

# **2025 International Symposium on Ocean Technology (SYMPOL 2025)**

**Kochi, India  
10-12 December 2025**



**IEEE Catalog Number: CFP2597L-POD  
ISBN: 979-8-3315-6648-7**

**Copyright © 2025 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP2597L-POD
ISBN (Print-On-Demand):	979-8-3315-6648-7
ISBN (Online):	979-8-3315-6647-0
ISSN:	2326-5558

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# Contents

<i>Sponsors</i> . . . . .	v
<i>Preface</i> . . . . .	vii
<i>Advisory Committee</i> . . . . .	ix
<i>Technical Programme Committee</i> . . . . .	xi
<i>Organising Committee</i> . . . . .	xiii
<i>Acknowledgements</i> . . . . .	xv
<i>About the Editors</i> . . . . .	xvii
 <b>Session I : SONAR Technology</b>	
Time Delay Estimation using Phase Data and its Application in SONAR <i>Deepa B, Vijay Gopal and Sooraj K Ambat</i> . . . . .	1
Experimental Study of Bearing Bias Induced by Bottom-Bounce Propagation in Towed-Array Sonar <i>Baiju M Nair and Rubin Jose Peter</i> . . . . .	5
Navigational Aid for Submerged Underwater Vessels using Obstacle Detection Sonar and Open Source GIS Systems <i>Fathima M S and Sumi A Samad</i> . . . . .	9
 <b>Session II : Artificial Intelligence for Ocean Exploration</b>	
Performance Analysis of Deep Learning Classification Algorithms using Different Optimizers for Underwater Target Classification in Lake Environment <i>Jinka Venkata Aravind and Shanthi Prince</i> . . . . .	15

A Comprehensive Evaluation of State-of-the-art Deep Learning Object Detection Frameworks for Crown-of-Thorns Starfish in Coral Reef Monitoring <i>Sadaf Ansari, Akaash Samson Anand Gudlangari and Pratik Khirod Nayak . . .</i>	20
An initiative through ML+interpolation model for extreme wave predictions <i>Jishnu Vijay, Vaishnavi S and Prabhakar V . . . . .</i>	26
Edge AI based Real -Time Classification of Underwater Target in Images using YOLO Deep Learning Algorithm <i>Jinka Venkata Aravind and Shanthi Prince . . . . .</i>	34
<b>Session III : Navigation Communication Instrumentation and Localisation</b>	
Analytical Model For The Early Detection Of Undersea Seismic Activity – A Tsunami Precursor <i>Girish Kumar Tiwari and Staley Arya . . . . .</i>	40
Doppler-Robust Zero-Crossing Deep Autoencoder Vocoder for Secure and Efficient Underwater Acoustic Speech Communication <i>Sunil Kumar R K, Ebin Antony, Sameer V V and Aljinu Khadar K V . . . . .</i>	46
Performance Analysis of BPSK and DPSK Modulation Schemes with Hybrid Analog-Digital Transmission Framework in MATLAB <i>Abila R, Manoj G and Harry P R . . . . .</i>	52
Performance Analysis of BPSK and QPSK Modulation Schemes on an Underwater Acoustic Communication Testbed <i>Akash Sonowal, Archit Yadav, Suraj Kumar, Nabajyoti Nath and Sonali Chouhan . . . . .</i>	58
<b>Session IV : Ocean Acoustics</b>	
Enhancing Underwater Sonar Target Recognition using Non-linear Wavelet Transforms <i>Andrew Christensen, Ananya Sen Gupta and Ivars Kirstenins . . . . .</i>	63
Underwater Acoustic Channel Estimation Using Sparse Representations and Machine Learning <i>Preeti Meena, Ananya Sen Gupta, Brejesh Lall and Monika Aggarwal . . . . .</i>	69

Model Study of Underwater Acoustic Convergence Zone in Eastern Indian Ocean <i>Akshay K J, Raju R P and Arya Ajith Kumar</i> . . . . .	75
A Method for Enhanced Depth Detection in Underwater Navigation: Implementation and Comparative Study <i>Annapurna S M, Sarath Chandran R, Haneesh Sankar T P and Rajesh K R</i> . . . . .	81
<b>Session V : Signal Processing</b>	
Performance Analysis of Target Motion Analysis System based on IMM with Maneuvering Point Detection <i>Anila John, Aparna V, Sreekanth Raja, Eldho Joby and Naseeba E</i> . . . . .	87
Color Manipulation and Fusion for Enhancement of Dark Underwater Images <i>M Kanagavel, M Annapoopathi and S Bama</i> . . . . .	92
A Modified SOS (m-SOS) Algorithm for Optimal SVM Parameter Selection in Underwater Target Classification <i>Sherin B M, Mohankumar K and Supriya M H</i> . . . . .	96
Azimuth Estimation using Normal Mode Based MUSIC in New England Mud Patch <i>Gopu R Potty, James H Miller and Christopher Bristow</i> . . . . .	101
Color Correction and Contrast Enhancement for Underwater Image Enhancement <i>M Kanagavel and M Annapoopathi</i> . . . . .	106
<i>Author Index</i> . . . . .	111
<i>Subject Index</i> . . . . .	113
<i>Announcement</i> . . . . .	115