Sensor Signal Processing for Defence Programme

Location: Royal College of Physicians, Edinburgh/WEBEx link sent in email

Note all questions and answers will be managed using https://www.sli.do/ – the code for the main conference is SSPD21 and the password has been sent in an email to delegates.

Tuesday 14th September 2021

8:30 to 9:00 Refreshments

Session 1 – Imaging and Underwater Signal Processing - Chair Stephen McLaughlin, Heriot-Watt University

9:00 Introduction and Welcome to Day 1/Session 1 – Stephen McLaughlin

9:05 – 9:35 Invited Speaker: Multi-Spectral and Multi-Modal Underwater Acoustic Imaging, Alan Hunter, University of Bath.

9:35 – 10:00 Fast Classification and Depth Estimation for Multispectral Single-Photon LiDAR Data, Mohamed Amir Alaa Belmekki[1], Steve McLaughlin[1], Abderrahim Halimi[1], [1]Heriot-Watt University.

10:00 – 10:25 Spaceborne SAR based assessment of nuclear test effects: the case of North Korea, Nicomino Fiscante[1], Filippo Biondi[2], Pia Addabbo[3], Carmine Clemente[4], Gaetano Giunta[1], Danilo Orlando[5] [1]University of Study "Roma TRE", [2]University of Study of "L'Aquila", [3]University "Giustino Fortunato", [4]University of Strathclyde, [5]University "Niccolo Cusano".

10:25 – 10:50 The Maximal Eigengap Estimator for Acoustic Vector-Sensor Processing, Robert L Bassett[1], Jacob Foster[1], Kay Gemba[2], Paul Leary[1], Kevin B. Smith[1], [1]Naval Postgraduate School, [2]U.S. Naval Research Laboratory.

10:50 – 11:20 Refreshments

Session 2 – Mixed Panel Discussion and Posters - Chair - Jordi Barr, Dstl

11:20 Introduction and Welcome to Session 2 – Jordi Barr

11:20 – 12:20 Mixed Panel Discussion: The defence sector is inherently risk-averse in the face of disruptive R&D. How would you enable more rapid adoption of novel, beneficial technology? Moderator, Jordi Barr, Dstl.

12:20 – 12:50 Lightning Presentations

- **P1.** Joint surface detection and depth estimation from single-photon Lidar data using ensemble estimators, Kristofer Drummond[1], Agata Pawlikowska[2], Robert Lamb[2], Steve McLaughlin[1], Yoann Altmann[1], [1]Heriot-Watt University, [2]Leonardo.

- **P2.** Detecting LFM Parameters in Joint Communications and Radar Frequency Bands, Kaiyu Zhang[1], Fraser K Coutts[1], John Thompson[1], [1]University of Edinburgh.

- **P3.** Joint Spatio-Temporal Bias Estimation and Tracking for GNSS-Denied Sensor Networks, Sofie J. J. Macdonald[1,2], James R Hopgood[1], [1]University of Edinburgh, [2]Leonardo.

- **P4.** Detection of Human Target Location Under Simulated Randomized Rubble Using Global Fresnel's Reflection Coefficient, Amit Sarkar[1], Debalina Ghosh[1], [1]Indian Institute of Technology Bhubaneswar.

- **P5.** Semi-supervised domain adaptation via adversarial training, Antonin Couturier[1], Anton-David Almasan[1], [1]Thales.

- **P6.** Fast Givens Rotation Approach to Second Order Sequential Best Rotation Algorithms, Faizan Khattak[1], Stephan Weiss[1], Ian Proudler[1], [1]University of Strathclyde.

- **P7.** Target Detection and Recognition of Ground Penetrating Radar using Morphological Image Analysis and Graph Laplacian Regularisation, Jun Dong[1], Vladimir Stankovic[1], Nigel Davidson[2], [1]University of Strathclyde, [2]Dstl.

- **P8.** Object Detection in EO/IR and SAR Images Using Low-SWAP Hardware, Richard O Lane[1], Adam Wragge[1], Wendy Holmes[1], Stuart Bertram[1], Tim Lamont-Smith[1], [1]QinetiQ.

- **P9.** Exponential Filters for Passive Underwater Acoustic Detections - A Global Processing Gain Perspective, Stephane Blouin, Defence Research and Development Canada.

12:50 – 14:00 Lunch and Poster Presentations – There will be an opportunity to view posters either online or at Edinburgh. (Q & A will use https://www.sli.do/ and can be submitted for individual posters using the following #SSPD21-Poster1, #SSPD21-Poster2, #SSPD21-Poster3, #SSPD21-Poster4, #SSPD21-Poster5, #SSPD21-Poster6, #SSPD21-Poster7, #SSPD21-Poster8, #SSPD21-Poster9.

Session 3 RF Sensing and Communications - Chair – Gary Heald, Dstl

14:00 Introduction and Welcome to Session 3 – Chair – Gary Heald

14:00 – 15:00 Defence Keynote Speaker: Why Defence Acquisition is Difficult, Hugh Griffiths, Defence Science Expert Committee (DSEC) / University College London.

15:00 – 15:25 An Approximate Likelihood Ratio Detector for QTMS Radar and Noise Radar, David Luong[1], Bhashyam Balaji[2], and Sreeraman Rajan[2], [1]Carleton University, [2]Defence Research and Development Canada.

15:25 – 15:45 Refreshments

15:45 – 16:10 Detection of Weak Transient Signals Using a Broadband Subspace Approach, Stephan Weiss[1], Connor Delaosa[1], James Matthews[2], Ian Proudler[1], Ben Jackson[3], [1]University of Strathclyde, [2]PA Consulting, [3]Dstl.

16:10 – 16:35 Rate Splitting Multiple Access for Multi-Antenna Multi-Carrier Joint Communications and Jamming, Onur Dizdar[1], Bruno Clerckx[1], [1]Imperial College London.

16:35 – 16:45 Closing remarks

19:30 Conference Reception Drinks in the Library, Royal College of Physicians

20:00 Conference Dinner in the Great Hall, Royal College of Physicians

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8:30 to 9:00 Refreshments

Session 4 Distributed Processing and Tracking – James Hopgood, University of Edinburgh

9:00 Introduction and Welcome to Day 2/Session 4– James Hopgood

9:05 – 9:35 Invited Speaker: Optimising and Understanding the Impact of the NHS COVID-19 app Using Data Science Mark Briers, The Alan Turing Institute.

9:35 – 10:00 Adaptive Kernel Kalman Filter, Mengwei Sun[1], Mike E Davies[1], Ian Proudler[2], James R Hopgood[2], [1]University of Edinburgh, [2]University of Strathclyde.

10:00 – 10:25 Detection of Malicious Intent in Non-cooperative Drone Surveillance, Jiaming Liang[1], Bashar I. Ahmad[2], Mohammed Jahangir[3], Simon Godsill[1], [1]University of Cambridge, [2]Aveillant Thales Land and Air Systems, [3]University of Birmingham.

10:25 – 10:50 Modelling bi-static uncertainties in sequential Monte Carlo with the GLMB model, Murat Uney[1], Alexey Narykov[1], Jason F. Ralph[1], Simon Maskell[1], [1]University of Liverpool.

10:50 – 11:15 Graph Filter Design for Distributed Network Processing: A Comparison between Adaptive Algorithms, Atiyeh Alinaghi[1], Stephan Weiss[1], Vladimir Stankovic[1], Ian Proudler[1], [1]University of Strathclyde.

11:15 – 11:45 Refreshments

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

11:45 Introduction and Welcome to Session 5 – **Jordi Barr, Dstl**

11:45 – 12:45 Mixed Panel Discussion: The TRL model impedes algorithmic development. How does the defence community need to change to reduce barriers and increase opportunities?, Moderator, TBC, Dstl.

12:45 – 13:45 Lunch

Session 6 – Machine Learning and Information Processing – Chair Mike Davies, University of Edinburgh

13:45 Introduction and Welcome to Session 6 – Chair – Mike Davies

13:45– 14:45 Academic Keynote Speaker: Semantic Information Pursuit, René Vidal, Johns Hopkins Mathematical Institute for Data Science

14:45 – 15:15 Invited Speaker: AI-enabled Multi-Domain Processing and Analytics for Decision Making, Tien Pham, (CISD) U.S. DEVCOM ARL.

15:15 – 15:45 Refreshments

15:45 – 16:10 Approximate Proximal-Gradient Methods, Anis Hamadouche[1], Yun Wu[1], Andrew M Wallace[1], Joao Mota[1], [1]Heriot-Watt University.

16:10 – 16:35 Learning a Secondary Source From Compressive Measurements for Adaptive Projection Design, Fraser K Coutts[1], John Thompson[1], Bernard Mulgrew[1], [1]University of Edinburgh.

16:35– 16:45 Closing remarks