Sensor Signal Processing for Defence Programme

Sensor Signal Processing for Defence Conference 2022 Programme

**Location:** IET: London Savoy Place / Link to online conference sent in an email to delegates

**Note** all questions and answers will be managed using Zoom chat. The questions in the poster session will be managed using [https://www.sli.do/](https://www.sli.do/) – the code for the main conference is #SSPD22 and the password will be sent in an email to delegates.

**Tuesday 13th September 2022**

9:00 to 9:30 Refreshments

**Session 1 – Applications and Implementation – Chair – Mike Davies, University of Edinburgh**

9:30 Introduction and Welcome to Day 1/Session 1 – Mike Davies, University of Edinburgh.

9:40 – 10:40 **Keynote Speaker:** Dealing with Epistemic Uncertainty in Information Fusion Systems, Lance Kaplan, ARL.

10:40 – 11:05 Automatic Approximation for 1-Dimensional Feedback-Loop Computations: a PID Benchmark, Yun Wu¹, Yun Zhang¹, Anis Hamadouche¹, Joao Mota¹, Andrew M Wallace¹, ¹Heriot-Watt University.

11:05 – 11:35 Refreshments

11:35 – 12:00 Efficient Joint Surface Detection and Depth Estimation of Single-photon Lidar Data using assumed Density Filtering, Kristofer Drummond², Dan Yao¹, Agata Pawlikowska², Robert Lamb², Steve McLaughlin¹, Yoann Altmann¹, ¹Heriot-Watt University, ²Leonardo.

**Session 2 – Panel Discussion and Lightning Posters – Chair – Jordi Barr - Dstl**

12:00 Introduction and Welcome to Session 2 – Jordi Barr, Dstl

12:00 – 13:00 **Panel Discussion:** Open Source intelligence

13:00 – 13:30 **Lightning Poster Presentations**

- **P1.** An Extension to the Frenet-Serret and Bishop Invariant Extended Kalman Filters for Tracking Accelerating Targets, Joe Gibbs¹, David Anderson¹, Matt MacDonald², John Russell², ¹University of Glasgow, ²Leonardo.

- **P2.** Joint Undervolting and Overclocking Power Scaling Approximation on FPGA, Yun Wu¹, Joao Mota¹, Andrew M Wallace¹, ¹Heriot-Watt University.

- **P3.** State Estimation of the Spread of COVID-19 in Saudi Arabia using Extended Kalman Filter, Lamia Alyami², Saptarshi Das¹, ¹University of Exeter.

- **P4.** Optimal Bernoulli Point Estimation with Applications, Alexey Narykov¹, Murat Uney¹, Jason F. Ralph¹, ¹University of Liverpool.

- **P5.** High Resolution DOA Estimation for Contiguous Target with Large Power Difference, Murtiza Ali¹, Karan Nathwani¹, ¹Indian Institute of Technology.
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- **P6.** Compressive Self-Noise Cancellation in Underwater Acoustics, Pawan Kumar\(^1\), Karan Nathwani\(^1\), Vinayak Abrol\(^2\), Suresh Kumar\(^3\), \(^1\)Indian Institute of Technology, \(^2\)University of Oxford, \(^3\)DRDO, India.

- **P7.** Non-Coherent Discrete Chirp Fourier Transform for Modulated LFM Parameter Estimation, Kaiyu Zhang\(^1\), Fraser K Coutts\(^1\), John Thompson\(^1\), \(^1\)University of Edinburgh.

- **P8.** Unsupervised Expectation Propagation Method for Large-Scale Sparse Linear Inverse Problems, Dan Yao\(^1\), Steve McLaughlin\(^1\), Yoann Altmann\(^1\), \(^1\)Heriot-Watt University.

- **P9.** Movement Classification and Segmentation Using Event-Based Sensing and Spiking Neural Networks, Paul Kirkland\(^1\), Gaetano Di Caterina\(^1\), \(^1\)University of Strathclyde.

- **P10.** Enhanced Space-Time Covariance Estimation Based on a System Identification Approach, Faizan Khattak; Ian Proudler\(^1\), Stephan Weiss\(^2\), \(^1\)University of Strathclyde.

13:30 – 14:45 Lunch and Poster Presentations – There will be an opportunity to view posters either online or at Savoy Place (Q & A will use https://www.sli.do)

**Session 3 Networking and Communications – Chair – Steve McLaughlin, Heriot-Watt University**

14:45 Introduction and Welcome to Session 3 – Steve McLaughlin, Heriot-Watt University

14:45 OMASGAN: Out-of-distribution Minimum Anomaly Score GAN for Anomaly Detection, Nikolaos Dionelis\(^1\), Sotirios Tsaftaris\(^1\), Mehrdad Yaghoobi\(^1\), \(^1\)University of Edinburgh.

15:10 Refreshments

15:45 Fast Trajectory Forecasting With Automatic Identification System Broadcasts, Yicheng Wang\(^1\), Murat Uney\(^1\), \(^1\)University of Liverpool.

16:10 Deep Learning for Spectral Filling in Radio Frequency Applications, Michael Girard\(^1\), Matthew Setzler\(^1\), Elizabeth Coda\(^1\), Jeremiah Rounds\(^1\), Michael Vann\(^1\), \(^1\)Pacific Northwest National Laboratory.

16:35 Closing remarks

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19:30 Conference Reception Drinks - IET Savoy Place

20:00 Conference Dinner
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Wednesday 14\textsuperscript{th} September 2022

8:30 to 9:00 Refreshments

**Session 4 Machine Learning – Chair – James Hopgood, University of Edinburgh**

9:00 Introduction and Welcome to Day 2/Session 4 – Machine Learning – James Hopgood, University of Edinburgh

9:05 – 10:05 **Academic Keynote Speaker**: Lie Groups Statistics and Machine Learning for Military Sensors based on Symplectic Structures of Information Geometry, Frédéric Barbaresco, Thales

10:05 – 10:35 **Invited Speaker**: Signal Processing for Military Communications, Jon Spencer, Dstl.

10:35 – 11:00 Robust DOA Estimation Based on Deep Neural Networks in Presence of Array Phase Errors, Xuyu Gao\textsuperscript{2}, Aifei Liu\textsuperscript{2}, Yutao Xiong\textsuperscript{2}, \textsuperscript{1}Harbin Engineering University, \textsuperscript{2}Northwestern Polytechnical University.

11:00 – 11:25 Refreshments

**Session 5 – Panel Discussion – Chair – Jordi Barr - Dstl**

11:25 Introduction and Welcome to Session 5 – Jordi Barr, Dstl

11:25 – 12:25 **Panel Discussion**: Should defence be more university friendly or should universities be more defence friendly?

12:25 – 13:25 Lunch

**Session 6 – Radar Sonar and Acoustics – Chair – Gary Heald, Dstl**

13:25 Introduction and Welcome to Session 6 – Gary Heald, Dstl


13:55 – 14:20 A Polynomial Subspace Projection Approach for the Detection of Weak Voice Activity, Vincent W Neo\textsuperscript{1}, Stephan Weiss\textsuperscript{2}, Patrick A Naylor\textsuperscript{1}, \textsuperscript{1}Imperial College London, \textsuperscript{2}University of Strathclyde.

14:20 – 14:45 Optimizing Sonobuoy Placement using Multiobjective Machine Learning, Christopher M Taylor\textsuperscript{1}, Simon Maskell\textsuperscript{1}, Jason F. Ralph\textsuperscript{1}, \textsuperscript{1}University of Liverpool.

14:45 – 15:10 Refreshments

15:10 – 15:35 Image Quality SAR Refocus of Moving Targets undergoing Complicated Rolling Maneuvers, David A. Garren\textsuperscript{1}, \textsuperscript{1}Naval Postgraduate School.

15:35 – 16:00 Learning Low-Rank Models From Compressive Measurements for Efficient Projection Design, Fraser K Coutts\textsuperscript{1}, John Thompson\textsuperscript{1}, Bernard Mulgrew\textsuperscript{1}, \textsuperscript{1}University of Edinburgh.

16:00 – 16:25 LoRaWAN Performance Evaluation and Resilience under Jamming Attacks, Vaia Kalokidou\textsuperscript{1}, Manish Nair\textsuperscript{1}, Mark Beach\textsuperscript{1}, \textsuperscript{1}University of Bristol.

16:25 Closing remarks