

2021 Sensor Signal Processing for Defence Conference (SSPD 2021)

**Edinburgh, United Kingdom
14 – 15 September 2021**



**IEEE Catalog Number: CFP21SPD-POD
ISBN: 978-1-6654-3315-0**

**Copyright © 2021 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:	CFP21SPD-POD
ISBN (Print-On-Demand):	978-1-6654-3315-0
ISBN (Online):	978-1-6654-3314-3

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
Web: www.proceedings.com

Table of Contents

SSPD 2021 Welcome Message	v
SSPD 2021 Programme	vi
SSPD 2021 Keynote Speakers	x
SSPD 2021 Invited Speakers.....	xii
SSPD 2021 Conference Committee	xv
Session 1: Imaging and Underwater Signal Processing	
1.1 Fast Classification and Depth Estimation for Multispectral Single-Photon LiDAR Data	1
<i>Mohamed Amir Alaa Belmekki, Stephen McLaughlin, and Abderrahim Halimi</i>	
1.2 Spaceborne SAR Based Assessment of Nuclear Test Effects: The Case of North Korea.....	6
<i>Nicomino Fiscante, Filippo Biondi, Pia Addabbo, Carmine Clemente, Gaetano Giunta, and Danilo Orlando</i>	
1.3 The Maximal Eigengap Estimator for Acoustic Vector-Sensor Processing	11
<i>Robert Bassett, Jacob Foster, Kay L. Gemba, Paul Leary, and Kevin B. Smith</i>	
Session 2: Poster Presentations	
2.1 Joint Surface Detection and Depth Estimation from Single-Photon Lidar Data using Ensemble Estimators	16
<i>K. Drummond, S. McLaughlin, Y. Altmann, A. Pawlikowska, and R. Lamb</i>	
2.2 Detecting LFM Parameters in Joint Communications and Radar Frequency Bands	21
<i>Kaiyu Zhang, Fraser K. Coutts, and John Thompson</i>	
2.3 Joint Spatio-Temporal Bias Estimation and Tracking for GNSS-Denied Sensor Networks	26
<i>Sofie Macdonald and James R. Hopgood</i>	
2.4 Detection of Human Target Location under Simulated Randomized Rubble using Global Fresnel's Reflection Coefficient.....	31
<i>Amit Sarkar and Debalina Ghosh</i>	
2.5 Semi-Supervised Domain Adaptation via Adversarial Training	36
<i>Antonin Couturier and Anton-David Almasan</i>	
2.6 Fast Givens Rotation Approach to Second Order Sequential Best Rotation Algorithms	40
<i>Faizan Khattak, Stephan Weiss, and Ian K. Proudler</i>	
2.7 Target Detection and Recognition of Ground Penetrating Radar using Morphological Image Analysis and Graph Laplacian Regularisation	45
<i>Jun Dong, Vladimir Stankovic, and Nigel Davidson</i>	
2.8 Object Detection in EO/IR and SAR Images using Low-SWAP Hardware.....	50
<i>Richard O. Lane, Adam J. Wragge, Wendy J. Holmes, Stuart J. Bertram, and Tim Lamont-Smith</i>	

2.9 Exponential Filters for Passive Underwater Acoustic Detections - A Global Processing Gain Perspective.....	55
<i>Stéphane Blouin</i>	
Session 3: RF Sensing and Communication	
3.1 An Approximate Likelihood Ratio Detector for QTMS Radar and Noise Radar	60
<i>David Luong, Bhashyam Balaji, and Sreeraman Rajan</i>	
3.2 Detection of Weak Transient Signals using a Broadband Subspace Approach	65
<i>Stephan Weiss, Connor Delaosa, James Matthews, Ian K. Proudler, and Ben A. Jackson</i>	
3.3 Rate Splitting Multiple Access for Multi-Antenna Multi-Carrier Joint Communications and Jamming	70
<i>Onur Dizdar and Bruno Clerckx</i>	
Session 4: Distributed Processing and Tracking	
4.1 Adaptive Kernel Kalman Filter	75
<i>Mengwei Sun, Mike E. Davies, Ian Proudler, and James R. Hopgood</i>	
4.2 Detection of Malicious Intent in Non-Cooperative Drone Surveillance	80
<i>Jiaming Liang, Bashar I. Ahmad, Mohammad Jahangir, and Simon Godsill</i>	
4.3 Modelling Bi-Static Uncertainties in Sequential Monte Carlo with the GLMB Model	85
<i>Murat Üney, Alexey Narykov, Jason Ralph, and Simon Maskell</i>	
4.4 Graph Filter Design for Distributed Network Processing: A Comparison between Adaptive Algorithms	90
<i>Atiyeh Alinaghi, Stephan Weiss, Vladimir Stankovic, and Ian Proudler</i>	
Session 6: Machine Learning and Information Processing	
6.1 Approximate Proximal-Gradient Methods.....	95
<i>Anis Hamadouche, Yun Wu, Andrew M. Wallace, and João F. C. Mota</i>	
6.2 Learning a Secondary Source from Compressive Measurements for Adaptive Projection Design	101
<i>Fraser K. Coutts, John Thompson, and Bernard Mulgrew</i>	
Author Index	106
SSPD 2022 Flyer	108