Sensor Signal Processing for Defence Programme

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

Tuesday 12th 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 Sun¹, Ian Proudler², Mike E Davies², James R Hopgood¹, ¹University of Edinburgh, ²University of Strathclyde.

10:35 – 11:00 Refreshments

11:00 – 11:25 Implementation of Adaptive Kernel Kalman Filter in Stone Soup, James Wright¹, James R Hopgood², Mike E Davies², Ian Proudler³, Mengwei Sun², ¹Dstl, ²University of Edinburgh, ³University of Strathclyde.

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

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


12:25 - 14:30 Poster Presentations and Lunch

- **P1.** A Lower Complexity Deep Learning Method for Drones Detection, Amal El-Fallah-Seghrouchni¹, Frederic Barbaresco², Mohamad Kassab³, Raed Abu Zitar⁴, ¹University of Pierre and Marie Curie, ²Thales Air Systems, ³Mohamad Bin Zayed University of Artificial Intelligence, ⁴Sorbonne University-Abu Dhabi.

- **P2.** Kalman Filter-Based Suspicious Object Tracking for Border Security and Surveillance System using Fixed Automotive Radar, Ji-il Park¹, Seunghyeon Jo², Hyung-Tae Seo³, Keun Ha Choi⁴, Jihyuk Park⁵, Kyung-Soo Kim⁶, ¹Ministry of National Defense, ²DXC Luxoft, ³Kyounggi University, ⁴KAIST, ⁵Automotive Engineering & Yeungnam University.

- **P3.** Joint Learning with Shared Latent Space for Self-Supervised Monaural Speech Enhancement, Yi Li¹, Yang Sun², Wenwu Wang³, Syed Mohsen Naqvi⁴, ¹Lancaster University, ²University of Oxford, ³University of Surrey, ⁴Newcastle University.

- **P4.** Underwater Passive Target Classification based on β Variational Autoencoder and MFCC, Adarsh Sunilkumar¹, Shamju Joseph K¹, Manoj Kumar K¹, ¹Naval Physical Oceanographic Laboratory.

- **P5.** Association based Feedback Aided Underwater Passive Target Tracking, Adarsh Sunilkumar¹, Shamju Joseph K¹, Manoj Kumar K¹, ¹Naval Physical Oceanographic Laboratory.
Sensor Signal Processing for Defence Programme

- **P6.** Computational Enhancement of Accumulated CA-CFAR Process in Side Scan Sonar Data, Ansila Veliyathparambil Muhamedali¹, Bibin Basheer¹, Sooraj K. Ambat¹, ¹Defence Research and Development Organisation.

- **P7.** Multi-Target Tracking Using a Swarm of UAVs by Q-learning Algorithm, Seyed Ahmad Soleymani¹, Shidrokh Goudarzi², Xingchi Liu³, Lyudmila Mihaylova¹, Wenwu Wang¹, Pei Xiao¹, ¹University of Surrey, ²University of West London, ³University of Sheffield.

- **P8.** Generalised Sequential Matrix Diagonalisation for the SVD of Polynomial Matrices, Faizan Khattak¹, Ian Proudler¹, John G McWhirter², Stephan Weiss¹, ¹University of Strathclyde, ²Cardiff 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, ¹Alexandrou Serb, ¹University 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 Yan¹, Carmine Clemente², Sudan Han³, Chengpeng Hao¹, Danilo Orlando⁴, Giuseppe Ricci⁵, ¹Institute of Acoustics, Chinese Academy of Sciences, ²University of Strathclyde, ³National Innovation Institute of Defense Technology, ⁴Universita' degli Studi Niccolo' Cusano, ⁵University of Salento.

15:25 – 15:45 Refreshments

15:45 – 16:10 Consensus-based Distributed Variational Multi-object Tracker in Multi-Sensor Network, Qing Li¹, Runze Gan¹, Simon Godsill¹, ¹University of Cambridge.

16:10 – 16:35 Joint Sensor Scheduling and Target Tracking with Efficient Bayesian Optimisation, Xingchi Liu¹, Chenyi Lyu¹, Seyed Ahmad Soleymani², Wenwu Wang³, Lyudmila Mihaylova¹, ¹University of Sheffield, ²University of Surrey.

16:35 Closing remarks

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19:30 Conference Reception Drinks – Royal College of Physicians

20:00 Conference Dinner
Sensor Signal Processing for Defence Programme

Wednesday 13th September 2023

8:30 to 9:00 Refreshments

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

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.


10:35 – 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$$^1$$, Gaetano Di Caterina$$^1$$, Robert Lamb$$^2$$, David Humphreys$$^2$$, Paul Kirkland$$^1$$, University of Strathclyde, $$^2$$Leonardo.

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


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$$^1$$, Fraser K Coutts$$^1$$, John Thompson$$^1$$, University of Edinburgh.

14:20 – 14:45 Generalised Polynomial Power Method, Faizan Khattak$$^1$$, Ian Proudler$$^1$$, Stephan Weiss$$^1$$, University of Strathclyde.

14:45 – 15:10 Refreshments

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

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

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

16:25 Closing remarks