered with the IEEE Oceanic Engineering Society (OES), our inclusive reach has extended even further. The benefits of OSES event attendance are realized immediately in the connection to concepts and colleagues that are driving the leading edge of offshore energy integration. However, the most strategic value of your involvement with OSES is the energizing and enduring relationships that are incubated at our events. Come see what people are talking about.

OSES2019 drives a confluence of leading industrial, policy, and academic professionals to challenge convention. Offshore Energy Generation and Storage Technology, Environmental Integration, Policy, and Expanding Global Markets will be tackled at this event. Cleaner and smarter energy systems mean sustainable economic growth. Offshore Energy and Storage capitalizes on the tremendous resource opportunities associated with coastal regions. Over half the world lives near the coast. Its energy should too.

April 7, 2019: deadline for abstract submission;

April 26, 2019: acceptance notification;

June 8, 2019: deadline for registration and full research paper submission.



Do not forget IEEE OES exists to serve you, but only your participation in events can allow the society to fulfill its mission!

The New OES Vice-President for OCEANS

John Watson, New Vice President for OCEANS

Hello to you all. I'd like to introduce myself to you as the Oceanic Engineering Society's newly appointed Vice-President for OCEANS (VPO). I will serve a two-year term from 1st January 2019.

As many of you will know, the VPO is a cornerstone position in the OES management structure for the OCEANS conferences. The VPO provides a link between the OCEANS management structure, the Local Organizing Committee (LOC) for the conference and the various committees responsible for promoting and running OCEANS. My role (in conjunction with my counterpart in MTS with whom we co-sponsor OCEANS) is to ensure that any OCEANS conference develops smoothly and efficiently from initial identification of potential locations to award of the event through to the ultimate delivery of a successful conference itself.

To ultimately deliver an OCEANS conference, reliable and efficient communication is needed between the OCEANS Steering Committee and the two operational committees, the JOINT OCEANS ADMINISTRATIVE BOARD (JOAB) and the RECONAISSANCE Committee (RECON), charged with selecting and delivering the conference. These committees comprise members of both OES and MTS and are co-Chaired



by each. One of my first duties was to nominate members for election to represent OES and I took this opportunity to introduce some new blood, and maybe some new inspiration, into the teams. I want to take this opportunity to thank all the past members for their valuable contributions to JOAB and RECON over many years.

The OES members, who have all been approved to serve three-year terms, are:

JOAB—Bill Kirkwood (Co-Chair); Brian Horsburgh, Venu Palliyal, Chris Whitt and Rene Garello

RECON—Brian Horsburgh (Co-Chair), Bob Wernli, Fausto Ferreira, Lian Lian, Jim Barbera and Ken Tagaki

These OES members are matched by their counterparts in MTS.

In addition, Shyam Madhusudhana has been approved as the OES co-Chair of the prestigious Student Poster Competition.

Finally, the next two OCEANS Conference and Expositions are to be held in Marseille in June and Seattle in October of this year. Thanks to my predecessor as VPO, Diane DiMassa, these conferences are well advanced in their preparations and are promising to be amongst the best in the series, and I hope to see some of you there.

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:

- "Modelling Acoustical Pressure and Particle Acceleration Close to Marine Seismic Airguns and Airgun Arrays" by M. Prior; A. Duncan; H.O. Sertlek; M. Ainslie
- "Buoy Analysis in a Point-Absorber Wave Energy Converter" by A. Ruezga; J. Cañedo
- "Waveguide Invariant-Based Ranging and Receiver Localization Using Tonal Sources of Opportunity" by A. Young; H.A. Harms; G. Hickman; J. Rogers; J. Krolik



- "Station Keeping Underwater Gliders using a Predictive Ocean Circulation Model and Applications to SWOT Calibration and Validation" by E. Clark; A. Branch; S. Chien; F. Mirza; J. Farrara; Y. Chao; D. Fratantoni; D. Aragon; O. Schofield; M. Flexas; A. Thompson
- "Effects of the Rough Sea Surface on the Signature of a Single Airgun" by H.O. Sertlek; G. Blacquièrre
- "Inverse Synthetic Aperture Sonar Imaging of Underwater Vehicles Utilizing Three-Dimensional Rotations" by S. Sun; Y. Chen; L. Qiu; G. Zhang; C. Zhao
- "Frequency-Time Domain Turbo Equalization for Underwater Acoustic Communications" by J. Xi; S. Yan; L. Xu; Z. Zhang; D. Zeng

- “Comparison of Propagation Models for the Characterization of Sound Pressure Fields” by E. Küsel; M. Siderius
- “Simulation Driven Optimization of Underwater Docking Station Design” by B. Page; N. Mahmoudian
- “Vision-Based in situ Monitoring of Plankton Size Spectra Via a Convolutional Neural Network” by N. Wang; J. Yu; B. Yang; H. Zheng; B. Zheng
- “High-Resolution Power Spectral Estimation Method Using Deconvolution” by W. Guo; S. Piao; T.C. Yang; J. Guo; K. Iqbal
- “A Neural Network-Based Sensitivity Analysis Approach for Data-Driven Modeling of Ship Motion” by X. Cheng; G. Li; R. Skulstad; S. Chen; H.P. Hildre; H. Zhang
- “Performance Prediction and Estimation for Underwater Target Detection Using Multi-Channel Sonar” by N.H. Klausner; M.R. Azimi-Sadjadi
- “Characterisation of Piezoelectric Material Parameters Through a Global Optimisation Algorithm” by M. Wild; M. Bring; L. Hoff; K. Hjelmervik
- “Offshore Underwater Image Restoration Using Reflection Decomposition Based Transmission Map Estimation” by M. Yang; A. Sowmya; W. Zhiquang; Z. Bing
- “AUV Homing with a Single Range-Only Beacon” by J.R. Keane; A.L. Forrest; H. Johannsson; D. Battle
- “Unit Circle Rectification of the Minimum Variance Distortionless Response Beamformer” by S. Tuladhar; J. Buck

OES Awards

Hanumant Singh, OES Member

The OES Autonomous Marine Vehicle Awards ceremony was held during the AUV 2018 Symposium in Porto, Portugal on 8 November 2018.

2018 Mid-Career Rising Star Award:

This is the first time we are presenting this award and the idea is to recognize the faculty and researchers who have been exceptionally good work but as a mid-career award we also want to celebrate the future potential of these individuals.

This year we considered 10 nominations and as it was the first year we are doing this we actually deadlocked and decided to make two awards.

Hayato Kondo

Hayato Kondo graduated from Waseda University with Bachelor and Master Degrees in mechanical engineering. He graduated from the University of Tokyo and received his Ph.D. in naval architecture in 2002. After doing research as a post doctoral fellow (JSPS) at the Institute of Industrial Science,

the University of Tokyo, he started teaching, as an associate professor, at Tokyo University of Mercantile Marine, which later became Tokyo University of Marine Science and Technology (TUMSAT) after a merger in 2003. He is currently a professor.

He distinguished himself from the very beginning while working on a wide variety of problems to do with optical and acoustic imaging from AUVs. His work on the Biointeractive AUV “BA-1” is particularly impressive. This was designed specifically for working with the fisheries industry and he continues to work on a variety of new vehicles, navigation and imaging algorithms.

João Tasso de Figueiredo Borges de Sousa

João Sousa is the director of the LSTS lab here at the university of Porto. He received his PhD and an MSc in Electrical Engineering, both awarded by Porto University.

His work and that of his lab in the area of AUVs, USVs and UAS, individually and taken together as a system is at the cutting edge of where our field is going.



Hanumant Singh, Hayato Kondo and Bill Kirkwood.



Hanumant Singh, João Sousa and Bill Kirkwood.



Hanumant Singh, Pamela Kirkwood and Bill Kirkwood.

2018 Lifetime Achievement Award:

William Kirkwood

It is my pleasure to introduce you to the 2018 Recipient of the Lifetime Achievement Award from the IEEE committee on Unmanned Underwater Systems.

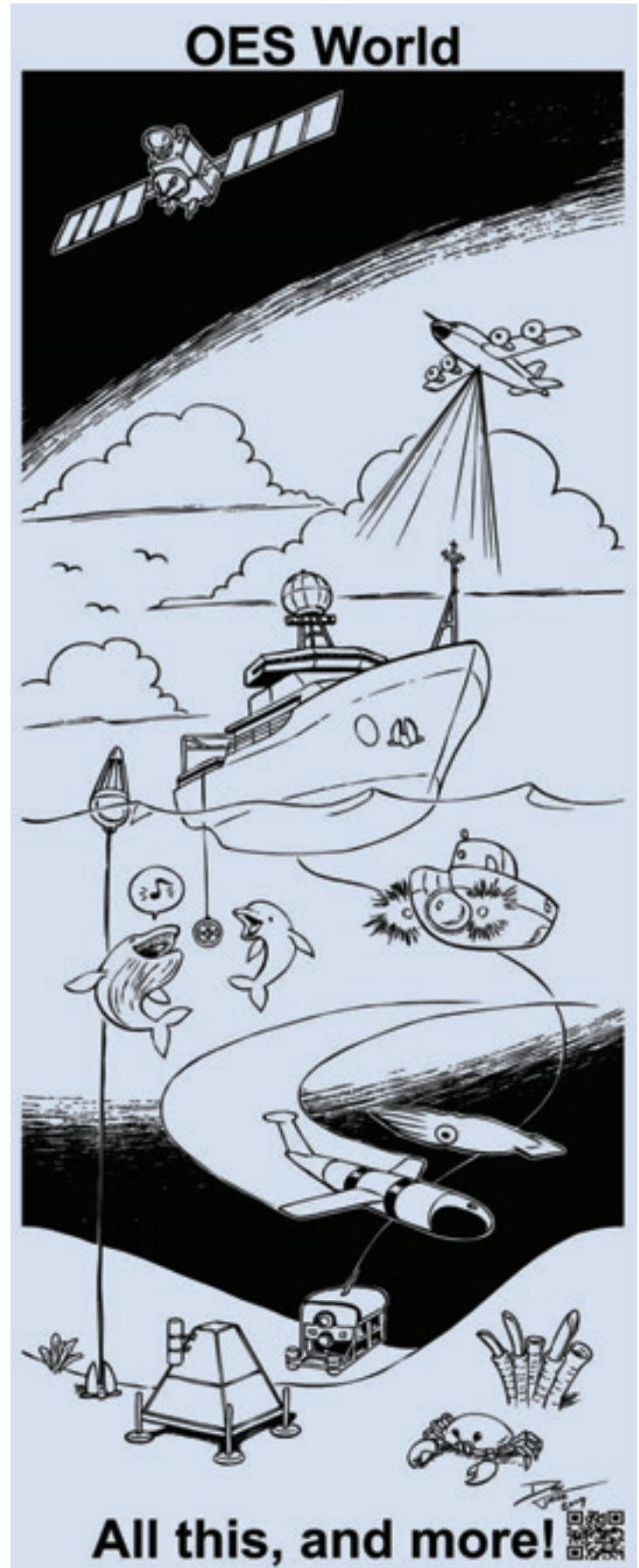
William (Bill) Kirkwood has been with the Monterey Bay Aquarium Research Institute (MBARI) for close to 30 years. While at MBARI he has held various positions including being the Director of Engineering.

He has worked on a large variety of vehicles and sensing systems in that time including the Tiburon ROV, the Dorado AUV, Deep Ocean Raman In Situ Spectroscopic (DORISS) and the Free Ocean CO₂ Enrichment (FOCE) systems. He has taken these systems all over the world including deployments in the Arctic, in the Antarctic as well as the Mariana and Costa Rican Trenches.

While these achievements are extremely impressive, there are two other aspects of Bill's career that really stand out. The first is the (often) thankless job of taking leadership administrative roles within the community. He has been the Chair or Co-chair of the Unmanned Underwater Systems committee for almost ten years (now the Autonomous Marine Systems committee), he was also the treasurer of the IEEE OES Society from 2013 to 2017 and is currently on the Executive Committee (ExCom) as Assistant to the President as well as on the Advisory Committee (AdCom) for OES as the OES Chair on the Joint Oceans Advisory Board (JOAB). Having interacted with him in this capacity I can tell you most people are in awe of his ability to do the right thing while offending the least number of people.

And finally, and almost most importantly Bill has been the mentor to literally dozens of students and researchers. I know there are senior people in the room whose careers have been powerfully affected by his advice and guidance. Bill's work continues to this day, if you attended this conference as a student with a travel grant it is in large part because of Bill. As an Adjunct Professor at the university at Santa Clara, Bill has positively changed the lives of an entire generation of graduate and undergraduate students.

So please join me in congratulating the latest recipient of this prestigious award—Bill Kirkwood.



Awards for OES members

Contact the Editors With Your Submissions

Ferial El-Hawary is the recipient of 2017 “The Murugan Memorial Award” and 2018 “Life Member Appreciation Citation Award” by the IEEE Canadian Atlantic Section (CAS) during their Annual General Meetings (AGM).

Congratulations!

The Murugan Memorial Award

The Murugan Memorial Medal was established in June of 1986, one year after the tragic and untimely death of its namesake, Gnanendran Murugan, Chairman of the IEEE Canadian Atlantic Section 1983–84. This Medal is presented on an annual basis to “the member who best demonstrates the qualities of professionalism and dedication to the purposes of the IEEE”.

During the CAS/AGM, October 2017 which is considered as the traditional Awards Celebration Over Dinner Night and usually is well attended with IEEE members and nonmembers with invited speaker and some invited guests. Ferial was surprised by announcing her name as the recipient of 2017 **The Murugan Memorial Award** from the IEEE Canadian Atlantic Section (CAS).

Responding to the announcing of the Award, Ferial said: This Award reflects some memories to me that is never forgotten, especially that is quite touchy to our OES local Chapter. As stated above Mr. Murugan was the Chair of the CAS 1983–84, during his term in office he was seeking for an IEEE Volunteer to take the lead in establishing new OES Chapter since this was a necessary step to have a local OES Chapter as a spearheading for IEEE—OCEANS’ 1987 Conference in Halifax. That time I was starting my carrier in Academia as Engineering Faculty member in addition to my activities with OES in Paper Publications, then it was the best choice for Mr. Murugan to approach me with accepting the task in taking the lead of forming CAS/OES Chapter and to be the founding Chair. After couple of weeks of my acceptance to this task, Mr. Murugan and his family (Wife and two children) died in the tragic



Ferial El-Hawary receiving the 2018 “Life Member Appreciation Citation Award” by: Jason Rhinelandler, 2018 CAS Chair.



Some IEEE members with Invited Guest Speaker, sharing the Award Celebration with Ferial over the dinner at the CAS/AGM Event.



Ferial El-Hawary receiving the 2017 “The Murugan Memorial Award” by: Christopher Whitt, 2017 CAS Chair.

Air India crash during their visit back home in India, which was a complete shock to all of us who live with his good memories.

My recent Award during CAS/AGM, November 2018 was the “**Life Member Appreciation Citation Award**” by the CAS **In Recognition and Honour of the Membership Grade of Life Member**.

I wish to express my thanks with appreciation to the IEEE—CAS members who nominated me and have confidence in me.

*Dr. Ferial El-Hawary, IEEE Life Fellow
IEEE-Board of Directors 2008-2009
IEEE-Canada President 2008-2009
IEEE/OES AdCom member 2019-2021
Formal, Prof., Dalhousie University
Email: F.El-Hawary@ieee.org
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Scope of the OES Professional Activities Area

Jim Collins, Vice President of Professional Activities

In recent years there has been a major shift in the focus of OES Professional Activities facilitated by new features and applications available on the internet. The OES continually evolves and grows by using these new tools and techniques for providing members with the ability to enhance their professional, social, economic and ethical status. Members are involved developing students activities, Women in Engineering groups, Young Professionals groups, and Social Media tools that will support their efforts.



Continuing education of members and promoting activities with other professional organizations such as the Marine Technology Society (MTS) will further the aims of the IEEE and the Society. The OES has high quality non-peer reviewed publications, such as the OES Beacon and the OES website, www.ieeeoes.org, to support the goals of the membership and promote the OES to potential members. In the following paragraphs we provide more detail on these activities.

YP-BOOST Program Dear OES Young Professional Members

Frederic Maussang, OES Young Professionals Rep.

At the beginning of this year, two candidates were chosen for the second year of the YP-BOOST program. In competition with 12 active IEEE Oceanic Engineering Society members who applied, the candidates were selected based on past participation in IEEE OES activities and on a letter of application showing their motivation and describing how they would like to be involved. We choose two new YP-BOOST candidates each year who will have their travel paid for to support OES at the next four OCEANS conferences. We will begin taking YP-BOOST applications for 2020 beginning in November of this year.

Congratulations to our two selected YPs!



Roberto Petroccia

Roberto Petroccia (M'10) (SM'18) received a Laurea Degree with the highest honours (2006) and a Ph.D. (2010), both in Computer Science, from Rome University "La Sapienza," Italy, where he has also been affiliated as research staff until 2015. Since 2015, Dr. Petroccia is a Research Scientist at the NATO STO Centre for Maritime Research and Experimentation (CMRE). His research interests include wireless sensor networks design, underwater communications and networking, security, underwater robot's localisation and cooperation, underwater digital communications standardisation. So far, he has contributed in these fields with more than fifty papers published in leading venues ranging from fundamental problems to practical aspects, mov-

ing from mathematical modelling and simulations to the actual implementation and at-sea experimentation. In the last seven years Dr. Petroccia has participated and led over thirty experimental campaigns at sea where the communications and networking solutions he developed were extensively tested and validated. Additionally, he has been actively collaborating with several acoustic modem and underwater vehicle manufacturing companies and research labs to design novel technologies supporting cooperative underwater acoustic networks. Dr. Petroccia was in the organizing committee of the IEEE UComms 2016 and 2018, ACM WUWNet 2014 and ACM WUWNet 2012 conferences. Dr. Petroccia is also an invited lecturer of the Masters in Ocean Engineering offered by the University of Pisa (ITA) and he has supervised the work of several master thesis and Ph.D. students.



Hari Vishnu

Hari Vishnu is a Research Fellow at the Acoustic Research Laboratory (ARL) in the National University of Singapore (NUS). He obtained his Ph.D. in 2013 from the Nanyang Technological University in Singapore, and Bachelors in Electrical and Electronics Engineering in 2008 from the National Institute of Technology, Calicut (NITC) in India. At ARL, he has been working for the past 6 years on diverse research interests including active sonar,

machine learning for underwater applications, acoustic modelling and bio acoustics.

He has been an IEEE Member for 12 years now, including 5 years as a full professional member and OES member for the last 7 years. He joined as a student member in 2005 in NITC. His student branch was instrumental in giving birth to and organizing FOSSMeet (Free and Open software conference), one of the largest meetups of its kind in India. He served as General Secretary and public relations officer of IEEE SB, NIT Calicut through 2005–2007.

He has been an active professional member in the IEEE OES Singapore chapter since 2013. In addition, he has been part of the executive committee in the Singapore chapter from 2014–2019, and currently is the chair of the IEEE OES Singapore chapter. During his professional membership period, he has been actively involved in organizing the Singapore AUV Challenge (SAUVC). SAUVC is Asia's largest AUV competition, attracting hundreds of students from around the world each year. He was involved in bringing social media publicity to the frontline of SAUVC's community outreach. Apart from social media outreach, he also undertook the role of Secretary, MC, Judge and Webmaster for this flagship event.

Currently he is involved in the social media outreach of the Oceanic Engineering society, contributing to the social media team via Facebook and Twitter. He is also aiming to boost student activities in the Singapore region as part of the chapter, by getting more students involved through student-oriented activities.

As YP-BOOST laureates, they will be fully included in the leadership of the OES for the following two years. They will be particularly active at **OCEANS'19 Marseille**, as judges for the Student Poster Competition, as social media reporters, and as participants in society meetings, among other activities.

In addition of these YP-BOOST representatives for 2019–2020, two other candidates have been selected for a one-year appointment to fill the BOOST vacancies created when Fausto Ferreira and Shyam Kumar Madhusudhana were selected and approved as OES AdCom members at OCEANS 2018 Charleston:

- **Jeff Dusek**, from Needham, MA, USA;
- **Stephanie Kemma**, from Trondheim, Norway.

Do not hesitate to seek all of them out at OCEANS and introduce yourself. They will be busy but you'll be sure to find them participating in the IEEE OES YP BYO lunch meeting held during each OCEANS conference.

See you soon in Marseille!

Fred

Email: frederic.maussang@imt-atlantique.fr

Expanding Mentorship Opportunities

Brandy Armstrong, Student Activities Committee Chair

Mentorship is now widely considered the key element leading to increased participation and retention of women and minorities in the fields of science, technology, engineering and math. In response, scientific societies and organizations, including the IEEE Oceanic Engineering Society (OES), have been making an effort to increase mentorship opportunities for students and young professionals (YP). IEEE OES is providing access to role models, a support network, and personal interaction with experienced professionals for its student and YP members.

Since the start of 2018 the student activities committee has recruited around 40 students and YPs to participate in regular committee meetings. The interaction during these meetings has made clear the types of opportunities and support students and YPs need to succeed. The student activity committee meetings also provide a way to share opportunities with students who are seeking mentorship and personal interaction with senior IEEE OES members. Creating mentoring opportunities for students and young professionals has become a top goal of the student activities committee. As a result, many committee members have become involved in technical committees, IEEE funding opportunities, IEEE OES Earthzine, and social media initiatives.

IEEE OES received special initiative funding for social media in 2018 and again for 2019, which is being used to create opportunities to get our newest members involved. The social media support



Brandy Armstrong (right), Student Activities Committee Chair 2018-present (former WIE liaison 2015–2018) with Farheen Fauziya (left) current WIE liaison, at OCEANS Charleston.

provided to students and YPs has helped create engaging content for the IEEE OES on social media (Facebook, LinkedIn, and Twitter) while reaching a broader audience. By creating a prominent social media presence for OES, we have increased the lines of communication with students and YPs. This has encouraged students



Young Professionals meet during lunch at OCEANS Charleston, 2018. From left to right Hari Vishnu (YP Boost 2019–2020), Fred-eric Maussang (YP chair), Katherine Woodard Weathers, Fausto Ferreira (AdCom), Shyam Madhusudhana (AdCom), Christopher Whitt (AdCom), and Brandy Armstrong (AdCom).

and YPs to be more active in the society. As a result, IEEE OES saw an increase in student branch chapter formation and YP membership in 2018 when compared with 2017.

Opportunities for professionals and students abounded at OCEANS 2018 Charleston. In addition to the student poster competition, there were new opportunities for students and YPs, including a mentorship program, a Women in Engineering (WIE) panel, and a Career panel. Both panels were shared to Facebook live and recordings are available on the IEEE OES Facebook page.

The 2019 social media initiative funding will be used to create more opportunities for student and YP involvement in Earthzine. Many students and YPs have already volunteered as associate editors for Earthzine. The Singapore chapter has received social media support for providing member time to administer the Earthzine website. Rajat Mishra has already greatly improved the sites efficiency and loading speed. Once submissions are rolling in, the volunteer students and YPs will be working with senior IEEE OES members on themes and focus areas, another mentorship opportunity.

In 2019 IEEE OES members can earn support for their chapters through volunteering for the social media initiatives. I am currently



Shyam Madhusudhana (left) and Fausto Ferreira (right) the 2018 YP Boost awardees at OCEANS Kobe. Both were promoted into AdCom at OCEANS Charleston.

seeking volunteers to report on IEEE OES conferences, submit content to Beacon and Earthzine, and contribute to global social media updates. We also need members with WordPress experience, or who would like to gain experience, to join our Earthzine team. If you would like to join the student activities committee, or are looking for other ways to become more involved in IEEE OES, please contact Brandy Armstrong at brandy.armstrong.us@ieee.org. To keep up with the latest events and news please follow IEEE OES and Earthzine on Facebook and Twitter (@IEEE_OES, @Earthzine) and join the IEEE OES LinkedIn group.

I came into the position of student activities committee chair in 2018 with many ideas on how to aid students and YPs in their professional journeys. Through interaction with the students and YPs who have joined the student activities committee, we have compiled and enacted so many more ideas! The possibilities are immense, so 2019 is sure to be another great year for student and Young Professional members of IEEE OES.

IEEE OES Webmaster

Steve Holt, IEEE OES Webmaster



We are now entering the year 2019 with a wide range of activities underway with our OES website. One annual ritual is always making changes to the site because newly elected members of the AdCom and ExCom, as well as those appointed to committees, have to be displayed quickly.

While all of this is ongoing, we are migrating to a new WordPress based platform, which is hoped to prove more user friendly. This newly redesigned website will provide an enhanced, graphic-rich experience, with a focus on current news, event and articles of interest to OES members and the broader oceanic engineering community.

The new responsive site layout will now provide optimal viewing of the website across mobile devices and tablets.

The website will offer quick access to the OES Beacon, our quarterly newsletter, extensive information about the society's technical activities and sponsored competitions, and a calendar of upcoming conferences and events, including the semi-annual flagship event, our OCEANS conference. Also, the website will feature an increased focus on students, young professionals, and women in engineering. As part of our social networking outreach, the website will play an important role in our overall effort to promote an online community serving the interests of ocean engineering students, professionals and others.

Finally, special thanks is extended to Matthew Gelis of Veraprise for all of his tireless efforts in making these timely modifications.

Chapter News

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

IEEE Oceanic Engineering Chapter of the Canadian Atlantic Section (OES—CAS) by:

Dr. Ferial El-Hawary, IEEE Life Fellow, Chapter Chair

Historical power interconnector in Canada achieves key milestone

Asea Brown Boveri (ABB) and The Maritime Link Project—Connecting Nova Scotia and Newfoundland with an HVDC Underwater Link



Ferial El-Hawary, OES-CAS Chapter Chair.

In addition to our traditional Networking Events of the IEEE (OES-CAS) was a joint event with the *Young Professionals Affinity Group* that took place at St. Mary's University where two prominent speakers (see below) from ABB and Emera briefed the audience on the success of ABB testing of the Maritime Link, enabling Emera to exchange electricity between the Island of Newfoundland and Nova Scotia for the first time in history. Historical Underwater power interconnector in Canada achieves key milestone. High-voltage

direct current (HVDC) Light is a preferred solution for long-distance underground and underwater power links and interconnections like the Maritime Link Project.

Faisal Iqbal is a management professional and Project Director for the just commissioned HVDC Maritime Link Project in Atlantic Canada. And **Kenneth Almon** is a Senior Electrical Engineer employed with ABB as a Technical Interface Manager on the Maritime Link project.

The Maritime Link is a 500 Megawatt (MW) HVDC connection that will enable clean, renewable energy, generated in Newfoundland and Labrador to be transmitted to the North American grid in Nova Scotia. The stabilizing features of ABB's latest HVDC Light® solution will also allow Nova Scotia to integrate additional renewables and contribute to Canada's emission-reduction efforts.

The HVDC Light® Maritime Link is the first of its kind in the world with a full Voltage Source Converter (VSC) bipolar configuration, to enhance system availability. The converter stations are equipped with the ABB Ability™ based advanced Modular Advanced Control for HVDC (MACH™) control and protection system which acts like the brain of the High Voltage DC (HVDC) link. It monitors, controls and protects the smart technology in the stations and manages thousands of operations to ensure power reliability. Its advanced fault registration and remote-control functions also help protect the link from unexpected disruptions, such as lightning strikes. In addition to the two converter stations for the ±200 kilovolt (kV) HVDC link, the project scope also includes two 230 kV alternating current (AC) substations in Newfoundland, one 345 kV AC substation in Nova Scotia and two cable transition stations.

This technology includes integration of renewable energies from land-based and offshore wind farms, mainland power supply to islands and offshore oil and gas platforms, city center in-feeds where space is a major constraint and cross-border interconnections that often connect across the seas. Its ability to meet grid code compliance ensures robust network connections regardless of application. The latest generation of this technology can transmit power at ±640 kilovolts (kV) over 2,000 kilometers and deliver up to 3,000 MW of electricity—enough to power several million households.

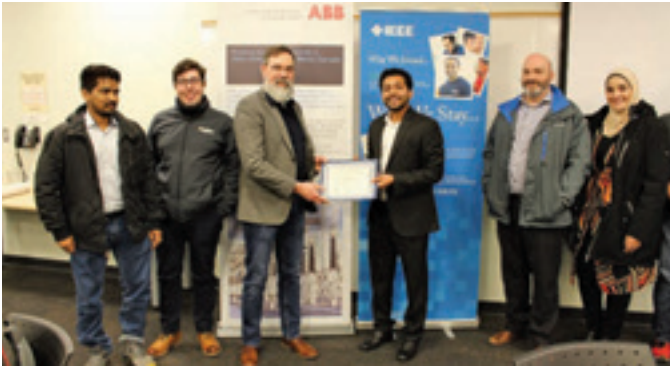
ABB is a leader in electrification products, robotics and motion, industrial automation and power grids, serving customers in utilities, industry and transport & infrastructure



Some illustration of the presentation.



Faisal Iqbal (Speaker) during his presentation.



Kenneth Almon (Speaker) receiving a Certificate of appreciation from Aman Tanvir (YP Chair).



Participants and Presenters Following the Event.

globally. Continuing a history of innovation spanning more than 130 years, ABB today is writing the future of industrial digitization and driving the Energy and Fourth Industrial Revolutions.

This was an excellent event, well attended with YP, Students and Industry represented. Many thanks for the cooperation of the YP Affinity Group in taking the lead for this event.

Singapore Chapter Activities

Reported by Hari Vishnu and Venugopalan Pallayil

Annual Technical Workshop

IEEE Oceanic Engineering Society (Singapore Chapter) organized its annual workshop for the year 2018 on 2nd Nov 2018 at the S2S conference room in Tropical Marine Science Institute, National University of Singapore. The workshop consisted of technical talks by academics, and a high-tea cum networking session. The aim of the workshop is to get experts and enthusiasts in oceanic engineering and related fields together, to share their experiences and expertise via discussion and talks, and to provide an avenue for networking within the community. It also provides an opportunity for relevant industry to showcase their new products and capabilities.

The talks spanned a wide variety of disciplines related to ocean engineering and marine sciences. A list of talks organized and the speaker names are provided in the table below. More details on the talk as well as other OES activities and events can be found on its website <http://www.ieeeoessg.org/>.

Speaker Name and affiliation	Title of Talk and brief description
Dr. Anupam Gupta, Research Fellow at the Singapore Institute for Neurotechnology (SINAPSE), National University of Singapore	Can sensing strategies inspired by bats boost sonar performance? The speaker discussed on how bats are able to navigate under their extremely difficult clutter-filled environment with minimal sensors. The talk delved into the evolutionary marvels that have allowed bats to perform well using their active sonar sensing techniques.
Dr. Tan Koh Siang, Senior Research Fellow and Head of the Marine Biology and Ecology Laboratory (MBEL) at the Tropical Marine Science Institute (TMSI), National University of Singapore	Looking for deep-sea creatures around the corner: The South Java deep-sea expedition 2018: In this talk, Dr. Tan described results from a benthic biodiversity survey undertaken by NUS and the Indonesian Institute of Sciences (LIPI) off Southwestern Java during March-April 2018. According to the speaker, the cruise resulted in identifying 12 new species and 40 new records for Indonesia.
Dr. Jani Tanzil, Senior Research Fellow at the Saint John's Island National Marine Laboratory (SJINML-NUS); jointly appointed at the Asian School of the Environment, Nanyang Technological University	Corals: engineers and natural archives of the marine world: Dr. Jani focused her presentation on how corals act as historians, yielding temporal records of trace elements that can be used to reconstruct the environment in which the corals lived.
Dr. Ahmed Mahmood, Research Fellow at the Department of Electrical and Computer Engineering, National University of Singapore	The curious case of the snapping shrimp: It is well known that snapping shrimp snaps interfere strongly with sonar. In this talk Dr. Ahmed covered various approaches (in chronological order) that have worked towards understanding, countering and exploiting the snapping shrimp noise problem in acoustic systems.
Dr. Malika Megh-jani, Post-doctoral scholar at the Autonomous Vehicle group at Singapore-MIT Alliance for Research and Technology (SMART)	Finding Dories—Multi-Target Search Strategies in Marine Environments: This talk addressed the problem of searching multiple non-adversarial targets using a mobile searcher in an obstacle-free environment. In particular, it dealt with marine applications where the targets drift on the ocean surface.



Dr. Anupam Gupta delivering his talk on bat bio-sonar.



Attendees listening keenly to Dr. Koh Siang's talk on his cruise to Southwestern Java.



Some of the members and participants during high tea break.

The event drew more than 30 attendees from across industry, academia, research institutions and other organisations. This is a considerable level of participation given that Singapore has only a small community of OES members and non-members working in this field. All the talks drew a great level of engagement and discussion, which continued over a high-tea reception. As in previous years, the 2018 annual workshop also was a huge success in terms of its technical contents and participation. A membership drive was also organised during the event.

After the technical talks, the Chair of the OES Singapore chapter, Dr. Hari Vishnu, elaborated on the benefits of OES membership, and also publicized the upcoming SAUVC 2019 underwater robotics competition and the OCEANS 2020 Singapore conference.



Some of the Workshop participants posing for a group photograph.

List of Office Bearers for 2019

The Chapter held its annual general body meeting at the end of the workshop. Office bearers for the year 2019 were elected during this meeting. Their names and positions are listed below.



*Hari Vishnu: Chairman
harivishnu@gmail.com*



*Bharath Kalyan:
Vice-Chair bharath@
arl.nus.edu.sg*



*Chi Cheng: Secretary
tmschic@nus.edu.sg*



*Cheng Siong Chin:
Treasurer cheng.chin@
newcastle.ac.uk*



*Yuen Min Too: Committee
Member ymtoo86@
gmail.com*



*Manu Ignatius:
Committee Member
manu@subnero.com*



*Anshu Singh: Committee
member anshu.arlmail@
gmail.com*

The banner features a black header with the text "Offshore Technology Conference" and social media icons for Facebook, LinkedIn, and Twitter. Below this is a blue section with the main title "GOING THE DISTANCE" in large white letters, and a red box below it that says "CELEBRATING 50 YEARS OF OTC". On the left side, there is a circular logo with a wave and the text "OFFSHORE TECHNOLOGY CONFERENCE" and "CELEBRATING 50 YEARS 1969-2019". At the bottom, the text reads "OFFSHORE TECHNOLOGY CONFERENCE 2019" in red, followed by "6-9 May 2019 // Houston, Texas, USA // NRG Park" in black.

UT'19 Kaohsiung

Pathway to Get Green in Deep Blue

Undersea Technology

UT'19 Kaohsiung

April 16-19, 2019, NSYSU in Kaohsiung, Taiwan



Dear Sir/Madam,

We are pleased to invite you to participate UT'19 Kaohsiung, which will be hosted by five organizers and institutes, IEEE Oceanic Engineering Society (IEEE/OES), IEEE/OES Japan Chapter, IEEE/OES Taipei, Taiwan Chapter, Taiwan Ocean Research Institute, and National Sun Yat-sen University. The symposium will be held from 16-19 April 2019 at National Sun Yat-sen University (NSYSU) in Kaohsiung, the third largest city in Taiwan.

NSYSU is known for the natural fortress in the campus. Sitting along the side of Kaohsiung Harbor, the NSYSU is surrounded by mountains and faces the crystal blue water of Taiwan Strait. The beautiful Sizihwan beach in the campus makes NSYSU to be one of most valuable universities to visit in Taiwan.

We cordially invite researchers from all participating countries to attend our upcoming UT symposium and look forward to welcoming you in Taiwan in April 2019!

Sincerely,

UT'19 Kaohsiung Co-Chairs



Robert L. Wernli

President at First Centurion Enterprises, USA



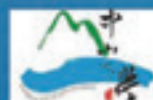
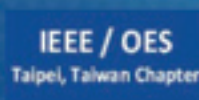
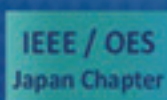
Tamaki Ura

Professor of Kyushu Institute of Technology, Japan



Forng-Chen Chiu

Chairman at Ship and Ocean Industries R&D Center, Taiwan



For further information about UT'19 Kaohsiung please contact:

Email: info_ut19@narlabs.org.tw

<http://ut19.tori.org.tw/>

2018 IEEE OES AUV Symposium, Porto, Portugal, November 6–9, 2018

João Tasso de Figueiredo Borges de Sousa, LSTS—University of Porto, Chair



Group photo of participants in the 2018 IEEE OES AUV Symposium.

The IEEE OES AUV Symposium is organized every other year to bring together those working in the field of autonomous underwater vehicles (AUV). In 2018, the Symposium was held in early November, at the Rectory of the University of Porto—a venue conveniently located close to downtown Porto within walking distance from the house of Henry the Navigator. The Symposium was jointly organized by the Laboratório de Sistemas e Tecnologia Subaquática (LSTS), University of Porto, IEEE OES and the IEEE OES Portuguese chapter.

The 2018 IEEE OES AUV Symposium was sponsored by:

- APDL—Administração dos Portos do Douro, Leixões e Viana do Castelo, SA;
- Evologics;
- Kongsberg;
- Ocean Infinity;
- OceanScan Marine Systems and Technologies, LDA.
- Schmidt Ocean Institute.

More information about the IEEE OES AUV 2018 Symposium can be found at the website: auv2018.lsts.pt

The 2018 IEEE OES AUV by the Numbers

The IEEE OES AUV 2018 had a record number of submissions and participants:

- 205 abstract submissions;
- 24 submissions to the student poster competition;
- 10 finalists of the student poster competition;
- 95 abstracts accepted for oral presentation;
- 25 abstracts accepted for poster presentation;
- 30 participating countries;
- 210 registrations;
- 8 exhibitors.

These figures show that the AUV community has been growing significantly in size and diversity. In fact, IEEE OES AUV 2018 has drawn a total attendance of over 200 participants coming from academia, industry, governmental organizations, research institutes and private foundations.

IEEE OES AUV was very well aligned with the surge of Portuguese interest in the oceans that comes from the recognition that Portugal harbors unique environments in the deep sea, as well as in the water column, and holds tremendous potential for the installation and operation of offshore wind/wave energy harvesting infrastructures and aquaculture farms. Simultaneously, the Symposium was also very well aligned with the Atlantic International Research Centre (AIR Centre) initiative launched by the Portuguese government to foster a long-term multilateral platform for cooperation along and across the

Atlantic with an inclusive perspective to S&T and economic development.

Technical and Poster Sessions

Thanks to the remarkable work of a committed group of 65 reviewers from Europe, Asia, and North and South America, each submitted abstract was evaluated by 3 reviewers. The same happened with the student Poster competition's submissions.



Presentation during one of the technical sessions.

In total, 95 presentations were organized into the following technical sessions covering a wide range of topics of interest to the AUV community:

- Software
- Extreme environments
- Vehicles I & II
- Planning I & II
- Multi-vehicle
- Localization/Navigation I & II
- Control
- Applications I & II
- Applications/Mapping

In a departure from the traditional presentation format, this IEEE OES AUV edition also included two poster sessions in the technical program. The sessions took place during the lunch breaks and were well attended with a very strong engagement from the participants.

Again, the single-track format for the technical sessions proved very successful, with individual presentations followed by a few minutes dedicated to questions from the audience. Most sessions, even those taking place in the early morning or in the late afternoon, had over 100 participants. This was even more impressive considering the heavy schedule of the Symposium.

Plenary Sessions

The Symposium had three plenaries:

- *A 30-year History of Research in Unmanned Systems* by Prof. Anthony Healey, Naval Postgraduate School, USA.
- *Multi-platform Ocean Observation from Events to Climate: Challenges and Opportunities* by Dr. Joaquín Tintoré, Socib, Spain.



Q&A after presentations.

- *Oceanographic collaborations with Schmidt Ocean Institute* by Dr. Victor Zykov, Schmidt Ocean Institute, USA.

Student Poster Competition

The competition was about a conceptual AUV design challenge, entitled “AUV system for data collection in the water column”. Students were invited to submit proposals addressing the following design requirements:

- Endurance: for over 9 hours;
- Launch and recovery: from shore or from a ship (without the support of a workboat);
- Data transfer: wireless;
- Maximum time between deployments: 6 hours;
- Motion patterns: profiling the water column between the surface and 100 meters along predefined paths;
- Sensor payload: CTD, turbidity and fluorometer;
- Command and control interface: smartphone based;
- Low cost.

There were 24 applications from Europe, Asia and USA, out of which 10 were selected to participate in the Symposium and present their project. The selected applications received a financial incentive of up to € 900 in the form of travel support and



Participants in the Student Poster Competition.

registration discount. Furthermore, the 3 best posters were awarded with prizes totaling € 3,000.

The first prize went to Brian Page from Michigan Technological University, for his poster entitled “Littoral Magnetic and Water Column Survey Underwater Glider”. Misung Sung from Pohang University of Science and Technology (POSTECH) received the second prize for his poster entitled “Ballon AUV: Seawater Sampling AUV Using Active Buoyancy Control”. Finally, Tsz Ho Sze from CityU Underwater Robotics, City University of Hong Kong, was placed third for his poster entitled “Low Cost Structural Morphing AUV for Long-term Water Column Exploration and Data-Harvesting”.

Awards

The awards ceremony took place at the end of the second day. After the award ceremony, Neil Bose gave a short presentation about the IEEE AUV 2020 that will take place in St. John’s, Newfoundland and Labrador, Canada.

The *Lifetime Achievement Award* from the IEEE committee on Unmanned Underwater Systems, was given to William (Bill) Kirkwood for his outstanding career and commitment to the IEEE OES Society. At MBARI he advanced the state of the art in AUV systems by designing, developing and deploying several innovative vehicles and technologies. Bill has been an outstanding mentor to dozens of students and researchers and a role model for the AUV community.

The new *Rising Star Award* was presented for the first time in the 2018 edition of the IEEE OES AUV Symposium. This award aims to recognize researchers for outstanding work with exceptional future potential. Ten nominations were considered for that purpose, and deliberations resulted in a tie between two nominees. As a result, two awards were to be given, one to Hayato Kondo from Tokyo University and the other to João Borges de Sousa from LSTS—University of Porto.

At the end, the local organizing committee of the 2018 edition was also honored by IEEE OES in appreciation for an outstanding organization.



Bill Kirkwood (on the right) after being presented with the Lifetime Achievement Award, joined by his wife and Hanumant Singh.



On the left, Hayato Kondo receiving his Rising Star Award from Bill Kirkwood. On the right, the same award being presented to João Borges de Sousa by Hanumant Singh and Bill Kirkwood.

Exhibits

The Symposium also comprised an exhibit that was very well attended. The exhibit hall was strategically located close to the area in which lunch and coffee breaks were served to encourage networking and product showcasing.

The exhibitors list included the Directorate-General for Maritime Policy, the EU Marine Robots project, Nortek, Oceanscan Marine Systems and Technologies, Escola Secundária de Santa Maria Maior and Ocean Sonics.

The exhibit segment was complemented by some other participations, namely from Ocean Infinity and the Schmidt Ocean Institute.

Outreach

In view of raising awareness of new generations to Ocean Robotics, a group of high school students from the Escola Secundária de Santa Maria Maior was invited to participate in the Symposium activities.

At the exhibit area, the students were encouraged to showcase a marine robot targeted at providing real-time information



Students from the Santa Maria Maior high school present their marine robotics project.

about rip currents to beach goers and water sports athletes, which they have developed under a robotics project sponsored by LSTS and by the Escola Azul (a Portuguese national program that aims at promoting ocean literacy and awareness in high schools). Alongside their participation in several sessions, the students also connected with participants engaged in student outreach activities in their countries. The students were thrilled for being able to interact with some of most prominent names in marine robotics worldwide.

Ice-breaker and Conference Dinner

The ice-breaker and the conference dinner provided excellent opportunities for discussions and networking.

The first day of the conference closed with an ice-breaker reception sponsored by Ocean Infinity. Port wine took central stage, as expected in the capital of Port wine.

The conference dinner took place at the Intercontinental Hotel during the third day of the Symposium. Featuring codfish as the main course, the dinner was mainly punctuated by the elegant design of the place and the friendly ambience, all combining into a very pleasant evening.



Conference dinner.



Participants at the Ice-breaker sponsored by Ocean Infinity.

The Future

The AUV community has been growing significantly over the last decade and it is expected to continue growing at an accelerated pace. The organization of future editions of the IEEE OES AUV Symposium is taking these facts into consideration to best serve the AUV community.

The Symposium closed with one discussion session, chaired by Hanumant Singh, about the future of the Symposium. The topics under discussion included the duration and size of the Symposium, the single-track format, as well as the reviewing process. The elements of the discussion provided the background for an online questionnaire, made available to all participants, about future editions of the Symposium. The lessons learned from the over 100 answers to these questionnaires are being used to shape the future of the IEEE OES AUV Symposium. The 2020 edition of the Symposium will put these contributions to the test!



2018 IEEE 8th International Conference on Underwater System Technology: Theory and Application (IEEE USYS'18)

Khalid Isa and Mohd Rizal Arshad

The 2018 IEEE 8th International Conference on Underwater System Technology: Theory and Application (IEEE USYS'18) was held in Wuhan, China from 1 to 3 December 2018. The IEEE USYS 2018 was sponsored by the IEEE Oceanic Engineering Society, co-organized by the IEEE Oceanic Engineering Society Malaysia Chapter and Huazhong University of Science and Technology (HUST). This conference is one of the important academic conferences in the field of naval architecture and ocean engineering. It aims to provide a platform for researchers, scientists, engineers, academicians, as well as industrial professionals from all over the world to share, discuss and disseminate their current R&D activities and experiences related to the field of underwater technology, including relevant theories as well as applications. The outcomes from this event are proceedings and journal publication, academic exchange among the participants, research network, and collaboration.

The IEEE USYS'18 received more than 140 papers with 123 papers presented during the conference. The conference started with a workshop on Marine Robots on 1 December 2018. The Opening Ceremony was held on 2 December followed by 4 plenary speeches and 8 oral sessions. Moreover, on the last day, 3 December, 6 keynote talks were presented, followed by 8 oral sessions, the award banquet, and closing ceremony. Two best paper awards were presented. One was in the application category, which was awarded to Khalid Isa, Herdawatie Abdul Kadir and Radzi Ambar from Universiti Tun Hussein Onn Malaysia (UTHM) for the paper entitled "Design and Development of an Autonomous Underwater Vehicle (AUV) with Target Acquisition Mission Module." On the other hand, the best paper in the theory category was awarded to Yueqi Yang, Zhengxing Wu, and Junzhi Wu from CASIA for the paper entitled "Fault-Tolerant Speed Control of a Biomimetic Multijoint Robotic Fish." The plenary and keynote

speakers for the conference were António M. Pascoal (Portugal), Decheng Wan (China), Guang Pan (China), Fumin Zhang (U.S.), Francesco Maurelli (Germany), Lionel Lapierre (France), Guohua Xu (China), Jiancheng Yu (China), Nikola Mišković (Croatia) and Simon Rohou (France).

In conclusion, the IEEE USYS'18 was successfully organized and received excellent feedback from all participants. All the great activities were well managed, and Huazhong University of Science and Technology (HUST) was a great conference host. The next IEEE USYS conference will be held in 2020.



Opening Ceremony of IEEE USYS'18—Xianbo Xiang (right) & M. Rizal Arshad (left).



Workshop session on Marine Robots.



Plenary and keynote speakers for IEEE USYS2018 with organisers.

Breaking the Surface—International Interdisciplinary Field-Training for Experts, End-Users and Students

Zoran Vukić, Nikola Mišković, Antonio Vasiljević, Ivana Mikolić. BtS point of contact: bts@fer.hr



BtS (<https://bts.fer.hr>) was approved as an OES Initiative Activity on March 2019. Welcome to OES!

Underwater systems and technologies are used by various disciplines, and designers of these systems should be aware of end-user needs. The idea of joining together various disciplines came naturally as a way of how to appease these needs of cross fertilization among various disciplines. It was decided that the best way to accommodate different needs of experts in the field, end-users, designers/engineers, and students is to offer a venue where all can join and exchange information about their particular know-how. Thus, the international interdisciplinary field-training “Breaking the Surface” (BtS) was proposed with four program tracks: Marine robotics (MAROB); Marine biology and Marine nature protection (MARBIO); Maritime security, naval and coast guard operations (MARSEC); and Maritime, nautical and ship archaeology (MARCH). From time to time we also introduce new speakers from areas such as marine geology (MARGEО), oceanology (OCEAN), oceanography (GRAPH), and others.

BtS field trainings are organized by the University of Zagreb Faculty of Electrical Engineering and Computing—Laboratory for Underwater Systems and Technologies (<https://labust.fer.hr>), and NGO Center for Underwater Systems and Technologies (<http://www.cepost.hr>). BtS has evolved from a small field training gathering of some 40 participants in 2009 to a world-recognized event that today brings together around 200 participants from all around the globe. As a consequence of thorough analysis of every BtS, the structure, the content and scope changed over the years resulting in an event with smooth and well accepted activities by participants, but from the very beginning the duration of the field training was set to one week and remained unchanged ever since. The first five workshops were held in Murter (island Murter), Croatia. Since 2014, BtS changed location to Biograd na Moru, Croatia. More about all ten field-trainings can be found at <http://bts.fer.hr>. Today we can affirm that the BtS became a brand with high appreciation among all those that participated. Visibility of this event improved over the years and the number of participants, especially students, increased each year. Statistics over 10 years gives: 1300 participants from 30 countries, 201 lectures, 56 companies, 26 tutorials, 25 demonstrations, 41 vehicles, 16 project presentations.

Present structure of the BtS consists of plenary type lectures by leading experts in the field (~25-30), demo presentations of research results of various R&D projects (~3), demo presentations of com-



EvoLogics preparation for demo of USV SONOBOT and sub-sea gliders (manta rays) at BtS2017.



Preparation of the H2020 project SUBCULTRON demo with aPads (H2OmniX USVs) and aMussels at BtS2018.

mercial products by various companies (~4), tutorials with specific topics (~4), and social events (~6). Companies that has been with us at BtS several times and presented their products at sea were: EvoLogics, Hydroid-Kongsberg, Blueprint Subsea, Blueye Robotics, Video Ray Llc, L3 Ocean Server, Oceanscan-Marine systems and technology Lda., Sonardyne (Aberdeen, Scotland, UK).

Our BtS partners from the research community are among the best in Europe. We can mention only few of them here: CNR-ISSIA (Genoa, Italy), NTNU-AMOS (Trondheim, Norway), IFREMER (Toulouse, France), NATO-CMRE (LaSpezia, Italy), University of Limerick—MaREI (Limerick, Ireland), University of Girona—Underwater vision and robotics (Girona, Spain), Heriot-Watt University—Ocean Systems Laboratory (Edinburg, Scotland, UK), ISME (Genoa, Italy), IST-ISR (Lisbon, Portugal), University of Porto—LSTS (Porto, Portugal), and others.

BtS field-trainings are not only popular because of bringing high quality activities, but also by providing enough time for participants to discuss, exchange ideas, and start preparing joint research proposals as well as a social programme that deepens interaction and friendship.



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 - **Maria Claudia Borrás**, President & CEO, Oilfield Services, Baker Hughes, a GE Company
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OTC Asia aims to:

- Meet the demand for technical information to support the growth of the offshore energy industry in Asia.
- Provide opportunities for industry professionals and their employers to share their applied technologies and best practices with other producing areas in the world.
- To create opportunities to institute and strengthen intersociety collaboration and cooperation with member societies based in Asia.

Submission Information

SUBMISSION DEADLINE: 24 May 2019

A proper review of your paper proposal requires that it contain adequate information on which to make a judgement. The suggested limit of 225 - 450 words should not

be constraining if the paper proposal is limited to the following factual highlights.

Objective/Scope: Outline the objective and/or scope of the proposed paper. If the paper is a review paper, carefully state the extent of the coverage.

Methods, Procedures, Process: Briefly explain your overall approach, including your methods, procedures, and process.

Results, Observations, and Conclusions: Describe the results, observations, and conclusions of the proposed paper

Novel/Additive Information: Please explain how this paper will present novel (new) or additive information to the existing body of literature that can be of benefit to and/or add to the state of knowledge in the petroleum industry.

The paper proposal should have the necessary clearance before it is submitted to OTC Asia 2020. Visit [submission guide](#) for more information.



Areas of Interest

Paper proposal categories (listed below) are used to direct the paper proposals to the appropriate subject-matter experts for evaluation. Please indicate the category designation on the online form where indicated.

- Alternative/Offshore Renewable Energy
- Artificial Lift
- Asset Integrity Management
- Autonomous Vehicles for Offshore Exploration
- Basement Plays
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- Deep Seabed Mining
- Deepwater Design and Development
- Deepwater Dry Tree System
- Deepwater Energy Efficient Offshore Support Vessels
- Deepwater Production and Reservoir Management
- Digital Operations
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- Flow Assurance
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- Geohazards
- Geotechnical, Geoscience & Geophysics
- Governance and Regulations

Health, Safety, Environment and Social

- Responsibility
- High CO2 and Contaminated Fields
- High Pressure High Temperature
- Installation/Construction/Pipeline and Operations
- Integrated Operations
- International Standards – Adapting to Local Requirements
- IOR, EOR and EGR
- Marginal Deepwater Production
- Marginal Fields
- Materials, Corrosion, Insulation and Inspection
- Metocean/Hydrodynamics
- Minimising Environmental Discharge
- Ocean Engineering Resources
- Oil and Gas Facilities Security
- Pipelines/Umbilicals
- Production Maintenance and Chemistry
- Project and Risk Management and Economics
- Reservoir Characterisation
- Reservoir Modelling Technology
- Reservoir Surveillance Technology
- Riser Systems
- Sand Management
- Sensors and Measurements for Environmental Hazards
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- Wells Construction and Completion



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The OCEANS'19 conference will take place in June 2019 on the Mediterranean coast in Marseille, France.

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CONFERENCE PROGRAM

	Monday 17	Tuesday 18	Wednesday 19	Thursday 20
Scientific	6 Tutorials 2 Workshops	Opening Ceremony	Plenary session	Technical sessions / Poster sessions Technical demonstrations / Exhibition visit
Social	Icebreaker Reception	Exhibitors' Reception	Gala Banquet	

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Hosted in the exhibition hall, you will have this dedicated time to meet the Exhibitors while enjoying live-cooking chefs's cuisine.



GALA BANQUET - WEDNESDAY JUNE 19



The Gala Banquet will take place at the Casa Delauze, created in 1981 by Henri Delauze, explorer of the subsea floor.

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- 816 submitted abstracts
- 1 plenary and 88 technical sessions, 6 tutorials, 2 workshops
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For more information, visit www.oceans19mtsieemarseille.org.

Take advantage of all the opportunities this prestigious event offers. The beautiful city of Marseille is waiting for you!



From where our contributors came and their fields of interest

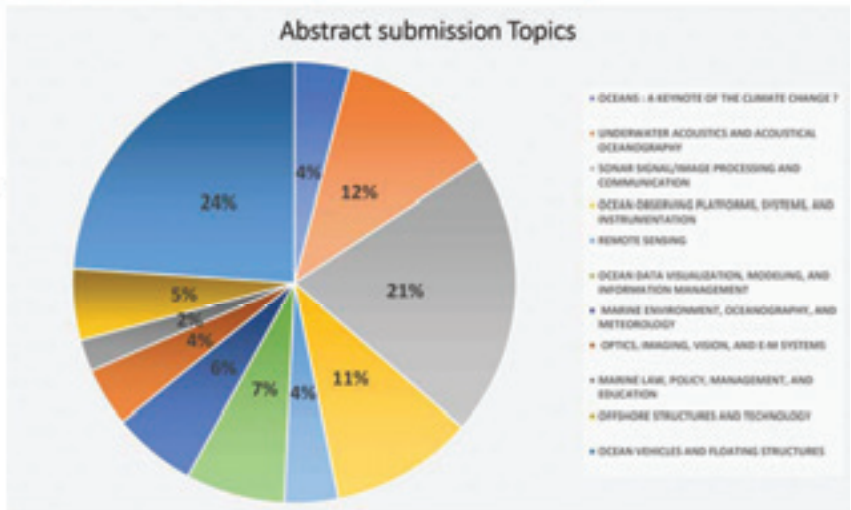
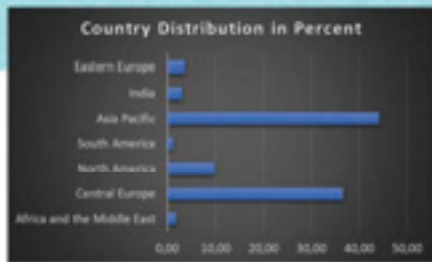
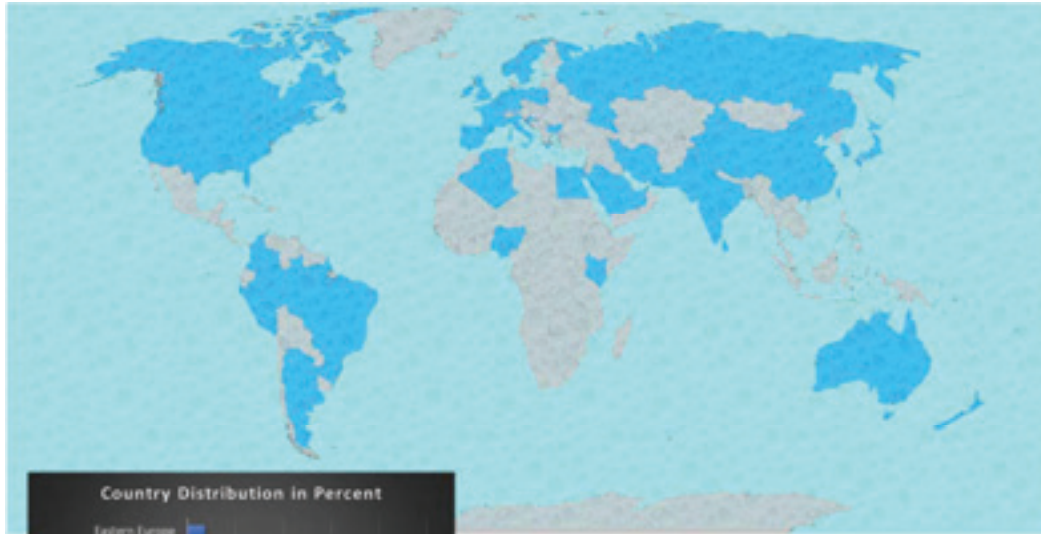
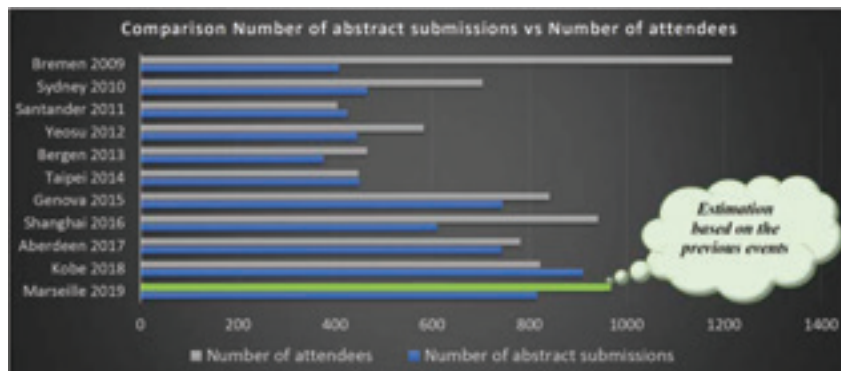


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450 square meters already booked



Technical Sessions
816 Submitted abstracts

Come and join us on this great event !



A Blast from the Past!

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



OCEANS 2019 Charleston From Inner Space to Outer Space.



OCEANS 2013 San Diego—Harley Sweepstakes It can pay to stay till the exhibits close!



OCEANS 2012 Yeosu Gala Entertainment.



OCEANS 2009 Bremen Town Musicians:
Cock, Dog, Cat & Donkey.



OCEANS 2011 Hawaii Teacher's Workshop—Build an ROV.



OCEANS 2018 Kobe Traditional Opening (Breaking!) of the Saki Barrell.

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Who's who in the OES

João Alves, IEEE Senior Member, OES AdCom Member

When I was recently preparing a presentation on the topic of maritime unmanned systems, I came to the rather scary realization that I've been working on the topic for almost 25 years now.

It started with my studies in the Technical University of Lisbon (now simply University of Lisbon). I have been working with Autonomous Underwater Vehicles since my undergrad thesis. I worked as a researcher in the Dynamical Systems and Ocean Robotics Lab of the same university on control and navigation and then moved into real-time systems. We were developing our own AUVs and ASVs and testing at sea was something I got used to since the beginning. In 2003, together with some lab colleagues we set up a spin-off company called Blue Edge. It was a turning point to me: an absolutely amazing learning experience. I started drawing my interest into underwater communications when, through the company, we joined

a European project where we were doing cooperative underwater robotics. Since all things come to an end, I decided to leave the company and started looking for a job. That's when I moved to Italy to join the NURC, now called NATO's Centre for Maritime Research and Experimentation or CMRE in short. I've been working at CMRE on underwater communications ever since. I've had incredible opportunities, took part in landmark initiatives like JANUS and led breakthrough studies and sea trials. It has been an absolutely amazing journey.

In 2018 I joined the OES AdCom. This has been another great opportunity to learn and to give something back to an institution that I have admired for a long time. This is the society that brings us the OCEANS conferences and the Journal of Oceanic Engineering! It is real a privilege to be associated with it. As of January 2019, I am also the OES Liaison for OCEANS 2021 Porto,



Three views from my tiny loft "home studio", including the subset of guitars I keep handy.



Taking a break after a hike in Yosemite National Park (CA) with my 3 ladies.



During a submarine rescue exercise, in Turkey, bringing JANUS as a new capability to the submarine rescue community with dear colleagues and friends from CMRE, Roberto Petroccia and Alberto Grati.

which is the perfect excuse to work with people I've known for a very long time and whom I genuinely like and admire.

As you could probably tell, I just skimmed through my professional career. The truth is that whenever I read the who's who articles I'm always drawn to the non-work part of the text. That's usually where one learns something a bit unexpected about the people that we got used to interact with and see a couple of times a year but of whom sometimes we miss the essence.

On that topic I'll talk to you about this old passion of mine: Music.

I started learning music through the regular school plan when I was about 10 years old with nothing particularly relevant to report. When adolescence came, I developed an interest for hard rock and inevitably I wanted to play the guitar. I took a few lessons but when I was 13 my sense of urgency was not compatible with the rate of my progress. Since I couldn't play fast and shredding distorted guitar solos by the end of week one, guitar school was not the place for me. The deep fascination for music was still there and I figured I could actually learn a lot if I joined the local philharmonic (!!). I was right. I learned a lot of the basics and did way more solfège than anyone should. When the conductor told me that he thought I was tailored to play the oboe, I did the only reasonable thing: I left to never return. I learned the guitar pretty much by myself, playing along to my favorite songs. In my late teens and early twenties, I had my bands and played in bars to no more than a couple of drunk people. I was never particularly interested in playing cover songs. I always wanted to do my own music and channel my creativity that way. I started to take an interest in recording and developed the (rather rudimentary) ability to arrange and orchestrate. The discovery of Rimsky-Korsakov's book "Principles of Orchestration" was a revelation for me. My biggest claim to glory was when I wrote, recorded and delivered a small 1-minute original piece for a campaign of a company back in Portugal. Was the owner of that company my friend? Absolutely. Still...



During a submarine rescue exercise, 100m below the surface, onboard NEMO: The NATO Submarine Rescue vehicle, with the head of the Spanish Submarine Flotilla.

I have a tiny home studio in a little loft area in the apartment where we live. I have my equipment there including my guitars, amplifiers, mixer, piano, synths, effects processors, etc. I still practice my scales and play with other people whenever possible. In the meantime I developed a problem with guitars: I own 18, between electrics (15), a bass, an acoustic and a classical. I aim at making it 20 fairly soon. This condition even has a "technical" name: it's called Guitar Acquisition Syndrome (GAS) and it's a thing. You can look it up.

I'm also married and have 2 beautiful daughters. Whenever I'm not working nor playing I love to travel with my family. We did two road trips in the U.S. in the last five years, we have been to Africa, South America and we are planning a family trip to Japan this coming April. Really looking forward to that!

*Cheers.
João*

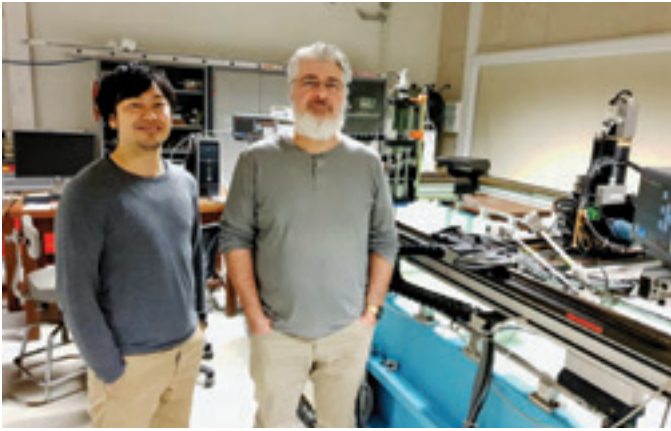
Member Highlights

Katsunori Mizuno, Beacon Associate Editor

As part of the University of Tokyo's Young Researchers Overseas Program, I am staying in Marseille, France, where the next "OCEANS '19" conference will be held. The Laboratory of Mechanics and Acoustics (LMA), CNRS, UMR7031, where I study computational ocean acoustics, is located northeast of Marseille. I joined the Wave and Imaging team where researchers are currently working on this topic. The LMA, founded in 1941, was first named CRSIM (Scientific Center for Industrial and Maritime Research) and was originally a laboratory dedicated to maritime research in general. With years, the topics studied at the LMA evolved to acoustics in general, and solid mechanics, but there is still an active group working on



Laboratory of Mechanics and Acoustics.



Author (left) and Dr. Paul Cristini (right, IEEE OES member).



Fort Saint-Jean captured from Parc Émile Duclaux.



Fish market.



Vieux-Port.



An old sail ship "Belem."

underwater acoustics and seismo-acoustics with several tank facilities.

Marseille is an ancient city founded in 600 BC by the Greeks. It is the main commercial port of France and also a city of fishermen. It offers many magnificent seascapes and landscapes. The sea and sky are really blue. People are active and always warm and kind. I live close to the old harbor because I want to see the sea every day. There is a daily fish market where you can find fresh and varied seafood. My recommendation is "the tasting of oysters" standing up just after buying them. You will certainly meet your favorites there. Of course, don't forget a glass of wine. Red, white, or rosé, it's up to you.

Let's join the *OCEANS '19* and enjoy Marseille.

Welcome New and Reinstated Members

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Amy Nau
Francis Valentinis

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David G Michelson
Nolan O Pretty
Jinyun Ren
Chao Shen
Vincent Yuan

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Xiaodong Cui
Lei Fan
Jing Han
Bo He
Chengbing He
Kaizhuo Lei
Yichen Li
Songzuo Liu
Tingting Lv
Yan Yu Ming
Qunyan Ren
Wentao Shi
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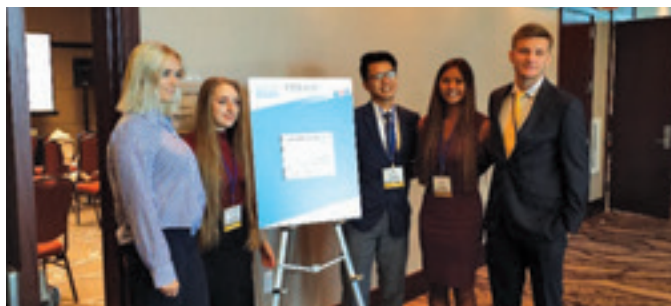
First Flight High School Students Present Papers at OCEANS (Again!)

Meghan Savona, University of North Carolina Wilmington, and Todd Morrison, Woods Hole Group

Since the founding of the Phytoplankton Club at First Flight High School (FFHS) in 2005, students have been independently analyzing phytoplankton samples from the coast of the Outer Banks, NC. With the help of the IEEE Oceanic Engineering Society (OES), the program has developed into something much greater than initially expected; it has now become a program that allows students to create a hypothesis, professionally research a topic, conduct experiments, and write and present their findings at an international conference. Through the financial and mentoring support of OES, students have been able to articulate their research on phytoplankton into tangible, meaningful research.

Most recently, student members of the FFHS Phytoplankton Club, the Phyto-Finders, traveled to Charleston, SC, for the OCEANS 2018 Charleston conference to discuss the results of their research. Presenters included FFHS seniors Benjamin Tran, Thomas Mahler, Julia Bachman, and Charlotte Tyson, and Meghan Savona, a recent graduate of FFHS who is now a freshman at UNC Wilmington (UNCW). Their papers, which were subjected to the full OCEANS review process, were accepted for publication in the Proceedings of OCEANS 2018 Charleston. As all OCEANS authors are required to do, the students presented their work in a very well received technical session at the conference.

Tran and Bachman presented their research in a talk called “The Bagel: Development of a Stable Towing Frame and Consistent Procedures for Sampling Phytoplankton,” detailing the process of improving phytoplankton collection methods. During the summer of 2016, Phyto-Finders visited the Woods Hole Oceanographic Institution (WHOI) as part of a trip sponsored by OES. During their



FFHS Phyto-Finders Meghan Savona (UNCW), Charlotte Tyson, Benjamin Tran, Julia Bachman, and Thomas Mahler outside the session room just before presenting their research papers.



Julia Bachman and Benjamin Tran present their plankton net towing frame research while Session Chair Todd Morrison looks on.



FFHS Phyto-Finders and supporters at the OCEANS 2018 Charleston Icebreaker—Ludovic Fouillé, Louise Hanson, Thomas Mahler, Hilary Morrison, Julia Bachman, Todd Morrison, Charlotte Tyson, Kathleen Neller, Benjamin Tran, and Matthew Gelis.



Thomas Mahler, Charlotte Tyson, Julia Bachman, and Benjamin Tran are able to smile more calmly after successful presentations in a well received OCEANS 2018 Charleston technical session.



Julia Bachman, Todd Morrison, and the Bagel.

time there, they collaborated with Dr. Todd Morrison, Senior Ocean Engineer at Woods Hole Group, to improve the stability and behavior of the tow frame. After researching potential problems and developing responsive solutions, they constructed a tow frame and tested it in the tow tank at WHOI. When they returned home to the Outer Banks, they were able to implement an improved design, based on their testing, that is now used for all tows, yielding consistent and reliable samples. Developing new features is an ongoing process for club members.

Savona presented a paper she co-authored with renowned molecular biologist, Dr. Hilary Morrison of the Marine Biological Laboratory (MBL), who has been instrumental in the success of the Phytoplankton Club. The Morrisons helped OES become aware of the program's research, which in turn led to the allocation of funding that has significantly advanced the capabilities and impact of the club. Both Hilary and Todd have become mentors to many students over the years, helping them to gain experience in professional research fields. Savona's presentation was made possible through Hilary's guidance; Hilary taught Phytoplankton Club members how to extract, analyze, and sequence phytoplankton DNA in order to more accurately detect and quantify the different species present in samples collected off the Outer Banks.

Although primarily an engineering conference, the microbiology-based presentation that Savona gave, titled "Extraction and Analysis of DNA from Phytoplankton Samples Acquired Offshore the Outer Banks of North Carolina (2016–2018)," was well received by the OCEANS 2018 community. In order to assess whether or not there are shifts in phytoplankton or microbial species relative abundance preceding or following a bloom, students begin by sampling water along a spatial and temporal gradient and attaching metadata. They then extract all DNA from the organisms in a sample, amplify a small part of the rRNA gene, sequence this DNA, and match the sequence to a reference database to determine the distribution of different phytoplankton and bacterial species in a sample. This method



FFHS Phyto-Finders taking in the sights outside the Fort Sumter Museum and the South Carolina Aquarium, site of the OCEANS 2018 Charleston Gala.



Benjamin Tran, Charlotte Tyson, mentors Todd and Hilary Morrison, FFHS science teacher and club advisor Kathleen Neller, Thomas Mahler, and Julia Bachman touring the "Toxin Lab" of NOAA's Phytoplankton Monitoring Network, to which the Phyto-Finders are longtime and seasoned contributors.

of analysis is revolutionary for the club, allowing them to quantifiably identify phytoplankton and microbial populations.

In a third paper, Mahler and Tyson presented the newly created and still developing method of documentation for the Phyto-Finders in a presentation titled "Development of Phytoplankton Web-Based Database Application." This talk detailed the importance of an online database in which samples can be recorded. Previously, the Phytoplankton Club had been documenting samples, both metadata and species concentrations, on paper forms that were subsequently sent to NOAA. By developing an online database in which sample information could be recorded and backed-up, the Phytoplankton Club greatly reduced the likelihood of lost data, something that had previously happened. The online database creates the opportunity for these data to be shared and distributed seamlessly, allowing for the potential synthesis of information worldwide. And, for the Phytoplankton Club, their data will finally be searchable.

Because of the opportunities that OES has provided to the Phytoplankton Club through funding and mentoring, the

students have been able to excel academically and professionally. By presenting at OCEANS, they have gained academic experience and been able to make professional connections rarely afforded to young people. Over the past decade, enabled by OES funding, hundreds of students have been able to participate in the Phytoplankton Club. All of them have gone on to college, approximately 95% in STEM subjects. Nine papers with approximately twenty student co-authors

have been presented at three OCEANS Conferences and published in the Proceedings. And more than a dozen students have been able to travel to Woods Hole, MA, to learn more at MBL and WHOI.

Based on the continuing performance of the student authors and their fellow Phyto-Finders, OES has elected to continue annual funding and mentoring support for the program, with more papers expected at OCEANS 2022 in Virginia Beach.

Two (More) Days on the Outer Banks with the FFHS Phyto-Finders

Todd Morrison, Woods Hole Group

I am freshly returned from two days on the Outer Banks of North Carolina, two windy February days spent with the Phyto-Finders of First Flight High School (FFHS). OES has sponsored this student run club since 2010 and these students have so far published nine papers documenting their research in the *Proceedings* of the OCEANS Conference. The Phyto-Finders are longtime contributors to the NOAA Phytoplankton Monitoring Network (PMN), which focuses on the timely detection of Harmful Algal Blooms (HABs). These FFHS students have been the first to detect and report blooms of *Pseudo nitzschia*, one of the PMN

target species, on a number of occasions. This family of diatoms can produce domoic acid, a potent neuro-toxin that is harmful and potentially fatal to marine and human life.

The purpose of my trip was delivery of two instruments donated to the club by RBR Ltd. of Ottawa, Canada. RBR very generously provided the Phyto-Finders with an RBR *duet* temperature and depth (T.D) logger and an RBR *duo* temperature and dissolved oxygen (T.DO) logger.

On the first day of my visit I showed two of the seniors how to connect a PC to the instruments and how to run RBR's Ruskin software to control the sensors. I also briefly explained what the sensors measured and roughly how the measurement was made. I then challenged them to program delayed-start deployments of these internally recording loggers, which they very quickly accomplished, occasionally breathing on the thermistors to introduce temperature variations in the recording. They went on to teach nearly a dozen members of the club, other seniors as well as juniors, sophomores, and freshmen, how to operate the sensors and what they measured. Several bench top deployments were conducted by each student until they felt comfortable with the software and the equipment.

We then fabricated secure mounts, including secondary retention, for the two instruments on the plankton net tow frame (see image above, taken after assembly on one of the sampling piers). Learning about and practicing o-ring and instrument maintenance rounded out the first day.



Seniors Ben Tran and Julia Bachman program the RBR loggers and run a bench top deployment.



Senior Julia Bachman trains freshmen Mason Gates and Ethan Duck. Club culture has long emphasized the importance of experienced students training and mentoring new members.



RBR duet T.D and RBR duo T.DO mounted on the plankton net tow frame, christen "the Bagel" by the Phyto-Finders.



Madison Beaver positions the Bagel for the start of a tow while Ethan Duck, Charlotte Tyson, and Mason Gates look on.



Phyto-Finders conduct a successful tow along Jennette's Pier in Nags Head, NC.



Madison Beaver secures the phytoplankton water sample for later analysis back in the science classroom at FFHS.



Ethan Duck, Summer Banning, Madison Beaver, Julia Bachman, Charlotte Tyson, and Mason Gates (holding the Bagel); and Noah Corbett, Ben Tran, Ivy Doyle, and Zeke Botson shown after completing their sampling tows at the FRF pier in Duck, NC, and ready to return to FFHS to see what their samples contain.

On day two the students programmed delayed starts for both instruments and departed from FFHS for their regular sampling locations, Jennette's Pier in Nags Head, NC, and the US Army Corps of Engineers Field Research Facility (FRF) in Duck, NC.

As usual, the piers were windy, the water was cold, and the students jumped right into their sampling routines, including training and mentoring the newest members of the club. They conducted three successful tows at each site, collecting phyto-

plankton water samples and logging measurements with the new instruments.

Back in the classroom at FFHS, some Phyto-Finders prepared slides from their samples and began examining them



Apparently high winds and cold water just add to the enjoyment.



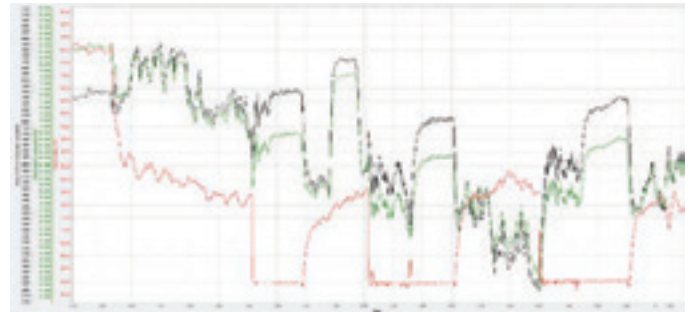
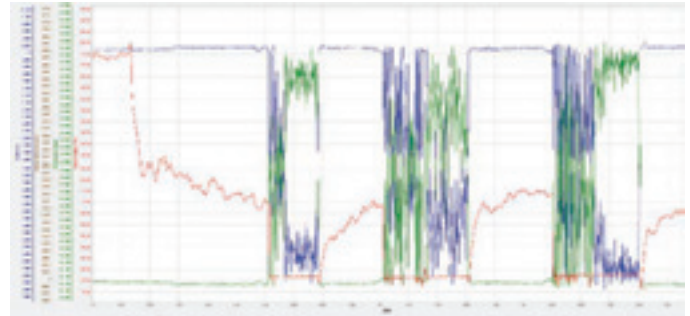
Summer Banning, Ivy Doyle, and Julia Bachman download the first data set and examine the first plots from the RBR duet T.D and RBR duo T.DO.

through microscopes while others carefully washed the new instruments with fresh water and then connected them to a PC to download the measurements. Students in each group were soon moving excitedly back and forth between the various stations to share their observations and results with each other, with their teacher and club advisor, Katie Neller, and with me.

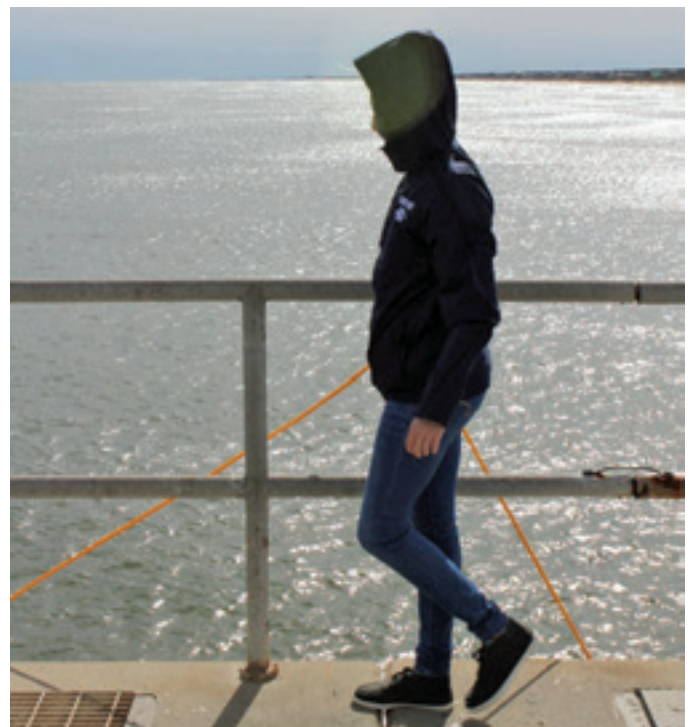
What caused this excitement? The first deployment of the instruments donated by RBR had been successful and there was an interesting new kind of data set to interpret and understand. That, and every single sample examined under the microscopes showed a bloom, potentially toxic, of *Pseudo nitzschia*.

Following the established protocol, an email was quickly sent to alert the NOAA PMN in Charleston, SC. Their equally rapid request: Overnight air shipment of samples for immediate analysis in the toxin lab.

The students will also be extracting DNA from these samples and shipping that genetic material to the Marine Biological Laboratory in Woods Hole, MA, where it will be sequenced to detect



A portion of the initial data set, plotted using RBR Ruskin software, showing the temperature drop after getting out of the bus (red trace) followed by the three sample tows along the FRF pier in Duck, NC.



With measured tread, Summer Banning tows the Bagel along the FRF pier in Duck, NC.

and identify, with very high sensitivity and precision, the different phytoplankton and microbial species present in the samples.

In summary, it was yet another productive and exciting two days with the FFHS Phyto-Finders on the Outer Banks of North Carolina.

ATTENTION OES STUDENTS

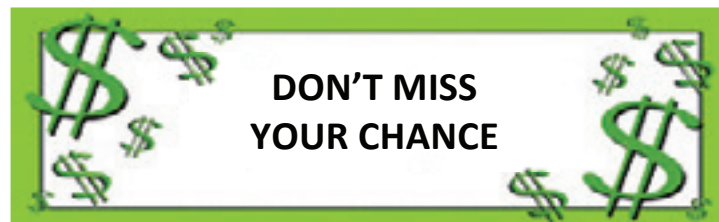


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