

2023 24.09. - 1.10.
Kumbor, Montenegro

BREAKING THE SURFACE

15th INTERNATIONAL INTERDISCIPLINARY FIELD WORKSHOP
OF MARITIME ROBOTICS AND APPLICATIONS

BTS MAP

HOTEL CARINE

- 1 / REGISTRATION DESK
- 2 / LECTURES HALL
- 3 / TUTORIAL ROOM
- 4 / COFFEE BREAK
- 5 / ANIMATION ROOM
- 6 / HOTEL TERRACE
- 7 / HOTEL RESTAURANT
- 8 / DEMO SITES
- 9 / BAIJA BIANCA BAR



ORGANIZED BY



University of Zagreb



Faculty of Electrical
Engineering and Computing



LABUST

Laboratory for Underwater
Systems and Technologies



CUST

Center for Underwater
Systems and Technologies



UCG
University of Montenegro

University of Montenegro

ABOUT BTS

The Breaking the Surface – BTS is an international interdisciplinary field workshop of maritime robotics and applications. Ever since 2009, it has served as a meeting place for international experts, university professors, scientists, industry representatives and students from various fields.

BTS 2022 IN NUMBERS



23
COUNTRIES



198
ATTENDEES



15
LECTURES



8
TUTORIALS



6
DEMOS

COMMITTEES

COMMITTEES CHAIRS



Prof. Zoran Vukić, PhD
Honorary General Chair



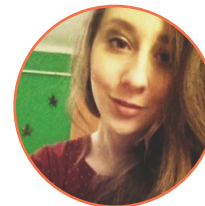
Prof. Nikola Mišković, PhD
General Chair



Prof. Roee Diamant, PhD
Programme Chair



Prof. Igor Radusinović, PhD
Local Organizing
Committee Chair



Milena Jenić
Organizing Committee
Chair



Igor Kvasić
Technical Committee
Chair

PROGRAMME COMMITTEE

Bridget Buxton; Massimo Caccia; Fausto Ferreira; Bill Kirkwood; Jeff Neasham; Irena Radić Rossi; Igor Radusinović; Ioannis Kyriakides; Aviad Scheinin

LOCAL ORGANIZING COMMITTEE

Igor Radusinović; Slavica Tomović; Žarko Zečević

ORGANIZING COMMITTEE

Milena Jenić, Željka Rajković

TECHNICAL COMMITTEE

Anja Babić; Nadir Kapetanović; Nikica Kokir; Igor Kvasić; Đula Nađ, PhD

LEGEND

SESSION COLOURS

	Lectures
	Tutorials
	Demonstrations
	Company programme

CATEGORIES

- Marine Robotics (MAROB)**
- Maritime Archaeology (MARCH)**
- Marine Biology (MARBIO)**
- Marine Oceanography (MAROCEAN)**
- Tutorials**
- Company Presentation**
- Demonstrations**

LOCATIONS

- LECTURE HALL – HOTEL CARINE**
Lectures, presentations and tutorials
- OPEN WATERS NEARBY**
Tutorials, equipment demonstrations, mission plannings, data analyses
- TUTORIALS ROOM – HOTEL CARINE**
Tutorials
- TERRACE BAR – HOTEL CARINE**
Social events
- ANIMATION ROOM – HOTEL CARINE**
International Night
- BAIA BIANCA BAR**
Karaoke
- KONOBA KRUŠO – HERCEG NOVI**
Gala Dinner

	SUNDAY, 24.09.	MONDAY, 25.09.	TUESDAY, 26.09. (Oceanography day)
09:00 - 09:15		Opening session	
09:15 - 09:30		Cyber-resilient Multi-modal Sensor Fusion For Autonomous Ships <i>Roberto Galeazzi</i>	Oceanographic Properties And Circulation In The Adriatic Sea <i>Miroslav Gačić</i>
09:30 - 09:45		Trondheimsfjorden – A National Test Area For Autonomous Vessels <i>Kay Fjortoft</i>	Using Smart Buoys To Turn Fishing Gear Into An Ocean Data Platform <i>Kortney Opshau</i>
09:45 - 10:00			
10:00 - 10:15		COFFEE BREAK	COFFEE BREAK
10:15 - 10:30			
10:30 - 10:45			
10:45 - 11:00			
11:00 - 11:15		Three Years Of CMMI – Advances In Cypriot Marine Robotics And Maritime Digitalisation <i>George Rossides</i>	Underneath The Antarctic Ice, Mapping The Seabed Of The Atlantic Ocean, Or In The Water For Weeks: Recent Successes For The Auvs Of The National Oceanography Centre <i>Fancesco Fanell</i>
11:15 - 11:30			
11:30 - 11:45			
11:45 - 12:00			
12:00 - 12:15		Company Presentation <i>Matko Barišić, ABB</i>	K2d: Towards A Global Scale Monitoring System For Oceans Using Subsea Cables And Autonomous Sensing Platforms <i>Bruno Ferreira</i>
12:15 - 12:30			
12:30 - 13:00		LUNCH	LUNCH
13:00 - 13:45			
13:45 - 14:00		Company Presentation <i>Adam Larson, David La Guen Thibaut Pollina, Fairscope</i>	T2 Intro - Three-minute Thesis (3MT) <i>Roe Diamant</i>
14:00 - 14:15			
14:15 - 14:30			
14:30 - 14:45		T1 Intro - Marine Explorers Society 20000 Leagues <i>Barbara Colić, Hrvoje Čizmek, 20k Leagues</i>	T3 Intro - Acoustic Localization challenge <i>challenge, Jeff Neasham</i>
14:45 - 15:00			
15:00 - 15:15			
15:15 - 15:30		BREAK	BREAK
15:30 - 16:00			
16:00 - 16:30			
16:30 - 17:00			
17:00 - 17:30	REGISTRATION	DEMO FairScope	T2 Roe Diamant
17:30 - 18:00		DEMO H20MNIX, FER a pad	DEMO Kourtney Opsaug
18:00 - 18:30	WELCOME DRINK	T1 20k leagues	T3 Nuno Cruz
18:30 - 19:00			
19:30 - 20:30	DINNER	DINNER	DINNER
20:30 - 21:00			
From 21:00		IEEE OES UNIZG PARTY	INTERNATIONAL NIGHT

WEDNESDAY, 27.09. (Biology day)					THURSDAY, 28.9. (Archaeology day)			FRIDAY, 29. 9.		SATURDAY, 30.9.
Needs and Solutions of Marine Biology	The Challenges Of Apex Marine Predators Research And Conservation In Israel <i>Aviad Scheinin</i>				Underwater Archaeology In Africa In The Age Of Modern Technological Engineering <i>Ceaser Bitu</i>			Three-minute Thesis (3MT) Competition		FIELD TRIP
	Developing A Swarm Of Low-cost Floaters To Acoustically Perform In-situ Fish Stock Assessment In Remote Areas <i>Anja Babic</i>				New Technologies To Enhance Subsea Operations And Autonomous Environmental Monitoring <i>Morel Groper</i>					
	COFFEE BREAK				COFFEE BREAK			COFFEE BREAK		
Aids for Marine Biology Research	Revitalizing Coastal Ecosystems: The Intersection Of 3d-printed Artificial Reefs, Iot, And Robotics <i>Manos Moraitis</i>				How To Protect An Outstanding Shipwreck Site? <i>Irena Radić Rossi</i>			Acoustic localization challenge presentation		
	Cetaceans In The Adriatic – What Can Acoustics And Machine Learning Teach Us? <i>Ana Sirović</i>				Novel Robotic Technologies For Mapping And Sampling The Mediterranean Coralligenous <i>Fabio Bruno</i>			An Open-source Low-cost Glider For Iterative Development <i>Krister Blanch</i>		
	LUNCH				LUNCH			LUNCH		
Challenge	T4 Intro DeeperSense: Ai Methods For Underwater Visual-acoustic Perception <i>Izakh Fabian, Nuno Gracias, Thomas Vogele, Bilal Wehb, DeeperSense</i>				T6 Intro - Akti Project And Research Centre <i>Xenia Loizidou, AKTI</i>			T8 Intro - Biomimetics Laboratory <i>Derek Orbaugh, Iain Anderson, Auckland Bioengineering Institute</i>		
	Company Presentation <i>Stephen Ritten, Lobster Robotics</i>				T7 Intro - Making Underwater Communications Private And Authentic <i>Paolo Casari, Cyber NATO</i>			T9 Intro - Gem & Fair Data In Marine Robotics <i>CNR</i>		
BREAK				BREAK			COFFEE BREAK			
	T4 DeeperSense	T5 Blueprint Subsea	DEMO UNEW		T6 AKTI	T7 CyberNATO	DEMO Dirk Meyer, Thomas Glatzbach	T8 Auckland Bioengineering Institute	T9 CNR	DEMO Ted Sjöblom, Krister Blanch
DINNER				DINNER			DINNER			
PUB QUIZ				BTS KARAOKE NIGHT			GALA DINNER AND CLOSING CEREMONY			

SOCIAL EVENTS



24.9.
SUNDAY
16:30 – 18:00
CARINE HOTEL KUMBOR
REGISTRATION



24.9.
SUNDAY
18:00 – 19:30
CARINE KUMBOR TERRACE BAR
WELCOME DRINKS



25.9.
MONDAY
FROM 20:30
CARINE KUMBOR TERRACE BAR
IEEE OES UNIZG PARTY



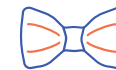
26.9.
TUESDAY
FROM 20:30
CARINE KUMBOR ANIMATION ROOM
INTERNATIONAL NIGHT



27.9.
WEDNESDAY
FROM 20:30
CARINE KUMBOR TERRACE BAR
PUB QUIZ



28.9.
THURSDAY
FROM 21:00
BAIA BIANCA BAR
BTS KARAOKE NIGHT



29.9.
FRIDAY
19:30 - 21:00
KONOBA KRUŠO HERCEG NOVI
CLOSING CEREMONY AND GALA DINNER



30.9.
SATURDAY
09:00 - 17:00
FIELD TRIP

RESTAURANT HOURS



07:30 - 09:00
BREAKFAST
12:30 - 13:45
LUNCH
19:30 - 20:30
DINNER



LOCATION

Carine Hotel Kumbor
Kumborskih ribara 55, 85340
Herceg Novi, Montenegro

VENUE

Breaking the Surface 2023 is taking place in Carine Hotel Kumbor in Kumbor, Montenegro.

REGISTRATION

The registration package includes :

- accreditation
- access to all technical programs (lectures, tutorials, demos, workshops)
- access to our social program: coffee breaks, social events, gala dinner on Friday evening, field trip on Saturday

A Corporate registration includes:

- 2 accreditations
- access to all technical programs (lectures, tutorials, demos, workshops)
- access to our social program: coffee breaks, social events, gala dinner on Friday evening, field trip on Saturday
- a 30 min time-slot for the presentation of the product gamut
logistical / infrastructural local support and organization collaboration for an expo / hands-on demonstration activity at the prescribed site

TYPE	EARLY BIRD BY 31 ST JULY	REGULAR
Student	150 €	170 €
Standard	300 €	350 €
Corporate	2000 €	2500 €

The background is a solid blue color. It is decorated with several small white dots scattered across the surface. There are also several dark blue silhouettes of fish, some of which are larger and more prominent than others, scattered across the background. The word "LECTURES" is centered in the upper half of the image in a bold, white, sans-serif font.

LECTURES



Cyber-Resilient Multi-Modal Sensor Fusion for Autonomous Navigation

Roberto Galeazzi, Technical University of Denmark, Denmark

The lecture will present recent advances on multi-modal sensor fusion for cyber-resilient navigation of autonomous ships in the presence of physical malfunctioning and cyber threats. Leveraging state-of-the-art methods in machine learning and sensor fusion, virtual redundancies are developed for the different sensing modalities allowing for the design of monitoring algorithms to ensure the information integrity of key sensors for navigation and target tracking. The theoretical framework will be introduced and specific examples for autonomous navigation of commercial vessels will be expanded, showing the validity of the research framework on full scale data collected during experimental campaigns of the first Danish autonomous ferry. The lecture will conclude presenting current and future directions of research.



📅 25.9.2023
🕒 09:00 – 09:45
🚢 Marine Robotics
👤 Roberto Galeazzi

Roberto Galeazzi received the M.Sc. degree in electronic engineering from the Polytechnic University of Marche, Ancona, Italy, in 2005 and the Ph.D. degree in automation and control from the Technical University of Denmark, Kongens Lyngby, Denmark, in 2010. He is an Associate Professor with the Department of Electrical and Photonics Engineering at the Technical University of Denmark. He is also Head of Centre for Collaborative Autonomous Systems at the Technical University of Denmark. He was with the Center of Excellence for Ships and Ocean Structures (NTNU) as a Post-Doctoral Fellow in 2009-2010. His research interests include motion planning and control, fault diagnosis and fault-tolerant control, nonlinear and adaptive control, state estimation and multi-modal sensor fusion. His focus areas are safety critical systems and autonomous systems. Dr. Galeazzi serves as Chair of the IFAC Coordinating Committee on Transportation and Vehicle Systems since 2023, and as Vice Chair of IEEE Denmark Section Joint Chapter CSS and RAS since 2022. He served as Chair of the Technical Committee on Marine Systems in the period 2018-2023. He is Associate Editor for Control Engineering Practice.

Trondheimsfjorden – a National Test Area for Autonomous Vessels

Kay Fjørtoft, SINTEF Ocean, Norway

The presentation Trondheimsfjorden – A National Test Area for Autonomous Vessels will consist of the presentation about OceanLab, which is an infrastructure project where technology for maritime research purposes was established. In the second part, the presenter will give a short introduction to maritime autonomy, with the focus on why they have established the test arena. The next part of the presentation will be dedicated to a solution called OceanInfo, a tool used to support the development of autonomy, where they collect data from previous autonomous tests and installed sensors in the fjord. OceanInfo will be used for analytic purposes as well as for operational decision support. Finally, the presenter will give a few examples from performed tests/demonstrations in the test arena.



📅 25.9.2023
🕒 09:45 – 10:30
🚢 Maritime Robotics
👤 Kay Fjørtoft

Mr. Kay Fjørtoft, MSc. is a Senior Researcher at SINTEF Ocean. SINTEF is one of Europe's largest independent applied research organizations. Kay has a broad research background and have been working with maritime research for more than 20 years. His academic background is from the Computer Science field, studying Artificial Intelligence. Kay has been involved in many research projects, mainly in projects covering software architecture and development, autonomous operations, integrated operations, maritime safety operations, Arctic operations, freight transport, port community systems, and communication (telecom). Kay has published several book articles, has been leading development of maritime technological roadmaps, have published many papers and articles, and have been project manager for a number of research projects. He is also part of the management group of establishing the Trondheimsfjorden test area for autonomous shipping, which will be an important test area for testing new maritime constructions and technology. Kay is also leading the work of establishing a forum for "ports of the future" where collaboration, digitalization, automation and sustainability are work focuses.




Three Years of CMMI – Advances in Cypriot Marine Robotics and Maritime Digitalisation

George Rossides, Cyprus Marine and Maritime Institute, Cyprus

Since 2020, the Cyprus Marine and Maritime Institute has been developing its marine robotic and maritime digitalisation infrastructure towards a more sustainable Cypriot blue economy. This includes the design and implementation of novel autonomous underwater and surface marine robotic platforms as well as the creation of state-of-the-art robotic and digitalisation systems for marine environmental and oceanographic applications, maritime surveillance and the digitalisation of the Cypriot maritime industry. This talk will describe the work that has been performed so far along with results obtained up-to-date.



***Dr. George Rossides** received his MEng degree in Integrated Mechanical and Electrical Engineering at the University of Bath where he also did his PhD on autonomous cooperative marine systems for passive acoustic source localisation and monitoring. His research has been concerned with the development of control algorithms for robotic swarms with the task of source localisation. His fields of interest are model-predictive control, swarm and cooperative robotics, marine autonomous systems, machine learning and population-based optimisation processes, and marine acoustics.*

 25.9.2023

 11:00 – 11:45

 Marine Robotics

 George Rossides

Oceanographic Properties and Circulation in the Adriatic Sea

Miroslav Gačić, Institute of Oceanography and Applied Geophysics, Italy

Adriatic Sea is a northernmost sub-basin of the Mediterranean, thus influenced strongly by the cold continental air outbreaks in winter (bora wind). At the same time, it is characterized by the pronounced riverine run-off representing a dilution basin (source of the low salinity water) for the neighboring Ionian Sea. Cold and dry winter air outbreaks are responsible for the dense water formation which then spreads through the Strait of Otranto over the entire Eastern Mediterranean. The key role of the Adriatic is thus that it represents a source of the water for the renewal and oxygenation of the bottom layer of the Eastern Mediterranean sub-basin. On the other hand, the Ionian and Eastern Mediterranean waters enter the Adriatic bringing salt and heat. The Strait of Otranto is the area where this exchange takes place reaching about 1.000.000 m³/sec. Due to this exchange the circulation within the Adriatic is counterclockwise where salty and relatively warm waters of the Mediterranean origin spreads along its eastern coast northwestward. The return fresher water flow spreads southeastward along the western coastal shelf. Interaction with the Ionian Sea varies on decadal scale bringing into the Adriatic saltier Levantine waters or lower salinity waters of the Western Mediterranean and Atlantic origin. This is then responsible for the variations of the Adriatic nutrient content as well as the transport of organisms coming either from the Levantine Sea or from the Atlantic Ocean.



📅 26.9.2023
🕒 09:00 – 09:45
🌐 Oceanography
👤 Miroslav Gačić

Miroslav Gačić obtained his Ph.D. in Meteorological Sciences at the University of Belgrade (1977-1983.) after doing his M.Sc. in Physical Oceanography at the University of Zagreb, 1971-1974. For his bachelor he studied Geophysics and Meteorology at the University of Zagreb from 1966 to 1970. He was awarded Fulbright Fellow Scholarship for the academic year 1978/79. His work experience includes: 2015-present Associate Scientist, National Institute of Oceanography and Experimental Geophysics, Trieste, Italy 1994-2015 Senior scientist, Head Oceanography group, National Institute of Oceanography and Experimental Geophysics, Trieste, Italy 1991-1994 Visiting Professor, Istituto per lo Studio della Dinamica delle Grandi Masse, Venice, Italy 1987-1991 Senior Scientist, Head Department of Oceanography, Institute of Oceanography and Fisheries, Split, Croatia 1984-1987 Scientist, Institute of Oceanography and Fisheries, Split, Croatia 1983-1984 Post-doc, Institute of Oceanography and Fisheries, Split, Croatia 1974-1983 Research Assistant, Institute of Oceanography and Fisheries, Split, Croatia. He participated on a number of national and international projects including: Two three-year projects on the Venice Lagoon interaction with the adjacent sea Financed by the Consortium for the Venice Lagoon Research – High-frequency (HF) measurements of the surface flow in the Northeastern Adriatic (NASCUM) Interreg Project – HAZADR IPA project Studies of the circulation and oil spills – RITMARE



5-year Italian national project on the open-sea circulation and interaction between the surface and deep water circulation. His scientific interests include Coastal oceanography, Adriatic oceanography and interaction with the Ionian Sea, Interannual and decadal variability and Dense water formation processes. He as author or co-author of about 130 papers in international journals.

Using Smart Buoys to Turn Fishing Gear Into an Ocean Data Platform

Kortney Opshaug, Blue Ocean Gear, US

Ocean data is critical for many different applications, including shipping, oil and gas, offshore wind and wave energy, and scientific research, but it can be challenging to acquire in a safe and reliable manner due to the volatility of marine conditions. One means gaining momentum is to use commercial fishing gear, which is already being deployed in some of the most economically important and active coastal zones to other ocean industries, to collect and transmit metocean data. Blue Ocean Gear's Smart Buoy devices are designed to do exactly that, with over 1,000 buoys deployed in fisheries on both coasts of North America over the past two years. As a primary application, the buoys are tracking devices to reduce lost fishing gear and improve efficiency for operations, so the fishers themselves gain from using these systems on their gear, while also providing additional information as to conditions on the water. Like 'Find my iPhone' for nautical equipment, this saves time, recovery costs, and data loss caused by inadequate and hard-to-upgrade equipment at sea. As this ocean data network grows, the ability to use fishing gear to generate mission-critical data becomes more advantageous from an economic and practical standpoint.



Kortney Opshaug is the CEO of Blue Ocean Gear, a California-based tech company focused on Smart Buoys for commercial fishing fleets to track gear on the ocean. After founding the company in 2015, she has led the growth of the business and product development through close collaboration with fishers throughout North America, as well as fostered partnerships with the Global Ghost Gear Initiative, Alaska Ocean Cluster, and NOAA. The author of the U.S. patents awarded for Blue Ocean Gear's smart fishing technology, her Ph.D. focus was on underwater robotics at Stanford University and the Monterey Bay Aquarium Research Institute.

📅 26.9.2023

🕒 09:45 – 10:30

🌊 Oceanography

👤 Kortney Opshaug

26th
SEP
Tue

Underneath the Antarctic Ice, Mapping the Seabed of the Atlantic Ocean, or in the Water for Weeks: Recent Successes for the AUVs of the National Oceanography Centre

Francesco Fanelli, National Oceanography Centre, UK

The Marine Autonomous and Robotic Systems group of the National Oceanography Centre develops, operates, and maintains one of the largest AUV fleets in the world. With more than 25 years of successful deployments in the harshest conditions and in the most remote regions of the planet, these vehicles continue to constitute an invaluable asset to the UK and global marine science communities, the data they gather used by scientists to understand processes such as global climate change or the evolution of our oceans. This talk will showcase the capabilities of MARS AUVs and their recent achievements, including the missions underneath the Antarctic ice shelves of Autosub Long Range (where the vehicle traveled a total of more than 190 km under ice, with 86 km in a single mission), the multi-week deployments at sea, piloted over the horizon with no ship intervention, and the 4000 m dives of Autosub5 in the Atlantic Ocean, carrying a multitude of optical and acoustic payload sensors to collect precious science data. Additionally, the talk will give an overview of the current state of development and the upcoming challenges in store for NOC AUVs.



📅 26.9.2023
🕒 11:00 – 11:45
🌐 Oceanography
👤 Francesco Fanelli

Dr. Francesco Fanelli received his M.Sc. in Automation Engineering from the University of Florence (Italy) in 2014, where he successfully completed his Ph.D. in 2018 with a thesis on the development and the field testing of navigation algorithms for Autonomous Underwater Vehicles. He joined the Marine Autonomous and Robotic Systems group of the National Oceanography Centre as a Software Engineer in 2018. He has 9+ years of experience in the field of underwater robotics, having developed software specifically targeted at AUVs ranging from planning, navigation, and control strategies to mission monitoring and robot sensors data analysis tools. In his current role, his main activity consists in developing, maintaining, and testing NOC's Onboard Control System, the unified software architecture that drives MARS AUVs; he is involved in all the phases of the software development process, from early concept design to the implementation and the field testing of the derived solutions. In the past three years, his focus has been the development of NOC's multi-platform Obstacle Avoidance System, which has been employed on different platforms in demanding conditions such as underneath the ice in Antarctica and during low-altitude flight, and is now used on all MARS AUVs.



K2D: Towards a Global Scale Monitoring System for Oceans Using Subsea Cables and Autonomous Sensing Platforms

Bruno Ferreira, INESC TEC, Portugal

Advancements in technology have opened up extraordinary opportunities for monitoring the Earth to an extent never seen before. Robots equipped with sensors have played a crucial role in providing valuable ongoing data to scientists, allowing them to delve into the intricate dynamics of our planet and assess the impact of human activities. However, our understanding of the oceans significantly lags behind that of the Earth's surface, atmosphere, and even other celestial bodies. Due to the well-recognized harshness of the oceanic environment, engineers and scientists face formidable challenges. Their task involves not only expanding our knowledge of the oceans but also taking proactive measures to prevent disasters and ensure more sustainable management of the Earth's resources. K2D aims at developing a global monitoring system for oceans, capable of collecting data from all depths, from the deep-sea bottoms to the surface. This system utilizes existing subsea communication and energy transport cables to create a network for real-time continuous sensing of ocean conditions. The project proposes the use of various components, such as sensing platforms and Autonomous Underwater Vehicles, to gather extensive and comprehensive data on physical, chemical, biological, and environmental variables. The lecture associated with the project discusses the motivation behind it, highlighting relevant applications and the potential of SMART (Sensor Monitoring And Reliable Telecommunications) cables. The lecture also provides insights into the project's concepts, developments, and major achievements.



Bruno M. Ferreira is a senior researcher at the Center for Robotics and Autonomous Systems, INESC TEC, Porto, Portugal, and an invited assistant professor at the Faculty of Engineering, University of Porto (FEUP). He received the M.Sc. and Ph.D. degrees in electrical and computer engineering from FEUP, Porto, Portugal, in 2009 and 2014, respectively. He has been actively participating in several national, European and other international research projects as a researcher, assuming coordination roles in some of them. His research interests orbit around underwater robotics, including control, cooperation, localization, mapping and design of robotic solutions.

📅 26.9.2023

🕒 11:45 – 12:30

🌐 Oceanography

👤 Bruno Ferreira

The Challenges of Apex Marine Predators Research and Conservation in Israel

Aviad Scheinin, Marine Apex Predators Lab, University of Haifa, Israel

The eastern Mediterranean Sea is a marine desert exhibiting extremely low biological productivity, particularly in its easternmost basin. Nevertheless, apex predators such as sharks and dolphins are present. This presentation will present two case studies of long-term research on coastal sharks and dolphins. Two species of carcharhinid sharks, Dusky shark (*Carcharhinus obscurus*) and Sandbar shark (*C. plumbeus*), aggregate every winter at the warm water effluent of the Hadera coastal power plant on the Israeli Mediterranean coast. Since 2016, the long-term ecological research of the Morris Kahn Marine Research Station's (MKMRS) Apex Predator Laboratory in Israel has led to the definition of seasonal 'hotspots' of sex-segregated aggregations of mainly female Dusky sharks and male Sandbar sharks. The common dolphins (*Delphinus delphis*) in the Mediterranean Sea are evaluated as 'Endangered' on the IUCN Mediterranean Red List. The local population inhabits the southern coastal waters of Israel, in the shallow waters. The decrease in their abundance, coupled with their apparent isolation level, qualifies the local population for a re-assessment of their conservation status since they are on the verge of local extinction as their numbers are decreasing dramatically. The cutting-edge methodologies used today for marine apex predator research still lack the ability to confront fundamental and basic questions such as movement patterns. This and others will be brought to discussion.



📅 27.9.2023

🕒 09:00 – 09:45

🔬 Marine Biology

👤 Aviad Scheinin

***Aviad Scheinin** is currently serving as Head of Marine Apex Predator Lab, which specializes in conservation, behavioral science, and long-term ecological research of coastal dolphins, sharks, rays, bluefin tuna. Apex predators are important for maintaining the integrity of ecosystems, yet there exists a huge knowledge gap on these predators of the Eastern Mediterranean Sea which we plan to overcome. The Marine Apex Predator Lab is continuously engaged in developing new sampling protocols and indicators for pelagic megafauna. Emphasis is placed on the function of these species as sentinels of the marine environment and their ability to inform us about human perturbations. Photogrammetric measurements are employed using drones and unmanned aerial vehicles (UAVs), both active and passive acoustic surveying techniques, mark-recapture methods, underwater observations, and cutting-edge technologies for molecular and stable isotope analyses, e-DNA and microbiome analysis.*



Developing a Swarm of Low-Cost Floaters to Acoustically Perform In-Situ Fish Stock Assessment in Remote Areas

Anja Babić, University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

The Schmidt Marine Fisheries Initiative SOUND project studies in-situ ocean monitoring which enables tracking of marine life via low-cost floaters that drift with the water current with one actuated degree of freedom – depth control, while autonomously performing acoustic fish detection and fish biomass assessment activities (for instance, spreading the swarm throughout the water column versus focusing the entire swarm at a specific depth). The aim is to achieve simple deployment requiring no additional permits, non-invasive aquaculture support, assisting fishermen and reducing bycatch – especially in remote and developing areas. The project’s technological contribution lies in two inter-related areas: underwater acoustics and marine robotics, with a novel underwater acoustic scheme for fish stock measurement that will combine probabilistic analysis with machine learning integrated into a novel design of an autonomous low-power and low-cost floater as a platform for marine exploration, resulting in a TRL6 prototype for selected pilot tests. This lecture focuses on the development of initial floater prototypes and field trials which took place in Šibenik, Croatia and Eilat, Israel.



📅 27.9.2023

🕒 09:45 – 10:30

🐟 Marine Biology

👤 Anja Babić

***Anja Babić** was born in 1991 in Zagreb, Croatia. In 2014 she graduated from the University of Zagreb, Faculty of Electrical Engineering and Computing (FER) and in 2023 she received her PhD from the same institution for her thesis titled “A hyper-heuristic approach to achieving long-term autonomy in a heterogeneous swarm of marine robots”. Since 2015 she has been a researcher at FER and a member of the Laboratory for Underwater Systems and Technologies (LABUST). In 2017 she was a visiting researcher at the Consiglio Nazionale delle Ricerche in Genoa, Italy. She is a post-doctoral researcher on the UWIN-LABUST project and was previously involved in the project “Multifunctional Smart Buoys” and in EU H2020 projects subCULTron – Submarine Cultures Perform Long-term Robotic Exploration of Unconventional Environmental Niches and H2020 EXCELLABUST. She participated in developing diver-focused sensing, data processing, and underwater communication as part of the FP7 project CADDY – Cognitive Autonomous Diving Buddy, as well as implementing tasks for a robot-assisted autism spectrum disorder diagnostic protocol using the humanoid robot NAO. Her research interests include evolutionary and bio-inspired robotics, emergent behaviour, task allocation and scheduling, and communication between both heterogeneous agents and members of a swarm, as applied to marine robotic platforms. From 2019 to 2023 she was the Chair of the IEEE Oceanic Engineering Society Student Branch Chapter of the University of Zagreb.*

Revitalizing Coastal Ecosystems: The Intersection of 3d-Printed Artificial Reefs, IoT, and Robotics

Manos Moraitis, Cyprus Marine and Maritime Institute, Cyprus

Coastal ecosystems worldwide are indispensable, nurturing biodiversity and productivity while offering services like food and fresh water supply, climate regulation, flood control, recreation, aesthetic value, nutrient cycling, and soil formation. However, these ecosystems are increasingly threatened by human activities such as climate change, tourism, aquaculture, over-fishing, and the operation of desalination plants, ports, and marinas. These pressures are not limited to areas with restricted coastlines, such as the one of Cyprus but also affect countries with extensive yet congested coastlines. Nature-based Solutions like artificial reefs emerge as innovative solutions to these threats. Artificial reefs increase coastal complexity increasing diversity and productivity. The CMMI utilizes 3D printing that will benefit the natural environment and also provide a test-bed for the development of novel IoT and marine vehicles for eco-friendly marine use cases. 3D-printed artificial reefs will be designed to regenerate marine ecosystems and protect biodiversity, allowing seamless integration and synergy with IoT and robotic assets equipped with sensing, processing, and communications providing environmental monitoring and early warning capabilities. The CMMI calls for collaboration between academic and research organizations, the industry, and the public for the success of this initiative.



📅 27.9.2023
🕒 11:00 – 11:45
🔍 Marine Biology
👤 Manos Moraitis

Dr. Manos Moraitis is a biologist interested in marine ecology, climate change and marine health assessment and artificial reefs. He is an expert on marine benthic ecology, environmental impact assessment, marine ecological status evaluation, macrofauna taxonomy, and ecological niche modeling. Manos completed a BSc in Biology from the University of Crete and an MSc on Environmental Biology from the same university. For his PhD he evaluated the potential effects of numerous climate change scenarios on the distribution of benthic indicator species currently used in environmental impact assessment studies. In addition, he worked with benthic indicator species currently used in marine health assessment and relevant Species Distribution Modelling methods (SDMs) in order to predict potentially eutrophic coastal areas on a large spatial scale. Manos has extensive experience in artificial reefs, ecological data analysis and benthic biodiversity assessment. He has been involved in research programs regarding the assessment of sensitive habitats using benthic macroinvertebrates as biotic tools and proxies of environmental disturbance. Manos has participated in several scientific diving and field expeditions as well as in numerous training courses/workshops/seminars. Manos has received two research grants from the A.G Leventis Foundation. Dr. Manos Moraitis is an Associate scientist at CMMI currently leading a flagship project which aims to develop a 3D-printed artificial reef as well as one HORIZON project to restore threatened coral populations in Cyprus.



Cetaceans in the Adriatic – What Can Acoustics and Machine Learning Teach Us?

Ana Širović, Norwegian University of Science and Technology, Norway

The presence of bottlenose, striped, and Risso's dolphins, as well as Cuvier's beaked whales and sperm whales are well documented in the Adriatic Sea. The area is also known to be occasionally visited by fin whales and common dolphins. This knowledge is based on data collected from visual sightings or strandings. This type of data, however, has poor temporal coverage. By deploying passive acoustic recorders, to listen to underwater sounds across the region, we can gain a better insight into the temporal and, to some degree, spatial extent, of their occurrence. First long-term passive acoustic recorder was deployed in October 2018 in the South Adriatic Pit. Since then, additional recorders have been deployed in the central and northern Adriatic. With over 6-instrument years of acoustic data, manual analysis for the presence of cetacean calls is not feasible. Therefore, we have been implementing machine learning approaches to extract information about the occurrence of cetacean species in these waters. For classification of echolocation clicks, we use a click detector followed by an unsupervised clustering approach and validation with an annotated dataset. This approach has showed there is continuous presence of Cuvier's beaked whales in the South Adriatic Pit, indicating they are residents in the area, making the region an important habitat for the species. Our analyses have also revealed that fin whales have visited the Adriatic Sea every year since 2018, seemingly making them regular rather than occasional visitors. The next step will include the development of a contour extraction process to enable automated classification of delphinid whistles. When completed, we will have the first fine-scale temporal picture of cetacean occurrence along the eastern Adriatic Sea.



Ana Širović is a marine bioacoustician and a professor at the Norwegian University of Science and Technology in Trondheim, Norway. Her research interests revolve around the development and use of acoustic methods to improve our understanding of highly exploited and endangered marine species, as well as ocean noise and the effects of anthropogenic noise on marine life. Her group uses acoustic tools to answer ecological, population-level questions relevant to the management of animal resources. Ana grew up in Croatia and started her education at FER, but completed her Bachelor's degree at the University of California Santa Barbara and received a PhD in oceanography from the Scripps Institution of Oceanography at the University of California San Diego. She is the recipient of the Medwin prize from the Acoustical Society of America and the US Antarctic Service Medal.

📅 27.9.2023

🕒 11:45 – 12:30

🎧 Marine Biology

👤 Ana Širović

Underwater Archaeology in Africa in the Age of Modern Technological Engineering

Caesar Bitá, National Museums of Kenya, Kenya

Africa is the cradle of mankind, and the continent boasts of having some of the most ancient civilizations in world. These are spread across the entire continent from the Pharaonic kingdoms in the North, the ancient kingdoms of Gao and Tumbuktu in the west to the Swahili civilization in the East African Coast. Further, the African continent was connected to ancient civilizations in other parts of the globe. Evidence of these civilizations and their networks remain today buried on land or under the oceans. While much of the evidence of these civilizations have retained some form of ruined monuments, others have completely disappeared. Either they were obliterated by enemies, submerged by rising sea levels or eroded away, majority got lost without trace only remaining in written records. It is only through archaeological studies that we come to appreciate these lost resources. With the advent of modern technological engineering, underwater archaeological studies are becoming easy to apply and the solution to recover much of the submerged sites. While technological methodologies such as Side Scan Sonar, ROVS, Multi-Beam Sonars, Sub bottom profilers etc. are a great invention, in Africa, underwater archaeologists face a number of challenges in the application of these technologies. Challenges emanate from the unavailability of the equipment to lack of local trained personnel with the requisite skills to operate these tools. Nevertheless, with the use of traditional physical on-site diver searches and underwater excavations, great discoveries are being recovered in the oceans of Africa. This presentation will explore the role of technology in the advancement of underwater archaeology in Africa and the technological barriers inherent in the continent.



📅 28.9.2023
🕒 09:00 – 09:45
👤 Marine Archeology
👤 Caesar Bitá

Caesar Bitá is an Underwater and Marine Cultural Research Scientist working for National Museums of Kenya and is the Head of the Department of Coastal Archaeology at Fort Jesus Museum in Mombasa, Kenya. Trained in Professional Underwater Archaeology at the Underwater Archaeology Center in Beijing, China, he holds a Professional Diploma in Underwater Archaeology and is currently completing his PhD in Archaeology at the University of Dar es Salaam in Tanzania. Bitá has a Master's Degree in Archaeology from the University of Dar es Salaam, Tanzania; a Postgraduate Diploma in Management of Heritage and Museum Collections and a Bachelor's Degree in Anthropology both from the University of Nairobi. Caesar Bitá has undertaken many underwater archaeological surveys including managing several underwater archaeological projects in Kenya and Tanzania. He has published severally on marine archaeology and underwater cultural heritage in many international journals and books. He too has presented papers in many international professional underwater archaeology conferences. In collaboration with UNESCO, he has managed and coordinated several sub-Saharan



regional training workshops on underwater cultural heritage management. Currently, he is the underwater archaeologist for the National Museums of Kenya coordinating terrestrial and underwater archaeological research and underwater cultural heritage management in coastal Kenya. He is interested in the maritime and underwater archaeology of the Western Indian Ocean Seaboard, the archaeology of Africa and underwater cultural heritage management.

New Technologies to Enhance Subsea Operations and Autonomous Environmental Monitoring

Morel Groper, Hatter Department of Marine Technologies, University of Haifa, Israel

Underwater environmental monitoring plays a vital role in comprehending and preserving the well-being of our oceans. However, conducting such monitoring in challenging marine environments poses significant difficulties. To address these challenges, the SubSea Engineering lab at the Hatter Department of Marine Technologies is dedicated to pioneering innovative projects. Three projects will be presented: 1) Obstacle Avoidance – Harnessing New Sensor Fusion Technology: Efficiently navigating through confined underwater spaces is crucial for successful autonomous operations. Our project focuses on developing a cutting-edge obstacle avoidance system, integrating advanced sensor fusion technology. 2) Final Approach to an Underwater Docking Station Based on Magnetic Navigation: Establishing underwater docking stations is essential for extending operational capabilities and optimizing resource management. In this project, we present our progress in creating an extremely accurate final approach navigation toward an underwater docking station based on an artificial magnetic field. 3) Development of a Lagrangian Float for Internal Wave Hunt: Understanding internal waves is pivotal for unraveling ocean dynamics and their influence on climate patterns. Our novel float project focuses on designing an autonomous platform to operate as a Lagrangian float capable of autonomous monitoring the water column, collecting data, and analyzing the existence of internal waves. The development of the platform will be presented.



Professor Morel Groper heads the SubSea Engineering Laboratory at the Hatter Department of Marine Technologies at the University of Haifa in Israel. Morel Groper served in the Israeli Navy as a design engineer, a navy shipyard chief marine engineer, and as the Navy Head of Naval Architecture and Marine Engineering. In 2014, Morel joined the University of Haifa to establish the Hatter Department of Marine Technologies and promote his own research. His research interests include propulsion, dynamics, and control of underwater platforms, unmanned fast surface platforms, and the design of mechanical components for marine and subsea applications.

📅 28.9.2023

🕒 09:45 – 10:30

🌊 Marine Archeology

👤 Morel Groper

How To Protect An Outstanding Shipwreck Site?

Irena Radić Rossi, University of Zadar, Croatia

In summer 2018, an outstanding shipwreck site was discovered in the waters of the island of Pag. It consists in several hundreds of amphorae of Lamboglia 2 type from the 1st c. BC, which lie in the original position as in the ship hold, reflecting the outline of the sunken ship. The site also contains some pottery items from the ship's galley, and the lead anchor stock bearing the inscription STRATON, indicating the probable owner of the unfortunate vessel. The first well-preserved sites were discovered in the waters of Lastovo Island at the end of the 1980s, and since then their number grew to eight. Seven sites, located at the islands of Rab, Pag, Žirje, Lastovo (2), Mljet and Supetar in front of Cavtat, are protected with the iron cages, which through time demonstrated their advantages and limitations. The recent negative experiences on the argument led to the conclusion that some other solutions should be experimented for the needs of the in situ protection of non looted shipwreck sites. The newly discovered site at the island of Pag served as a hint for attempting to find the alternative solution. Up to now a system composed of a 360 degrees fieldview camera for surface survey, and two PTZ cameras for underwater survey was suggested, and should be implemented next year. The paper aims at discussing the problem and challenging the professional audience to propose alternative solutions.



📅 28.9.2023
🕒 11:00 – 11:45
🏷️ Marine Biology
👤 Irena Radić Rossi

Irena Radić Rossi graduated from the Department of Archaeology of the Faculty for Humanities and Social Sciences of the University of Zagreb in 1988. In the same year she was assigned the permanent position of the underwater archaeologist-conservator in the Department of Archaeology of the Republic Institute for the Protection of Cultural Monuments in Zagreb. In 2004 she obtained the title of the senior conservator, as the highest rank in the cultural heritage conservation service. In 2009 she moved to the University of Zadar, in the quality of assistant professor at the Department of Archaeology. Since 2008 she is associated researcher of Centre Camille Jullian (Aix-Marseille Université, CNRS); since 2014 adjunct professor at Nautical Archaeology Program of Texas A&M University, and affiliated scholar of Institute of Nautical Archaeology. Since 2016 she is the member of Croatian Maritime Heritage Section of Maritime Council of Croatian Academy of Science and Arts. During her professional career, she was involved in numerous maritime archaeology excavations in Croatia and abroad. She currently directs several international research projects focused on maritime and nautical archaeology. She is the



principal investigator of the Archaeology of Adriatic Shipbuilding and Seafaring (AdriaS) Project, supported by Croatian Science Foundation, and focused on the technological development of ships and seafaring from prehistory to early modern age. She is the member of the Programme Committee of the Breaking the Surface International Field Workshop, and the co-founder of the association Institute for Maritime Heritage ARS NAUTICA.

Novel Robotic Technologies for Mapping and Sampling the Mediterranean Coralligenous

Fabio Bruno, University of Calabria, Italy

Coralligenous is a relevant habitat in the Mediterranean Sea made of in-place reef-building organisms primarily composed of calcareous red algae. Due to its importance as hot spot of biodiversity, coralligenous is considered among the priority habitats for monitoring and conservation by the European Community, also because the accretion rate is slow and constituent organisms are extremely sensitive to natural and anthropogenic environmental changes. In the context of the “CRESCIBLUREEF – Grown in the blue: new technologies for knowledge and conservation of Mediterranean reefs” project, new minimally-invasive monitoring and sampling technologies are being developed to complement the existing techniques. A ROV has been equipped with an optical system capable of interactively reconstruct the 3D morphology of the seabed and with a robotic coring system able to directly collect sample of the coralligenous. The presentation will focus on the different technical problems that have been solved and on the results of the first sea trials.



📅 28.9.2023
🕒 11:45 – 12:30
🌊 Marine Archeology
👤 Fabio Bruno

Fabio Bruno is an Associate Professor at the Department of Mechanical, Energetics and Management Engineering (DIMEG), University of Calabria (UNICAL) where he teaches “Rapid Prototyping” and “Virtual and Augmented Reality”. He is cofounder and President at 3D Research s.r.l. a spin-off Company specialized in the development of eXtended Reality technologies with a focus on marine applications. His research interests include the development of robotic and digital technologies for the documentation, preservation and dissemination of underwater cultural and natural heritage. He is the scientific coordinator of 3 EU funded projects: INTERREG MED, H2020-MSCA TECTONIC, Creative Europe CREAMARE and ART4SEA. He has coordinated various projects like: Interreg Med BLUEMED PLUS and VISAS. He had leading roles in many other EU projects like H2020 – iMARECULTURE, H2020-ECSEL-JU INSECTT, CREA CROSS SECT INNOVLAB – MAREBOX, EASME/EMFF Lab4Dive and DiveSafe”, EASME MeDryDive. He co-autored more than 160 research papers.

🕒 09:00 – 10:00

Three-Minute Thesis (3MT) Competition

Final event of the three-minute thesis (3MT) competition. Each competing student has 3 min to present his/her thesis using a single slide. A distinguished referee team from academy and industry as well as the audience will evaluate the three best pitches!

🕒 10:00 – 10:45

Marble Hackathon Results Presentation

During the session students will present their approach in detecting oyster larvae using vertical profilers and flow microscope.

🕒 11:00 – 11:45

Localization Challenge Results Presentation

Final event of the Acoustic Localization Challenge – after having a brief introduction to the challenge and learning the background theory on acoustic positioning on Monday, attending a tutorial and hands on session to familiarise themselves with the hardware on Tuesday, the competing teams had each a dedicated timeslot in a data gathering sessions out on the boat on Wednesday. After gathering precious data it's a race against the clock to come up with creative algorithms to determine the most precise location of a submerged pinger. Finally on Friday, each team gets a 5 minute slot to present their methodologies, approach and results in front the audience and a panel of expert judges that coached them throughout the week.

An Open-Source Low-cost Glider for Iterative Development

Krister Blanch, Chalmers University of Technology, Sweden

A relatively cheap glider was designed and built as part of a student competition involving two teams and twelve students. The work was carried out at Chalmers University of Technology at the vehicle laboratory Revere. The goal was to initiate work around an open-source platform that could be iteratively developed within an academic context, with potential users in small and medium sized organisations in sub-sea operations. Commercial gliders are known to be very expensive. Perhaps mainly due to their typical domain of operation, where they are expected to return after travelling unsupervised for long durations and over long distances. Presumably, to make the vehicles sufficiently robust, minimizing the risk of losing them on critical missions, huge amounts of engineering were invested in safety systems and robustness, resulting in significant costs. Commercial gliders are typically large, with the ability to carry advanced sea observation sensors, further contributing to higher unit costs but also costs



for launch and retrieval. It can therefore be argued that there is a market for smaller and less expensive gliders. Just considering the internal components of the glider, including the minimum set of electronics and software, the total cost could be quite low. However, robustness, redundancy, and safety systems need significant time to be developed. To address this, this work investigates the possibilities of working with the glider as a fully open-source system, inviting an online community. This presentation will discuss the idea of an open-source glider infrastructure and show initial results from the first prototype under water.



Krister Blanch completed his Masters of Information Technology, Software Development at Griffith University, Australia in 2020, and is currently a Doctoral student with the Applied AI group at Chalmers University, Sweden, an Associate Doctoral student of the WASP Graduate School, and a Maritime R&D Engineer at the Chalmers Revere laboratory. Aside from his long history within the various sailing industries, his more recent background is the integration of sensors within the maritime domain, specialising in high volume, high quality dataset generation, as well as sensor-fusion and autonomous decision making for surface and subsurface vessels.

📅 29.9.2023

🕒 11:45 – 12:30

🏠 Marine Robotics

👤 Krister Blanch

TUTORIALS

The background is a solid blue color with a subtle pattern of small white dots and faint, light blue silhouettes of fish and bubbles scattered across the surface.



Marine Explorers Society 20000 Leagues

Barbara Čolić, Hrvoje Čižmek, Marine Explorers Society – 20000 Leagues, Croatia






To live and act sustainably, it is essential to understand how the ocean influences us and how we influence it. This is the essence of ocean literacy. Through the Ocean literacy we are dedicated to creating a global ocean movement to save the planet on which we live by disseminating the world's ocean knowledge. The seven principles of Ocean literacy are: The Earth has one big ocean with many features; The ocean and life in the ocean shape the features of Earth; The ocean is a major influence on weather and climate; The ocean made the Earth habitable; The ocean supports a great diversity of life and ecosystems; The ocean and humans are inextricably interconnected; The ocean is largely unexplored. In this tutorial we will give an oversight of all seven principles to everybody fully understand how ocean influence on us and we on the ocean.



Barbara Čolić is a marine biologist who has focused her career on marine conservation. She has conducted study on a variety of marine ecosystems, including seagrass meadows and coral reefs, as well as species-focused studies on echinoderms, bivalves, and communities of necto-benthic fish. Her main areas of interest include marine protected zones, their efficacy, and how they affect local populations and marine biodiversity. Her work on outreach and educational programs, which combine ocean literacy and STEAM education for all age groups to bring the sea closer to everyone, runs parallel to her research interests. Barbara oversees the Janolus Ltd. nature conservation program and serves as vice president of the Croatian non-governmental organization Marine Explorers Society – 20000 Leagues.



Hrvoje Čižmek is a marine biologist and an expert in ecology of mediterranean benthic communities. His scientific research interest is in the ecology of marine caves, coralligenous and seagrass communities and also in marine seafloor habitat mapping. He is founder and manager of Marine Explorers Society – 20000 Leagues NGO where he is involved in marine biology research mostly in marine protected areas (MPA) in the Adriatic Sea as well in ocean literacy education. His professional skills include: NAUI SCUBA instructor, licensed technical and rebreather diver and speleologist, underwater photographer, sailor, Croatian mountain rescue speleodiver and GIS expert.

-  25.9.2023
-  14:30 – 15:15
-  Tutorial
-  Lecture Room
-  Barbara Čolić
Hrvoje Čižmek

Three-Minute Thesis (3MT)






Roee Diamant, Laboratory for Underwater Systems and Technologies, UniZg FER

This year, BTS will host a three-minute thesis (3MT) competition! The 3MT is an initiative to improve students research presentation skills in an elevator pitch style. 3MT is widely celebrated in North America as a competition: each student has 3 min to present his/her thesis using a single slide. A distinguished referee team from academy and industry as well as the audience will evaluate the three best pitches!

The event will include

1. Tuesday, Sep. 26th, 13:45-14:30: A tutorial on pitch making. How to open your pitch, structure and data delivery.
2. Tuesday, Sep. 26th, 15:30-18:30: Hands-on experience in pitch making with expert feedback.
3. Friday, Sep. 29th, 9:00-10:00. Pitch competition. Try out your 3min pitch on referees and the audience.



-  26.9.2023
-  13:45 – 14:30
-  Tutorial
-  Tutorial Room
-  Roee Diamant

Roee Diamant received his PhD from the Department of Electrical and Computer Engineering, University of British Columbia, in 2013, and his B.Sc. and the M.Sc. degrees from the Technion, Israel Institute of Technology, in 2002 and 2007, respectively. From 2001 to 2009, he worked in Rafael Advanced Defense Systems, Israel, as a project manager and systems engineer, where he developed a commercial underwater modem with network capabilities. In 2015 and 2016, he was a visiting Prof. at the University of Padova, Italy. In 2009, he received the Israel Excellent Worker First Place Award from the Israeli Presidential Institute. In 2010, he received the NSERC Vanier Canada Graduate Scholarship. Prof. Diamant has received three Best Paper awards and serves as an associate editor for the IEEE Journal of Ocean Engineering. He is the coordinator of the EU H2020 project SYMBIOSIS (BG-14 track) and leads the underwater Acoustic and Navigation Laboratory (ANL) as an Associate Prof. at the Dept. of Marine Technologies, University of Haifa. His research interests include underwater acoustic communication, underwater localization and navigation, object detection and classification, and sonar signal processing. He is currently serving as ERA Chair at the Laboratory for Underwater Systems and Technologies where he leads a branch of his Marine Acoustics Lab within the Faculty of Electrical Engineering at the University of Zagreb in Croatia.








Underwater Localization Challenge

Jeff Neasham, Newcastle University, UK

After a successful challenge in 2022, we are proud to present the underwater localization challenge 2023 which will again be held as part of the Breaking the Surface workshop! Underwater localization is vitally important for underwater exploration and data gathering. However, since radio waves are severely attenuated by sea water, we have to operate in a GPS denied environment. In contrast, underwater sound travels with much lower attenuation and so we rely on acoustic systems to enable us to measure position. Whilst the slow speed of sound underwater is an advantage and enables us to measure propagation delays/distance very accurately, we must also overcome challenges posed by severe, time varying multipath effects (reverberation) and noise from many natural and man-made sources. This is an opportunity for teams to gain valuable, hands-on experience in how underwater acoustic systems work, collecting acoustic range data to estimate the location of a subsea device. This year, participants in the localization challenge will be asked to locate a submerged miniature transponder using 2-way acoustic ranging. The groups will be given an acoustic modem to interrogate the transponder, a GPS receiver and access to a fast vessel to operate their localization methodology. The teams will analyse the collected range data on the boat and/or offline to estimate the position, presenting their results/method on the final day of the workshop. The teams will compete on three aspects (1) a race to locate the transponder most quickly (2) the most accurate final position after post processing (3) the most innovative localization strategy. Experts will accompany the participating groups, during their preparation, data collection and analysis, and hydrophones will be used to provide real-time visualisation of the acoustic traffic in the water.



Jeff Neasham received the B.Eng. degree in electronic engineering from Newcastle University, Newcastle upon Tyne, U.K., in 1994. He then worked at Newcastle University until 2007 as a Research Associate on research and commercial product development in underwater acoustic communication, sonar imaging, and wireless sensor networks, before taking up an academic post. He is currently a Professor of Acoustic Signal Processing with the School of Engineering, Newcastle University. He has published over 100 conference and journal publications and his work on underwater acoustic communication and positioning has been commercialised by 3 UK companies and 1 Italian company. His research interests are in underwater acoustic signal processing and device design, wireless communication networks and biomedical instrumentation.

-  26.9.2023
-  14:30 –15:15
-  Tutorial
-  Lecture Room
-  Jeff Neasham

DeeperSense: AI Methods for Underwater Visual-Acoustic Perception

Izhak Fabian, Nuno Gracias, Thomas Vögele, Bilal Wehbe, DeeperSense, Germany

The applicability of autonomous robots in marine applications relies heavily on their sensing capabilities. Only if a robot is able to perceive its environment even under harsh environmental conditions (low light conditions, turbid and back scatter, etc.), it is able to operate reliably and without putting the mission's success at risk. The unique challenges posed by the underwater environment necessitate the development and application of advanced Artificial Intelligence (AI) methods for accurate and efficient perception. In this tutorial, a showcase of several AI techniques and algorithms developed within the EU project DeeperSense will be demonstrated. This will include methods for acoustic-to-visual image translation, matching of objects between acoustic and camera views, and segmentation of different sea bed types in side-scan sonar images.



Izhak Fabian is a Ph.D. candidate at the Department of Marine Technologies, University of Haifa. He obtained his MA and MSc in Biophysics from Bar Ilan University in 1997 and 2000, respectively. Over the years, he occupied various development and management roles in both corporate and startup companies. His research is focused on utilizing deep networks for underwater sensor fusion.



Dr. Nuno Gracias received the MSc and Ph.D. degrees in Electrical Engineering (Control and Robotics) in 1998 and 2003 from the Technical University of Lisbon, Portugal. From 2004 to 2006 he was a postdoctoral fellow at the University of Miami. Since 2006 he has been a member of the Computer Vision and Robotics Group (ViCOROB) of the University of Girona. His research interests span the areas of underwater mapping, machine learning, and navigation and guidance of autonomous underwater robots.



Dr.-Ing. Thomas Vögele is a Senior Scientist at the Robotics Innovation Center (RIC), which is operated by the German Research Center for Artificial Intelligence DFKI GmbH in Bremen, Germany. He holds a PhD in Computer Science and Artificial Intelligence from Bremen University, and a MSc. in Geology from the Free University Berlin. In more than 15 years at DFKI, Thomas was involved in several R&D projects related to maritime technologies and underwater robotics.



📅 27.9.2023
🕒 13:45 – 14:30
👤 Tutorial
📍 Sea
👤 Izhak Fabian
Nuno Gracias
Thomas Vögele
Bilal Wehbe

Dr. Bilal Wehbe is a post-doc researcher in the field of marine robotics at the German Research center for AI (DFKI) in Bremen, Germany. He received his MSc in Mechanical engineering (Control and Automation) in 2014 at the American University of Beirut, Lebanon, and his Ph.D. in Informatics in 2020 from the University of Bremen, Germany. His research focuses on using machine learning methods for control and perception of underwater robots.

Blueprint Subsea – Using Multibeam Sonar and Acoustic Navigation to Improve Situational Awareness.

Simon Stockton, Rachael Reader, Robin Sharphouse, Blueprint Subsea, UK

Founded in 2006, Blueprint Subsea are innovative designers and manufacturers of underwater sonar imaging, positioning, communication, and navigation equipment. Providing solutions for subsea and offshore markets, Blueprint Subsea offers a diverse and adaptable product portfolio consisting of StarFish sidescan sonars, Oculus dual-frequency multibeam imaging sonars, SeaTrac Micro-USBL acoustic positioning and communication systems, and Artemis integrated navigation systems. The companies range of sensors can be used to aid divers and ROV operators with their navigation and situational awareness, or augment control systems for AUV's, as well as providing high quality acoustic imagery for survey and inspection work.



Simon Stockton is the principal engineer of Blueprint Subsea's research and design team, who has extensive experience designing imaging sensors and integrating them into high-speed data processing systems both in the aviation and subsea industries.



Rachael Reader has recently undertaken the role of managing the marketing and social media at Blueprint Subsea and spends her time trying to pry technical information out of engineers! She has previously travelled extensively while working in the aviation industry, and has been a freelance copywriter developing articles and on-line content for corporate clients.



Robin Sharphouse is an electronic engineer and the Technical Director of Blueprint subsea, a company he and business partner James Barratt founded in 2006. He has spent his career being involved with the design and manufacture of a diverse range of subsea systems, acoustic sensors, and electric fishing apparatus.






📅 27.9.2023
🕒 15:30 – 18:30
👤 Tutorial
📍 Sea
👤 Simon Stockton
Rachael Reader
Robin Sharphouse

AKTI Project and Research Centre

Xenia I. Loizidou, National Technical University of Athens, Greece

AKTI Project and Research Centre is a non-governmental, not-for-profit organisation based in Cyprus, whose overarching mission is to promote sustainable development and develop a knowledge-based society. Over the last 22 years, AKTI has become one of the most active environmental NGOs on the island and has created an extensive network of collaborators and volunteers in over 50 countries across Europe and the world. AKTI promotes and supports the development of a knowledge-based society through the involvement of the key actor groups and public in applied scientific research, through innovative methods for enhancing citizen science. AKTI received international recognition for its innovative approach to the issues of sustainability and its game changing way of working in the field of the environment. AKTI's activities span five main areas: – Applied environmental research; – Environmental education, vocational training and capacity building; – Coastal and marine environment; – Public outreach and advocacy; and – Social & Gender Issues. In BtS 2023 AKTI will focus on the importance of citizen science for marine litter monitoring and will build participants' capacity in this field. Through a tutorial and field work, participants will learn about (i) marine litter (sources, impacts, solutions), (ii) protocols for monitoring marine litter (including microplastics), (iii) marine litter characterisation and source identification, (iv) marine litter reporting tools and platforms. Note to organizers: To properly implement this activity we will need gloves for the participants (rather than single use gloves, participants could be asked to bring their own gardening gloves), a few large plastic bags, and pencils.



-  28.9.2023
-  13:45 – 14:30
-  Tutorial
-  Beach
-  Xenia I. Loizidou

Dr. Xenia I. Loizidou is a Civil Engineer (National Technical University of Athens) and Coastal Engineer (Imperial College of Science, Technology and Medicine of London, MSc, DIC in River, Estuary and Coastal Engineering) and she holds a PhD on participatory decision-making process for the integrated management of common resources from Aristotle University of Thessaloniki. Since 1990 she has been working as an international expert on issues relevant to coastal erosion management, Integrated Natural Systems Management, adaptation to climate change, decision support systems, entrepreneurship, gender equality, blue and green growth. She has worked in over 50 countries, and she has been a member of several European and international expert groups and networks as executive coastal engineer and sustainability expert. She has been awarded the title of the Ambassador of Mediterranean Coasts 2019 – 2020, by the UN Environment/ PAPA/RAC and the Governments of all Mediterranean countries. Since May 2020 she is UN International Expert in the Compliance Committee for the Barcelona Convention and its Protocols. Since March 2020 she is Member of the Executive Board of the SDSN Cyprus (Sustainability Development Solutions Network), a global initiative by the UN. She cooperates with international organizations and entities such as EU, the Intergovernmental Panel for Climate Change, UN, WWF et al. She is the co-founder and Chairperson of the Board of Directors of the NGO AKTI Project and Research Centre (www.akti.org.cy) active in the area of environment, education, gender issues peace keeping, social inclusion.

Making Underwater Communications Private And Authentic

Paolo Casari, University of Trento, Italy

Underwater acoustic communications and networking have made significant leaps forward in recent years. Recent advances include new high-speed communication technologies (achieving a throughput of several tens of kbit/s) as well as communications standards such as JANUS. Common lore on underwater acoustic channels is that they are harsh and affected by significant delay and Doppler spread. In this talk, we will discuss how such “harsh” channels can actually help secure underwater communications by enabling authentication and privacy, both for mildly mobile (e.g., drifting) and intentionally mobile nodes. Moreover, we will present the context and objectives of the NATO SPS SAFE-UComm project, that funded part of our research and is due to end in March 2024.



- 28.9.2023
- 14:30 – 15:15
- Tutorial
- Lecture Room / Sea
- Paolo Casari

Paolo Casari is associate professor at the University of Trento, Italy. He received the PhD in Information Engineering in 2008 from the University of Padova, Italy. He was on leave at the Massachusetts Institute of Technology in 2007, working on underwater communications and networks. He collaborated to several funded projects including EU FP7 and H2020 efforts, EDA projects, as well as US ARO, ONR and NSF initiatives, and is currently the PI of the NATO SPS project SAFE-UComm. In 2015, he joined the IMDEA Networks Institute, Madrid, Spain, where he led the Ubiquitous Wireless Networks group. Prof. Casari is currently on the editorial board of the IEEE Transactions on Wireless Communications, was on the editorial board of the IEEE Transactions on Mobile Computing for two terms, and regularly serves in the organizing committee of several international conferences. He is or has been guest-editing three special issues for IEEE Access, Elsevier Computer Communications, and Elsevier Computer Networks. He received two best paper awards. His research interests include diverse aspects of networked communications and computing, such as channel modeling, network protocol design, localization, resource allocation, simulation, and experimental evaluation.



Biomimetics Laboratory, Auckland Bioengineering Institute and FER, University of Zagreb

Derek Orbaugh, Iain Anderson, Biomimetics Laboratory, New Zealand

Đula Nađ, Luka Mandić, University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

People can highly benefit from robots, especially in underwater GPS – denied environments where localization and navigation of the diver become quite challenging tasks. Using robot as a diving buddy can severely ease the localization process. Using inertial, acoustic and other sensors mounted on the diver buddy, robot can estimate the location of the diver. In order to make that estimate, we are also estimating divers velocity with IMU suit that is consisted of many IMU sensors position on different parts of divers legs and fins. Along with velocity estimation, range between a robot and underwater beacons is being measured continuously using acoustic modems. On the other hand, the field of biomimetics seeks to use insights from nature for the creation of new materials, devices, and systems. From this perspective the Auckland Bioengineering Institute Biomimetics Laboratory focusses on new soft sensors, actuators, and smart materials. On this tutorial, you will be able to see diver-buddy robot in action along with diver wearing IMU suit and acoustic modems used for improving the location estimate, as well as wearable underwater sensor technology for diver-robot communication and the monitoring of diver health.. Diver-buddy will be presented and explained with all of its components and sensors as well as the main challenges met during robot production. The tutorial will demonstrate a smart dive glove with integrated wearable sensors and electronics for recognizing discrete hand motions in real-time, that are then converted to commands or messages transmitted acoustically through the water to a buddy diver or robot. A wetsuit with integrated sensors for monitoring and communicating diver kinematics and health will be demonstrated on divers in real time and results analyzed.



Derek Orbaugh is currently working for the Biomimetics Laboratory as a postdoc researcher. He was born in Guatemala City, Guatemala, in 1990. He received a B.S. degree in electronics engineering from the Universidad del Valle de Guatemala, Guatemala City, in 2015, and an M.S. degree in smart systems from Furtwangen University, Furtwangen, Germany, in 2017. In 2023, he was awarded a Ph.D. degree from the University of Auckland in Bioengineering with the Biomimetics Laboratory. For his research he developed a smart dive glove for underwater diver communication. The glove is capable of recognizing hand gestures used in diving communication, convert them into a message and transmit the message acoustically. He has authored and co-authored three conference proceedings and four journal articles.











Luka Mandić is a researcher and a PhD candidate in the Laboratory of Underwater Systems and Technologies (LABUST) at the University of Zagreb, Faculty of Electrical Engineering and Computing (FER). He received his Master of Science degree in electrical engineering and information technology at FER in 2019. His passion for robotics and intelligent systems drove him to participation in various projects, competitions and additional work outside of the university lectures in the fields of machine learning, intelligent control systems and robotics. His current field of research includes data-driven



Đula Nađ is a Assistant professor at the Department of Control and Computer Engineering and a project leader at the Laboratory of Underwater Systems and Technologies (LABUST), part of the University of Zagreb Faculty of Electrical Engineering and Computing. He is currently involved in the ONR funded project ROADMAP and has participated in multiple European, national and international projects over past years. His research interest includes navigation, guidance, and control of underwater vehicles, localization aiding, and diver-robot cooperation.



Iain Anderson is Group Leader for the Biomimetics Laboratory of the Auckland Bioengineering Institute. Iain completed his PhD (Engineering Science, University of Auckland) in 1996, and has worked as a whiteware product designer (Fisher and Paykel Ind.), a vibrations consulting engineer (NZ Department of Scientific and Industrial Research) and a research scientist associated with hip and knee implant design and surgery (Industrial Research Ltd., New Zealand). In 2000, Iain returned to the Department of Engineering Science as a staff member, and was one of the founding members of the Auckland Bioengineering Institute. Iain's interest in artificial muscles led to the formation of the Biomimetics Laboratory in 2004. The lab's research is currently focused on the control and self-sensing of artificial muscles and artificial muscle energy harvesting. Iain is involved in two Biomimetics Lab spin-out companies: StretchSense (2012) and PowerOn Ltd. (2019). StretchSense produces motion-capture gloves using soft elastomer dielectric elastomer sensors. PowerOn is commercializing the lab's electroactive polymer actuator technology. For his efforts in developing and commercializing electroactive polymer technology he was awarded the Royal Society of New Zealand's 2016 Pickering Medal.

-  29.9.2023
-  13:45 – 14:30
-  Tutorial
-  Sea
-  Derek Orbaugh
-  Igor Kvasić
-  Đula Nađ
-  Iain Anderson



Gem & Fair Data In Marine Robotics

Massimo Caccia, CNR - Institute of Marine Engineering, Italy

The problem of designing and implementing Good Experimental Methodologies, including procedures for replicable experiments and effective performance indexes, as well as a pipeline for highly automatised sharing of FAIR data of marine robotics experiments is open yet. A demonstration of how to do it for the basic case of an Autonomous Surface Vehicle executing straight line-following will be provided with the support of CNR-INM SWAMP ASV. A straight line-following guidance algorithms, co-designed by CNR and UoB in the framework of the MONUSEN project, will be implemented and used for illustrating the proposed procedures for replicable experiment execution, computation of performance indexes, and FAIR data storage.



📅 29.9.2023
🕒 14:30 – 15:15
👤 Tutorial
📍 Sea
👤 Massimo Caccia

Massimo Caccia After joining CNR on the 2nd of May 1993, his theoretical and applied research activities focused on marine robotics, mainly addressing the topics of modelling and identification, cooperative guidance and control, vision-based motion estimation and control, and embedded real-time platforms and architectures for Unmanned Marine Vehicles. He is among the European pioneer researchers in the field of unmanned surface vehicles and, with his research group, he developed pioneer research projects on the application of robotic technology to maritime safety. Research results, certified by more than 200 publications in international books, journals and conferences, led to the partnership in a number of EC, national and regional projects. Recently he coordinated the projects Blue RoSES (EMFF), ARES (PON Blue Growth), and MODA (PNRM), that represent state-of-the-art R&D in the definition of guidelines and codes of practice for the operation of robotic vehicles in harbour waters and coastal water, and in the integration of shipbuilding and robotics according to the vision identified by Blue Italian Growth National Technology Cluster. He is member of the Board of Directors of the Maritime Technology Cluster MareFVG, He was Chair of the 9th IFAC Conference on Manoeuvring and Control of Marine Craft 2012, and Exhibit Chair of Oceans'15 MTS/IEEE Conference 2015; Coordinator of the Topic Group Marine Robotics of euRobotics aisbl (2014-2016); member of the Board of Directors of the Distretto Ligure delle Tecnologie Marine (2011-2017); member of the Scientific Technical Committee on innovation in shipyards of the Italian Ministry of Infrastructures and Transport (2010-2012).



DEMOS



H2OMNIX – Omnidirectional Autonomous Surface Platform

Juraj Obradović, Luka Mandić, University of Zagreb Faculty of Electrical Engineering and Computing, Croatia



One of the driving factors of today's marine robotics research is the availability of small, affordable, multifunctional and autonomous surface vehicles. One such vehicle is the H2OMNIX – an Unmanned Surface Vehicle (USV) whose functionalities will be demonstrated live at the sea as a part of the blockchain communication mission. The mission includes three H2OMNIX vehicles and one underwater drone that acoustically communicate messages between them in real time while following the predefined path. In this demo you will experience manual control of the USV, look into the multiple ways to achieve autonomous navigation and try and test available communication and programming interfaces for mission execution, navigation and control.



Juraj Obradović is a researcher and a PhD candidate in the Laboratory of Underwater Systems and Technologies (LABUST) at the University of Zagreb, Faculty of Electrical Engineering and Computing (FER). He successfully completed his Master of Science degree in electrical engineering and information technology at FER in 2021 and joined LABUST upon graduation. During his undergraduate years, Juraj actively participated in numerous robotics projects, fostering a interest in areas such as Simultaneous Localization and Mapping (SLAM), reinforcement learning, and LiDAR perception. Currently, his primary focus is on contributing to the development of an autonomous ship.



Luka Mandić is a researcher and a PhD candidate in the Laboratory of Underwater Systems and Technologies (LABUST) at the University of Zagreb, Faculty of Electrical Engineering and Computing (FER). He received his Master of Science degree in electrical engineering and information technology at FER in 2019. His passion for robotics and intelligent systems drove him to participation in various projects, competitions and additional work outside of the university lectures in the fields of machine learning, intelligent control systems and robotics. His current field of research includes data-driven control, nonlinear systems modeling and identification and application of machine learning for localization and navigation.

-  25.9.2023
-  15:30 – 18:30
-  Demonstration
-  Juraj Obradović
Luka Mandić

Blue Ocean Gear

Kortney Opshaug, Blue Ocean Gear, US

Blue Ocean Gear, based in Silicon Valley, develops sensor-rich tracking buoys for ocean-based commercial activity. Our patented and depth-rated Smart Buoy technology allows fishers, aquaculture farmers, and other ocean industries in the remotest of locations to track and monitor data from any hardware anytime, anywhere. Like 'Find my iPhone' for nautical equipment, this saves time, recovery costs, and data loss caused by inadequate and hard-to-upgrade equipment at sea. With over 1,000 buoys delivered to customers around North America, our goal is to expand our ocean-based network to allow fishing gear to act as an ocean data platform. The goal of the hands-on part of the demo is to demonstrate in action the gear presented in the morning session talk. The demo is set at the peer where the Blue Ocean Gear Smart Buoy will be deployed with data transmission to a shore PC presented on a screen. The buoy is then towed away using a boat in order to trigger the automated SMS alert and demonstrate the tracking feature. The demo will conclude in a discussion on how that relates to gear tracking and preventing gear loss and ghost gear.



Kortney Opshaug is the CEO of Blue Ocean Gear, a California-based tech company focused on Smart Buoys for commercial fishing fleets to track gear on the ocean. After founding the company in 2015, she has led the growth of the business and product development through close collaboration with fishers throughout North America, as well as fostered partnerships with the Global Ghost Gear Initiative, Alaska Ocean Cluster, and NOAA. The author of the U.S. patents awarded for Blue Ocean Gear's smart fishing technology, her Ph.D. focus was on underwater robotics at Stanford University and the Monterey Bay Aquarium Research Institute.

📅 26.9.2023

🕒 15:30 – 18:30

🎤 Demonstration

👤 Kortney Opshaug



UNEW

Jeff Neasham, Benjamin Sherlock, Gawin Lowes, Thomas Corner, Newcastle University, UK



Jeff Neasham received the B.Eng. degree in electronic engineering from Newcastle University, Newcastle upon Tyne, U.K., in 1994. He then worked at Newcastle University until 2007 as a Research Associate on research and commercial product development in underwater acoustic communication, sonar imaging, and wireless sensor networks, before taking up an academic post. He is currently a Professor of Acoustic Signal Processing with the School of Engineering, Newcastle University. He has published over 100 conference and journal publications and his work on underwater acoustic communication and positioning has been commercialised by 3 UK companies and 1 Italian company. His research interests are in underwater acoustic signal processing and device design, wireless communication networks and biomedical instrumentation.



Benjamin Sherlock is a Research Associate in the SEALab team (School of Engineering) and engineer with 20 years experience in electronics and software engineering covering a wide range of research and development projects. As part of his recent PhD research (2013-2017), he developed bio-friendly acoustic waveforms to minimise the impact on marine mammals whilst still providing low-power and robust communications in the underwater channel. These waveforms were developed further and incorporated in the recent work on the USMART (EP/P017975/1) acoustic modem. He contributed to the design of this modem technology which has since resulted in commercialisation of the technology. He was part of the SONAR team that won the Moonshot Award in the Shell Ocean Discovery XPRIZE



Gawin Lowes received the MSc in Automation and Control and Ph.D. from Newcastle University, Newcastle upon Tyne, UK in 2017 and 2022 respectively. His Ph.D. research was in developing low energy, passive acoustic sensing technology for wireless underwater monitoring networks. He was employed as a Research Associate in 2021 at Newcastle University working on intrabody acoustic communication for bioelectronic therapeutics. Currently, he is working on developing passive acoustic localization of vessel activity as part of the COUSIN (Cooperative Underwater Surveillance Networks) project.in 2019.



Thomas Corner is a PhD Student at Newcastle University, England, United Kingdom, working part-time for Sonardyne International. He is currently researching the optimization of receiver architectures for underwater acoustic communication. His roles within Sonardyne include physical layer development and implementation of software-defined modems for underwater acoustic communication.

📅 27.9.2023

🕒 15:30 – 18:30

🎤 Demonstration

👤 Jeff Neasham

Benjamin Sherlock

Gawin Lowes

Thomas Corner

Hull Performance/Dynamics and Control of Boats and Marine Robots

Dirk Meyer, Thomas Glotzbach, Technische Hochschule Mittelhessen - University of Applied Sciences, Germany

At Technische Hochschule Mittelhessen, the Department of Electrical Engineering and Information Technology and the Department of Mechanical Engineering and Energy Technology are cooperating in the area of developments of hull performance/dynamics and control of boats and marine robots. In the common demonstration, we will on the one hand give an overview on our current research by measuring dynamic properties of hulls of boats and/or boat models. It is aimed to investigate in detail the influence of different hull parameters, beta-angles, V- or M-form, ratio of length and width by measuring of trim and roll angles as a function of speed, centre of gravity, load distribution, propeller immersion depth and propeller vector angle. On the other hand, we will show the usage of a low-cost marine robot for practical tasks within the undergraduate education. As a scenario, the robot is intended to operate as a fire fighting vessel, that has to extinguish a simulated fire at the shore. It is our goal to address international universities for possible future competitions with similar scenarios and the possibility to demonstrate the results at future BtS- workshops.



Dirk Meyer holds a professor position at THM in the department of Mechanical Engineering and Energy Technology since November 2012. His fields of teaching are Vehicle Propulsion Systems, Vehicle Lightweight Design, Game Development with Unity3d, and Vehicle Body Design. Before joining the THM, he was with Brunswick Marine EMEA, Belgium from 2004 to 2012, being responsible for marketing, distribution and technical support at boatbuilders in Europe in terms of Engine and Propulsion systems. He was with Ford/Visteon (1999 to 2004), working in the area of exterior lighting, and with Ford (1995-99) as a Product Integration Engineer, working in the field of engine engineering for the design and development of patrol engine oil pumps. He received his engineering diploma at the UAS Cologne, his Master Degree in automotive systems engineering at Loughborough university, UK, and his PhD-Degree at the University of Duisburg-Essen in Germany.



Thomas Glotzbach studied electrical engineering at the University of Applied Sciences in Fulda. He was with the Technische Universitaet Ilmenau and the Fraunhofer Application Center System Technology, receiving his doctoral degree in 2009 and his habilitation degree in 2018. In between, he was with the Instituto Superior Técnico, Lisbon, Portugal for an 18-month Marie Curie Intra-European Fellowship. From 2017 to 2019, he held a temporary professorship at the Aalen University of Applied Sciences. Since 2019, he is Professor for Control Engineering and Robotics at Technische Hochschule Mittelhessen – University of Applied Sciences (THM), Department of Electrical Engineering and Information Technology. His research interests are in the area of control and navigation for teams of marine robots, both in surface and underwater missions.

-  28.9.2023
-  15:30 – 18:30
-  Demonstration
-  Dirk Meyer
Thomas Glotzbach

An Open-source Low-cost Glider for Iterative Development

Krister Blanch, Chalmers University of Technology, Sweden

Ted Sjöblom, RISE Research Institutes of Sweden, Sweden

A relatively cheap glider was designed and built as part of a student competition involving two teams and twelve students. The work was carried out at Chalmers University of Technology at the vehicle laboratory Revere. The goal was to initiate work around an open-source platform that could be iteratively developed within an academic context, with potential users in small and medium sized organisations in sub-sea operations. Commercial gliders are known to be very expensive. Perhaps mainly due to their typical domain of operation, where they are expected to return after travelling unsupervised for long durations and over long distances. Presumably, to make the vehicles sufficiently robust, minimizing the risk of losing them on critical missions, huge amounts of engineering were invested in safety systems and robustness, resulting in significant costs. Commercial gliders are typically large, with the ability to carry advanced sea observation sensors, further contributing to higher unit costs but also costs for launch and retrieval. It can therefore be argued that there is a market for smaller and less expensive gliders. Just considering the internal components of the glider, including the minimum set of electronics and software, the total cost could be quite low. However, robustness, redundancy, and safety systems need significant time to be developed. To address this, this work investigates the possibilities of working with the glider as a fully open-source system, inviting an online community. This presentation will discuss the idea of an open-source glider infrastructure and show initial results from the first prototype under water.



Ted Sjöblom received a bachelor of Maritime captain, management and technology from Novia University in 2015, and in 2022 a Master's in Business, information system and a minor in Computer science from Åbo Akademi University, Finland. He is currently a Research and development engineer at RISE (Research Institutes of Sweden) in the department of Safety and transport and Maritime operations, focusing on the digitalization of sea transport. He has a background as a navigation officer on various ship types, from coastal tankers to cruise ships. From 2019 he worked with R&D within maritime digitalization in Finland and from 2021 in Sweden with task-related simulations, marine sensors, and navigation support tools.



📅 29.9.2023
🕒 15:30 – 18:30
🗣️ Demonstration
👤 Ted Sjöblom
Krister Blanch

COMPANY PRESENTATIONS

ABB

Matko Barišić, ABB, Czech Republic

At ABB Marine & Ports, we are at the forefront of driving the evolution of sustainable shipping. Electrical propulsion, data-driven decision support and integrated solutions for ship and shore from ABB are paving the way to a zero-emission marine industry, providing greater efficiency and reliability to shipowners, and preparing vessels to meet the demands of tomorrow. When it comes to autonomy and intelligent shipping operations, based around hybrid, collaborative decision-making between man and machine, ABB Ability Marine Pilot product family provides tools and functionalities to improve situational awareness and operational control for the crew – from onboard and onshore. ABB Ability Marine Pilot Control is a new way to control your vessel during all operational modes, including maneuvering, transit, and position-keeping. Designed for autonomous and remote operations, the system enables optimal and complete all-speed vessel control from one operator position, using only one joystick and touch screen. ABB Ability Marine Pilot Vision provides an augmented view of your vessel's surroundings by combining information from a range of sensors, resulting in enhanced situational awareness for the operator. On top of these two solutions, in partnership with the marine and shipping value-chain actors, as well as the triple helix of industry, academia, and government / regulators, we're hard at work developing a suite of solutions that enables largely unattended, eyes-off-mind-on, and conditionally unmanned operation of commercial shipping vessels with class notation and operating according to COLREGS, with supervision either from conditionally manned bridges, other crew spaces onboard, or Remote vessel operation centers on-shore.



***Dr. Matko Barišić** received his M.Sc. and Ph.D. from the University of Zagreb, Faculty of Electrical Engineering and Computation. His Ph.D. thesis, concurrent with his positions as a Research Assistant, and later a Researcher and shortly Postdoc Researcher, he pursued with the Laboratory for Underwater Systems and Technologies under prof. Vukic on the topic of collaborative control of autonomous underwater vehicles. In 2013 he relocated to Norway to start at ABB Marine & Ports where he steadily worked in the R&D and Technology functions, mainly focusing on intelligent and autonomous ship control topics, first as R&D Engineer, Senior R&D Engineer, R&D Manager, and most recently in 2019 – 2022 as Technology Manager and Head of Marine Software Development Centre in Krakow, Poland. Since 2023 he lives and works in the Czech Republic as the ABB Marine & Ports Global R&D Programmes and Partnerships Manager, focusing on 3rd party financing and partnerships for effective R&D programmes contributing to societal and technological challenges of the present day, as well as public-private partnerships with governments and international organisations. His professional interests remain autonomous and intelligent shipping, advanced control of power and propulsion aboard electrical propulsion vessels, all-electric ship concepts ameliorating climate change*

📅 25.9.2023

🕒 11:45 – 12:30

⚙️ Company presentation

👤 Matko Barišić



and curtailing greenhouse gas emissions. Dr. Barisic also works on R&D in increased asset availability, survivability, resilience, reduced manning, improved fuel efficiency and environmental sustainability, and reduced and harmonized skill thresholds for effective maritime defence and security, stemming from application of intelligently controlled electrical propulsion concepts in coast guard and navy vessels.

FairScope

Adam Larson, David La Guen, Thibaut Pollina, FairScope, US

FairScope is an innovative company specializing in cutting-edge microscopy, particularly for plankton observation. Based in France, the company is the direct manufacturer of the PlanktoScope, a disruptive invention in the field of microscopy. The PlanktoScope is a versatile, portable microscope capable of high-throughput quantitative imaging.



Adam Larson is a dedicated postdoctoral researcher currently affiliated with Stanford University and the Prakash Lab, with his work further backed by the prestigious Simons Foundation. Prior to this, Larson obtained his Ph.D. from the University of California, San Francisco. His research specialization lies within the realm of marine biology, specifically the study of plankton. He is known to be an integral contributor to the PlanktoScope project. This platform provides scientists, researchers, and enthusiasts a tool for studying plankton, and it seems that Larson frequently utilizes it to conduct field-flow-through imaging of Pacific plankton. Beyond his focus on plankton research, Larson has demonstrated a strong commitment to innovation and technology. He has been instrumental in advancing the capabilities of the PlanktoScope device.



David La Guen is the COO at FairScope. He is a highly versatile and self-taught engineer with extensive experience in various fields. David is interested in positions related to design, prototyping, procurement, fabrication, and assembly.



📅 25.9.2023
🕒 13:45 – 14:30
⚙️ Company presentation
👤 Adam Larson
David La Guen
Thibaut Pollina

***Thibaut Pollina** is the passionate CEO of FairScope. He is the inventor of the PlanktoScope and its coordinator. His core competencies include microscope prototype design, microscope manufacturing and cost-effective microscopy.*

Lobster Robotics

Stephan Rutten, Lobster Robotics, Netherlands

At Lobster, we are motivated by making the oceans accessible. Our in-house developed camera system brings unparalleled clarity and precision to the study of changing underwater ecosystems, attributed to factors like global warming and human impact. Our innovative underwater visual survey technology captures the seabed in high detail, empowering marine ecologists and researchers with the data and tools they need to truly understand the underwater world.



📅 27.9.2023
🕒 14:30 – 15:15
⚙️ Company presentation
👤 Stephan Rutten

***Stephan Rutten** is an engineer by schooling with a love for exploration. His education, a Bachelor's in Mechanical Engineering and a Master's in Marine Technology, both centered on robotics, set him on his current path. His hands-on experience began with lunar robotics during his undergraduate years. Now, he focuses on the mysteries beneath the waves at Lobster Robotics, where they are working hard to advance subsea technology for ecology and archaeology. They believe that their work has the potential to not only advance our understanding of the underwater world but also to contribute to its preservation. At this workshop, he is looking forward to demonstrating their latest product and discussing its implications for marine research.*



LIST OF PARTICIPANTS

Registered participants until 11th September:

ABB, Czech Republic

Matko Barišić,

AKTI Project and Research

Centre, Cyprus

Anna Tselepou

Xenia Loizidou

Biomimetics Laboratory, Auckland

Bioengineering Institute, New Zealand

Cheng Huan Lu

Derek Orbaugh

Iain Anderson

Blue Ocean Gear, US

Kortney Opshaug

Blueprint Subsea, UK

Rachael Reader

Robin Sharpouse

Simon Stockton

Chalmers University of

Technology, Sweden

Andreas Järlebratt

Andreas Jonsson

Filip Bergqvist

Fredrik Nygren

Jonatan Haraldsson

Jonathan Ekdahl

Krister Blanch

Maja Sunesson

Oscar Schyum

Oskar Persson

Petrus Dahlqvist

CNR-INM, Italy

Simona Aracri

Constructor University, Germany

Tim Hansen

Croatian Chamber of Economy, Croatia

Jelena Starčević

Mateo Ivanac

Cyprus Marine and Maritime

Institute, Cyprus

George Rossides

Ioannis Kyriakides

Manos Moraitis

Marina Loizidou

Zacharias Siokorous

DeeperSense, Germany

Bilal Wehbe

Izakh Fabian

Nuno Gracias

DIH Agrifood Croatia, Croatia

Andrijana Baranović

Ivana Bujas Rupić

Krešimir Ivić

Krešimir Kovač

Matija Bumbak

Nikolina Perkov Marin

Equinor ASA, Norway

Kjetil Eik

ETF Sarajevo, Bosnia and Herzegovina

Nedim Osmić

Faculty of Science, University of

Split, Croatia

Ana Bedalov

FairScope, US

Adam Larson

David La Guen

Thibaut Pollina

Fameline Energy Ltd, Cyprus

John Charalambides

Stella Fyfe

Geolmaging Ltd, Cyprus

Konstantinos Smagas

German Research Center for Artificial

Intelligence, Germany

Thomas Vögele

IN2, Croatia

Bojan Colnago

Josip Mandunić

Independent

Carlos Ferreira

Fernanda Ferreira

Aaron Newman

Dan Pierce

INESC-TEC, Portugal

Nuno Cruz

Bruno Ferreira

Institute of Oceanography and

Applied Geophysics, Italy

Miroslav Gačić

ISOTECH, Canada

Demetra Orthodoxou

Israel Antiquities Authority (IAA),

Israel

Jacob Sharvit

Istanbul Technical University, Turkey

Batuhan Ozer

Lobster Robotics, Netherlands

Danny Looman

Stephen Rutten

Marine Apex Predators Lab, Israel

Aviad Scheinin

Marine Explorers Society 20.000 leagues, Croatia

Barbara Čolić

Hrvoje Čižmek

Maritime Technology Cluster FVG, Italy

Carlo Kraskovic

Ministry of Culture Italy, Italy

Barbara Davidde

Monash University, Australia

Sarah Jane Pell

Monterey Bay Aquarium Research Institute, US

William Kirkwood

National Museums of Kenya, Kenya

Caesar Bitá

National Oceanography Centre, UK

Francesco Fanelli

National Research Council of Italy, Italy

Marco Bibuli

Massimo Caccia

National Technical University of Athens, Greece

Fotios Panetsos

George Karras

Sotirios Aspragkathos

Newcastle University, UK

Benjamin Sherlock

Gavin Lowes

Jeff Neasham

Thomas Corner

Norwegian University of Science and Technology, Norway

Ana Širović

Antonio Vasilijević

OGS, Italy

Maria Cristina Pedicchio

Oslo Metropolitan University, Norway

Moustafa Elkolali

RISE Research Institutes of Sweden, Sweden

Ted Sjöblom

Šibenik-Knin County, Croatia

Damir Slamić

SINTEF Ocean, Norway

Kay Fjørtoft

Syrenna AS, Norway

Abdelrahman Qadry

Tallinn University Of Technology, Estonia

Yuya Hamamatsu

Technical University of Denmark (DTU), Denmark

Roberto Galeazzi

Technische Hochschule Mittelhessen, Germany

Cathrin Schröder

Dirk Meyer

Irina Bulayenko

Jonas Grajetzki

Leon Möhl

Martin Wiegand

Monika Allest

Oguzhan Akman

Patrick Simon

Peter Weimar

Steven Fleischer
Susanne Schiffke
Svetlana Fjodorow
Thomas Glotzbach

TU Munich, Germany

Daniel Duecker

Università degli Studi di Firenze, Italy

Gherardo Liverani

Mirco Vangi

Universitat de Girona, Spain

Hayat Rajani

Valerio Franchi

University of Calabria, Italy

Fabio Bruno

Santina Fortuna

Umberto Severino

University of Haifa, Israel

Aviad Scheinin

Guy Gubnitsky

Morel Groper

Tamir Mishali

Yuri Katz

University of Limerick, Ireland

Edin Omerdic

Isela Ibrahimovic

University of Montenegro, Montenegro

Aleksa Albijanić

Igor Radusinović

Jasmin Čantić

Jovana Božović

Luka Lazović

Luka Martinović

Slavica Tomović

Tamara Drljević

Uroš Bibić

Vanja Asanović

Vladimir Novović
Žarko Zečević

University of Padova, Italy

Antonio Montanari

University of Rhode Island, US

Bridget Buxton
Gary Philbrick
Theresa Philbrick

University of Rostock, Germany

Ian Karez
Johannes Marx
Martin Kurowski
Sven Lack
Torsten Jeinsch

**University of Sarajevo, Faculty of
Electrical Engineering, Bosnia and
Herzegovina**

Senka Krivić
Adnan Tahirović
Bakir Lačević
Jasmin Velagić

University of Trento, Italy

Paolo Casari

University of Trieste, Italy

Oriela Halilaj

University of Zadar, Croatia

Irena Radić Rossi

**University of Zagreb Faculty of Electrical
Engineering and Computing, Croatia**

Anja Babić
Barbara Arbanas Ferreira
Blanka Gott
Đula Nađ
Eugen Kutleša
Fausto Ferreira

Igor Kvasić
Ivan Oreč
Juraj Obradović
Kristijan Krčmar
Luka Klaić
Luka Mandić
Magdalena Šimunec
Martin Oreč
Matej Ćosić
Matej Fabijanić
Matko Batoš
Milena Jenić
Nadir Kapetanović
Natko Kraševac
Nikica Kokir
Nikola Mišković
Petra Kovačević
Roe Diamant
Vesna Vukić
Zdravko Eškinja
Željka Rajković
Zoran Vukić

**Viseon Marine Imaging Lab,
University of Haifa, Israel**

Amir Dayan
Yevgeni Gutnik



LABUST



CUST



UCG

University of Montenegro



MONUSEN

– MONUSEN center for
Underwater Sensor Networks –



UWIN~LABUST

Interreg
ADRION



ADRIATIC-IONIAN

European Regional Development Fund – Instrument for Pre-Accession Assistance

MARBLE



IEEE



IEEE Oceanic
Engineering Society

SeaTechHub

