

# **Sensor Signal Processing for Defence 2010**

**(SSPD 2010)**

**IET Seminar Digests 2010/003**

**London, United Kingdom  
29-30 September 2010**

**ISBN: 978-1-61839-925-0**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2010) by the Institution of Engineering and Technology  
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact the Institution of Engineering and Technology  
at the address below.

Institution of Engineering and Technology  
P. O. Box 96  
Stevenage, Hertfordshire  
U.K. SG1 2SD

Phone: 01-441-438-767-328-328  
Fax: 01-441-438-767-328-375

[www.theiet.org](http://www.theiet.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>Underwater Target Detection in Synthetic Aperture Sonar Data .....</b>	<b>1</b>
<i>P. Hill, A. Achim, D. Bull</i>	
<b>Fractional Fourier Transform Based Monopulse Radar for Combating Jamming Interference .....</b>	<b>6</b>
<i>S. A. Elgamel, J. J. Soraghan</i>	
<b>Processing Three-Channel SAR-ATI for GMTI .....</b>	<b>11</b>
<i>J. E. Barker, B. C. Barber</i>	
<b>Using Context to Detect Underwater Objects.....</b>	<b>16</b>
<i>D. P. Williams, G. L. Davies, A. J. Evans</i>	
<b>Feature Extraction for Early Auditory-Visual Integration.....</b>	<b>20</b>
<i>A. Brown, S. Dugelay, D. Williams, S. Goffin</i>	
<b>Audio-Visual Convolutional Blind Source Separation .....</b>	<b>25</b>
<i>Qingju Liu, Wenwu Wang, P. Jackson</i>	
<b>Direct Learning Architectures for Digital Predistortion of Nonlinear Volterra Systems.....</b>	<b>30</b>
<i>E. Abd-Elrady, B. Mulgrew</i>	
<b>Adaptive MMSE Equalizer with Optimum Tap-length and Decision Delay .....</b>	<b>35</b>
<i>Yu Gong, Xia Hong, K. F. Abu-Salim</i>	
<b>Analysis of the Widely Linear Complex Kalman Filter .....</b>	<b>40</b>
<i>D. H. Dini, D. P. Mandic</i>	
<b>Synthetic Signals for Signal Processing .....</b>	<b>44</b>
<i>V. Blundell, T. Clarke, D. Williams</i>	
<b>On the Convergence Behavior of Recursive Adaptive Noise Cancellation Structure in the Presence of Crosstalk.....</b>	<b>48</b>
<i>P. Scalart, L. Lepauloux</i>	
<b>Soft Rake and DFE Based IDMA Systems for Underwater Acoustic Channels.....</b>	<b>53</b>
<i>S. Aliesawi, C. C. Tsimenidis, B. S. Sharif, M. Johnston</i>	
<b>Monte Carlo Realisation of a Distributed Multi-Object Fusion Algorithm .....</b>	<b>58</b>
<i>M. Uney, S. Julier, D. Clark, B. Ristic</i>	
<b>Robust Multi-object Sensor Fusion with Unknown Correlations .....</b>	<b>63</b>
<i>D. Clark, S. Julier, R. Mahler, B. Ristic</i>	
<b>A Robust Technique for Person-Background Segmentation in Video Sequences Based on the Codebook Method of Background Subtraction and Head Tracking.....</b>	<b>68</b>
<i>I. Colman, A. Rhuma, Miao Yu, J. Chambers</i>	
<b>Unsupervised Feature Based Abnormality Detection .....</b>	<b>73</b>
<i>Hao Li, D. R. Bull, A. Achim</i>	
<b>Analysis of Coulter Counting Data from Nanopores Using Clustering.....</b>	<b>78</b>
<i>P. Sattigeri, J. J. Thiagarajan, K. N. Ramamurthy, P. Joshi, A. Spanias, M. Goryll, T. Thornton</i>	
<b>Sensor Integration Using a Service Oriented Architecture .....</b>	<b>83</b>
<i>R. Miller</i>	
<b>Array Shape Self-calibration Using Particle Swarm Optimization and Decaying Diagonal Loading .....</b>	<b>88</b>
<i>Shuang Wan, Pei-Jung Chung, B. Mulgrew</i>	
<b>The Figure of Merit 'C' for Comparing Superresolution Direction-Finding Algorithms.....</b>	<b>93</b>
<i>H. Commin, A. Manikas</i>	
<b>Maximum Likelihood Sub-Arrayed MIMO Radar Receiver.....</b>	<b>98</b>
<i>D. Wilcox, M. Sellathurai</i>	
<b>Knowledge-Aided STAP Algorithm Using Affine Combination of Inverse Covariance Matrices for Heterogenous Clutter .....</b>	<b>103</b>
<i>Rui Fa, R. C. De Lamare, V. H. Nascimento</i>	
<b>Radar Matched Filtering Using the Fractional Fourier Transform.....</b>	<b>108</b>
<i>S. A. Elgamel, C. Clemente, J. J. Soraghan</i>	
<b>Fractional RDA and Enhanced FrCSA for SAR Imaging.....</b>	<b>113</b>
<i>C. Clemente, J. J. Soraghan</i>	
<b>The Performance of a Fractional Fourier Transform Based Detector for Frequency Modulated Signals.....</b>	<b>118</b>
<i>P. R. White, J. D. Locke</i>	
<b>Reduced-rank STAP for Airborne Radar Based on Switched Joint Interpolation, Decimation and Filtering Algorithm.....</b>	<b>123</b>
<i>Rui Fa, R. C. De Lamare</i>	

<b>On the Energy Efficiency of Wireless Sensor Networks with Local Fusion Centers</b> .....	128
<i>Jinho Choi</i>	
<b>Analogue Network Coding for Multi-Pair, Bidirectional Relay Channels</b> .....	133
<i>Chee Yen Leow, Zhiguo Ding, K. K. Leung, D. L. Goeckel</i>	
<b>Interference Alignment with Diversity</b> .....	138
<i>Haishi Ning, Cong Ling, K. K. Leung</i>	
<b>Lattice Decoding for Cooperative Communications Using the Segment LLL Algorithm</b> .....	143
<i>Shuiyin Liu, Xiaomei Fu, Cong Ling</i>	
<b>Author Index</b>	