

Location: The Royal College of Physicians of Edinburgh, 9 Queen Street, Edinburgh, EH2 1JQ

**Tuesday 12<sup>th</sup> September 2023**

**8:30 to 9:00 Refreshments**

## **Session 1 -Navigation and Tracking- Mike Davies, University of Edinburgh**

**9:00** Introduction and Welcome to Day 1/Session 1 – Mike Davies, University of Edinburgh.

**9:10 – 10:10 Keynote Speaker:** Instabilities in Navigation - Balancing on the Head of a Pin, Jason Ralph, University of Liverpool.

**10:10 – 10:35** Adaptive Kernel Kalman Filter for Magnetic Anomaly Detection-based Metallic Target Tracking, Mengwei Sun<sup>1</sup>, Ian Proudler<sup>2</sup>, Mike E Davies<sup>1</sup>, James R Hopgood<sup>1</sup>, <sup>1</sup>University of Edinburgh, <sup>2</sup>University of Strathclyde.

**10:35 – 11:00 Refreshments**

**11:00 – 11:25** Implementation of Adaptive Kernel Kalman Filter in Stone Soup, James Wright<sup>1</sup>, James R Hopgood<sup>2</sup>, Mike E Davies<sup>2</sup>, Ian Proudler<sup>3</sup>, Mengwei Sun<sup>2</sup>, <sup>1</sup>Dstl, <sup>2</sup>University of Edinburgh, <sup>3</sup>University of Strathclyde.

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

**11:25** Introduction and Welcome to Session 2 – Jordi Barr, Dstl

**11:25 – 12:25 Panel Discussion:** The Future for Defence Signal Processing.

**12:25 - 14:30 Poster Presentations and Lunch**

- **P1.** A Lower Complexity Deep Learning Method for Drones Detection, Amal El-Fallah-Seghrouchni<sup>1</sup>, Frederic Barbaresco<sup>2</sup>, Mohamad Kassab<sup>3</sup>, Raed Abu Zitar<sup>4</sup>, <sup>1</sup>University of Pierre and Marie Curie, <sup>2</sup>Thales Air Systems, <sup>3</sup>Mohamad Bin Zayed University of Artificial Intelligence, <sup>4</sup>Sorbonne University-Abu Dhabi.
- **P2.** Kalman Filter-Based Suspicious Object Tracking for Border Security and Surveillance System using Fixed Automotive Radar, Ji-il Park<sup>1</sup>, SeungHyeon Jo<sup>2</sup>, Hyung-Tae Seo<sup>3</sup>, Keun Ha Choi<sup>4</sup>, Jihyuk Park<sup>5</sup>, Kyung-Soo Kim<sup>4</sup>, <sup>1</sup>Ministry of National Defense, <sup>2</sup>DXC Luxoft, <sup>3</sup>Kyonggi University, <sup>4</sup>KAIST, <sup>5</sup>Automotive Engineering & Yeungnam University.
- **P3.** Joint Learning with Shared Latent Space for Self-Supervised Monaural Speech Enhancement, Yi Li<sup>1</sup>, Yang Sun<sup>2</sup>, Wenwu Wang<sup>3</sup>, Syed Mohsen Naqvi<sup>4</sup>, <sup>1</sup>Lancaster University, <sup>2</sup>University of Oxford, <sup>3</sup>University of Surrey, <sup>4</sup>Newcastle University.
- **P4.** Underwater Passive Target Classification based on  $\beta$  Variational Autoencoder and MFCC, Adarsh Sunilkumar<sup>1</sup>, Shamju Joseph K<sup>1</sup>, Manoj Kumar K<sup>1</sup>, <sup>1</sup>Naval Physical Oceanographic Laboratory.
- **P5.** Association based Feedback Aided Underwater Passive Target Tracking, Adarsh Sunilkumar<sup>1</sup>, Shamju Joseph K<sup>1</sup>, Manoj Kumar K<sup>1</sup>, <sup>1</sup>Naval Physical Oceanographic Laboratory.

## Sensor Signal Processing for Defence Programme

- P6.** Computational Enhancement of Accumulated CA-CFAR Process in Side Scan Sonar Data, Ansila Veliyathparambil Muhamedali<sup>1</sup>, Bibin Basheer<sup>1</sup>, Sooraj K. Ambat<sup>1</sup>,  
<sup>1</sup>Defence Research and Development Organisation.
- P7.** Multi-Target Tracking Using a Swarm of UAVs by Q-learning Algorithm, Seyed Ahmad Soleymani<sup>1</sup>, Shidrokh Goudarzi<sup>2</sup>, Xingchi Liu<sup>3</sup>, Lyudmila Mihaylova<sup>3</sup>, Wenwu Wang<sup>1</sup>, Pei Xiao<sup>1</sup>,  
<sup>1</sup>University of Surrey, <sup>2</sup>University of West London, <sup>3</sup>University of Sheffield.
- P8.** Generalised Sequential Matrix Diagonalisation for the SVD of Polynomial Matrices, Faizan Khattak<sup>1</sup>, Ian Proudler<sup>1</sup>, John G McWhirter<sup>2</sup>, Stephan Weiss<sup>1</sup>, <sup>1</sup>University of Strathclyde, <sup>2</sup>Cardiff University.

**14:30** Introduction and Welcome to Session 3 – James Hopgood, University of Edinburgh

**14:30 – 15:00 Invited Speaker:** Adiabatic computing for low power image sensing, <sup>1</sup>Alexandrou Serb, <sup>1</sup>University of Edinburgh.

### Session 3 – Multi-sensor Multi-target Tracking Detection – Chair – James Hopgood – University of Edinburgh

**15:00 – 15:25** A Novel Adaptive Architecture: Joint Multi-targets Detection and Clutter Classification, Linjie Yan<sup>1</sup>, Carmine Clemente<sup>2</sup>, Sudan Han<sup>3</sup>, Chengpeng Hao<sup>1</sup>, Danilo Orlando<sup>4</sup>, Giuseppe Ricci<sup>5</sup>,  
<sup>1</sup>Institute of Acoustics, Chinese Academy of Sciences, <sup>2</sup>University of Strathclyde, <sup>3</sup>National Innovation Institute of Defense Technology, <sup>4</sup>Universita' degli Studi Niccolo' Cusano, <sup>5</sup>University of Salento.

**15:25 – 15:45 Refreshments**

**15:45 – 16:10** Consensus-based Distributed Variational Multi-object Tracker in Multi-Sensor Network, Qing Li<sup>1</sup>, Runze Gan<sup>1</sup>, Simon Godsill<sup>1</sup>, <sup>1</sup>University of Cambridge.

**16:10 – 16:35** Joint Sensor Scheduling and Target Tracking with Efficient Bayesian Optimisation, Xingchi Liu<sup>1</sup>, Chenyi Lyu<sup>1</sup>, Seyed Ahmad Soleymani<sup>2</sup>, Wenwu Wang<sup>2</sup>, Lyudmila Mihaylova<sup>1</sup>, <sup>1</sup>University of Sheffield, <sup>2</sup>University of Surrey.

**16:35 Closing remarks**

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**19:30** Conference Reception Drinks – Royal College of Physicians

**20:00** Conference Dinner

## 8:30 to 9:00 Refreshments

9:00 Introduction and Welcome to Day 2/Session 4 – Images and Video – Steve McLaughlin – Heriot-Watt University g

9:05 – 10:05 **Keynote Speaker:** Some Pointers to when a Large Project is Going Wrong, and New Security Pointer Technology, Paul Caseley OBE, Dstl.

10:05 – 10:35 **Invited Speakers:** Machine Learning for Defence Signal Processing and Communications, Kin Leung and Thanos Gkelias, Imperial College London.

## 10:35 – 11:05 Refreshments

### Session 4 Images and Video – Chair – Steve McLaughlin, Heriot-Watt University

11:05 – 11:30 Simulation of Anisoplanatic Turbulence for Images and Videos, David Vint<sup>1</sup>, Gaetano Di Caterina<sup>1</sup>, Robert Lamb<sup>2</sup>, David Humphreys<sup>2</sup>, Paul Kirkland<sup>1</sup>, <sup>1</sup>University of Strathclyde, <sup>2</sup>Leonardo.

11:30 – 11:55 Investigation of an end-to-end neural architecture for image-based source term estimation, Abdullah Abdulaziz<sup>1</sup>, Mike E Davies<sup>2</sup>, Yoann Altmann<sup>1</sup>, Steve McLaughlin<sup>1</sup>, <sup>1</sup>Heriot-Watt University, <sup>2</sup>University of Edinburgh.

### Session 5 – Military Panel Discussion – Chair – Cdr Nick Jones - Dstl

11:55 Introduction and Welcome to Session 5 – Cdr Nick Jones, Dstl

11:55 – 12:55 **Panel Discussion:** Military Panel: Signal processing – the user experience.

## 12:55 – 13:55 Lunch

### Session 6 – Sonar, Radar and Maritime – Chair – Gary Heald, Dstl

13:55 Introduction and Welcome to Session 6 – Gary Heald, Dstl

13:55 – 14:20 Random Sampling for Robust Detection of Data modulated LFM Waveforms, Kaiyu Zhang<sup>1</sup>, Fraser K Coutts<sup>1</sup>, John Thompson<sup>1</sup>, <sup>1</sup>University of Edinburgh.

14:20 – 14:45 Generalised Polynomial Power Method, Faizan Khattak<sup>1</sup>, Ian Proudler<sup>1</sup>, Stephan Weiss<sup>1</sup>, <sup>1</sup>University of Strathclyde.

## 14:45 – 15:10 Refreshments

15:10 – 15:35 Joint Optimization of Sonar Waveform Selection and Sonobuoy Placement, Christopher M Taylor<sup>1</sup>, Jason F. Ralph<sup>1</sup>, Simon Maskell<sup>1</sup>, Alexey Narykov<sup>1</sup>, <sup>1</sup>University of Liverpool.

15:35 – 16:00 Development of the Line Scatterer Model for Bistatic Wind Turbine Clutter, Juhani Nissilä<sup>1</sup>, Pasi Pertilä<sup>1</sup>, Minna Väilä<sup>1</sup>, Juha Jylhä<sup>1</sup>, <sup>1</sup>Patria Aviation Oy.

16:00 – 16:25 DB-Drift: Concept drift aware density-based anomaly detection for maritime trajectories -y, Amelia Henriksen<sup>1</sup>, <sup>1</sup>Sandia National Laboratories.

## 16:25 Closing remarks