

MARESEC 2023

European Workshop on *Maritime Systems Resilience and Security*



The 3rd **European Workshop on Maritime Systems Resilience and Security (MARESEC)** was dedicated to the research on Resilience, Security, Technology and related Ethical, Legal, and Social Aspects (ELSA) in the context of Maritime Systems, including but not restricted to Offshore/Onshore Infrastructures, Navigation and Shipping and Autonomous Systems.

The event, organized by the Institute for the Protection of Maritime Infrastructures of the German Aerospace Center (DLR), took place virtually on June 27th, 2023, with over 60 participants. Out of all submitted extended abstracts, 13 were selected for oral presentations, and 2 keynotes were delivered on Maritime Surveillance and Networked Autonomous Underwater Robots. Additionally, 2 student presentations were held. The contributions to the conference came from institutions in 22 countries. The final schedule can be found in the appendix.

From the submitted full papers, 8 papers have been selected for publication. These works are listed as follows:

Soroush Rouhani, Sebastian Olias, Diego Piedra-Garcia, Carsten Hilgenfeld, Helge Parzyjegl, Peter Danielis and Gero Mühl

An Autonomous and Intelligent AIS Receiver Station

Jason Halog, Paul Margat and Michael Stadermann

Legal Considerations on the Protection of Subsea Cables in the International and National Legislative Framework

Finn Minßen, Matthias Steidel and Arto Niemi

Predicting Vessel Tracks in Waterways Using Bi-LSTM Models

Tino Flenker and Jannis Stoppe

Generation of Magnified Raster Tiles Using Shift Tiles to Improve Situational Awareness

Pranavkumar Ghoghari, Willi Brekenfelder, Helge Parzyjegl, Frank Sill Torres and Peter Danielis

Path Planning Algorithms for Autonomous Underwater Vehicles

Tristan Preis, Jendrik Schmidt, Alexander Klein, Enno Peters, Thomas Lübcke and Maurice Stephan

Vision Enhancement for Maritime Search and Rescue Operations at Night and Bad Weather Conditions

Jan Bauer, Joris Kutzner, Philipp Sedlmeier, Anisa Rizvanolli and Elmar Padilla
Phish & Ships and Other Delicacies from the Cuisine of Maritime Cyber Attacks

Paul Stube, Helge Parzyjega, Willi Brekenfelder, Frank Sill Torres and Peter Danielis
Collision Avoidance for Autonomous Underwater Vehicles

The following table lists all reviewers:

Name	Surname	Affiliation	Country
Akshya	Swain	University of Auckland	NZL
Alexander	Proelß	Universität Hamburg	DEU
Alexander	Gabriel	German Aerospace Center (DLR)	DEU
Alexander	Stolz	Fraunhofer EMI	DEU
Arto	Niemi	German Aerospace Center (DLR)	DEU
Bartosz	Skobiej	German Aerospace Center (DLR)	DEU
Bastian	Gruschka	Hochschule Bremen (HSB)	DEU
Benjamin	Kiefer	University of Tübingen	DEU
Bernhard	Schmitz	University of Bremen, Drift Noise GmbH	DEU
Bernhard J.	Berger	Hamburg University of Technology	DEU
Borja	Carrillo-Perez	German Aerospace Center (DLR)	DEU
Carl	Wrede	German Aerospace Center (DLR)	DEU
Chathura	Wanigasekara	German Aerospace Centre (DLR)	DEU
Christian	Meerpohl	TOPAS Industriemathematik Innovation GmbH	DEU
Christine	Eis	University Bremen, WG Optimisation and Optimal Control	DEU
Daniel	Lichte	German Aerospace Centre (DLR)	DEU
David	Heuskin	German Aerospace Centre (DLR)	DEU
Dhafer	Almakhles	Prince Sultan University	SAU
Dieter	Kraus	Hochschule Bremen (HSB)	DEU
Don	Gamage	University of Auckland	NZL
Enno	Peters	German Aerospace Center (DLR)	DEU
Faizal	Hafiz	SKEMA Business School	FRA
Frank	Fiedrich	Wuppertal University	DEU
Frank	Sill Torres	German Aerospace Center (DLR)	DEU
Gayan	Abeynayake	Ørsted	GBR
James	Imber	Synspective Inc.	JAP
Jannis	Stoppe	German Aerospace Center (DLR)	DEU
Josef	Oehmen	Technical University of Denmark (DTU)	DNK
Kai	Wah Chan	TOPAS Industriemathematik Innovation GmbH	DEU
Karin	Bernsmed	SINTEF	NOR
Karsten	Sohr	University of Bremen	DEU
Kevin	Cullinane	University of Gothenburg	SWE
Maarten	Schadd	Netherlands Organisation for Applied Scientific Research (TNO)	NLD
Maria	Höffmann	University of Bremen	DEU
Maurice	Stephan	German Aerospace Center (DLR)	DEU
Michael	Stadermann	German Aerospace Center (DLR)	DEU

Nikolai	Kulev	German Aerospace Center (DLR)	DEU
Osiris A.	Valdez Banda	Aalto University	FIN
Peter	Danielis	University of Rostock	DEU
Rikke Bjerg	Jensen	Royal Holloway University of London	GBR
Rory	Hopcraft	University of Plymouth	GBR
Sarah	Barnes	German Aerospace Center (DLR)	DEU
Sergey	Voinov	German Aerospace Center (DLR)	DEU
Shruti	Patel	University of Bremen	DEU
Simon	Watson	University of Manchester	GBR
Stanislaw	Iwan	Maritime University of Szczecin	POL
Stefanie	Schubert-Polzin	Hochschule Magdeburg-Stendal	DEU
Sylvia	Bach	University of Wuppertal	DEU
Tobias	Meisen	Bergische Universität Wuppertal	DEU
Ulla	Tapaninen	Tallinn University of Technology	EST
Vidura	Jayasooriya	University of Sri Jayewardenepura	LKA

On behalf of the whole organizing team, we thank all authors and reviewers for their effort and the technical team for their valuable support.

Borja **Carrillo Perez** – Publication Chair

Frank **Sill Torres** – General Chair

Chathura **Wanigasekara** – Program Chair

Schedule of the 3rd European Workshop on Maritime Systems Resilience and Security (MARESEC 2023)

Session 0 – Welcome

Time 09:00 – 09:10
Room MARESEC main
Session Chair Chathura Wanigasekara

Session A – Keynote: Maritime Surveillance

Time 09:10 – 10:00
Room MARESEC main
Session Chair Chathura Wanigasekara
Presenter Elisabeth Peinsipp-Byma

Tea/Coffee Break

Time 10:00 – 10:20

Session B – Autonomous Systems

Time 10:20 – 11:55
Room MARESEC main
Session Chair Frank Sill Torres

ID	Start	Title	Authors
B-1	10:20	Path Planning Algorithms for Autonomous Underwater Vehicles	Pranavkumar Ghoghari, Willi Brekenfelder, Helge Parzyjegla, Frank Sill Torres and Peter Danielis
B-2	10:40	An Autonomous and Intelligent AIS Receiver Station	Soroush Rouhani, Sebastian Olias, Diego Piedra-Garcia, Carsten Hilgenfeld, Helge Parzyjegla, Peter Danielis and Gero Mühl
B-3	11:00	Collision Avoidance for Autonomous Underwater Vehicles	Paul Stube, Helge Parzyjegla, Willi Brekenfelder, Frank Sill Torres and Peter Danielis
B-4	11:20	An approach for developing autonomous ship system requirements based on key enabling technologies	Osiris Valdez Banda, Victor Bolbot, Douglas Owen, Meriam Chaal, Ahmad Bahootoroody, Martin Bergstroem, Marko Rahikainen, Marja Liinasuo, Hanna Koskinen and Jari Laarni

B-S 11:40 Machine learning for maritime surveillance: Detecting anomalous maritime vessel activities Chamali Gamage

Lunch Break

Time 11:55 – 12:45

Session C – Maritime Security

Time 12:45 – 14:25

Room MARESEC main

Session Chair Alexander Gabriel

ID	Start	Title	Authors
C-1	12:45	Legal Considerations on the Protection of Subsea Cables and Pipelines in the National and International Legislative Framework	Jason Halog, Paul Margat and Michael Stadermann
C-2	13:05	Coast Guard Patrol Route Execution for Securing Offshore Assets	Bartosz Skobiej, Frank Sill Torres and Finn-Matthis Minßen
C-3	13:25	Cosmic Ray Tomography for Maritime Security	Sarah Barnes
C-4	13:45	Predicting Vessel Tracks in Waterways Using Bi-LSTM Models	Finn Minßen, Matthias Steidel and Arto Niemi
C-5	14:05	Phish & Ships and Other Delicacies from the Cuisine of Maritime Cyber Attacks	Joris Kutzner, Philipp Sedlmeier, Anisa Rizvanolli and Jan Bauer

Tea/Coffee Break

Time 14:25 – 14:45

Session D – Situational Awareness

Time 14:45 – 16:35

Room MARESEC main

Session Chair Borja Carrillo Perez

ID	Start	Title	Authors
D-1	14:45	Generation of magnified raster tiles using shift tiles to improve situational awareness	Tino Flenker and Jannis Stoppe

D-2	15:05	An OTTER for responsive maritime domain awareness	David Freiknecht, Marc Lehmann and Matthias Mück
D-3	15:25	Vision enhancement for maritime search and rescue operations at night and bad weather conditions	Tristan Preis, Jendrik Schmidt, Alexander Klein, Enno Peters, Thomas Lübcke and Maurice Stephan
D-4	15:45	Estimating ship availability after an earthquake-tsunami disaster in British Columbia, Canada	Lauryne Rodrigues, Floris Goerlandt and Ronald Pelot
D-S	16:05	Evaluation of the viability to use short to medium-range microwave radar data to detect moving targets using deep learning approaches	Pragati Patil

Short Break

Time 16:20 – 16:30

Session E – Keynote: Networked Autonomous Underwater Robots

Time 16:30 – 17:15

Room MARESEC main

Session Chair Borja Carrillo Perez

Presenter **Bernd-Christian Renner**

Session F – Closing

Time 17:15 – 17:30

Room MARESEC main

Session Chair Frank Sill Torres