‘Advances in AI for Positioning, Navigation and Timing Applications’
A joint event between the Cambridge Wireless Location SIG and The Royal Institute of Navigation

30th June 2026

Venue: Bradfield Centre, 184 Cambridge Science Park, Milton Road, Cambridge, CB4 0GA

AGENDA

13:00	Registration and networking over tea and coffee
13:30	Welcome from Cambridge Wireless **Michaela Eschbach, CEO of Cambridge Wireless**
13:40	Introduction & Welcome from our Chair, **Ramsey Faragher, CEO, Royal Institute of Navigation** & Cambridge Wireless SIG Champion
13:55	**AI and Navigation: Don’t Shoot The Physicists** **Prof Paul Groves, Professor of Positioning and Navigation, University College London (UCL)** Should we believe the hype? Can AI replace traditional physics-based approaches to positioning and navigation?
14:20	**AI-Driven Resilient PNT: Enabling Trusted Navigation and Timing in Challenging Environments** **Prof Ivan Petrunin, Professor of Signal Processing and Intelligent Systems in the Centre for Space Systems at Cranfield University** Artificial Intelligence (AI) is transforming the design and operation of Positioning, Navigation and Timing (PNT) systems across transportation, telecommunications, critical infrastructure, autonomous systems, space, and defence applications. As demands on accuracy, availability, integrity, and resilience continue to grow, AI is emerging as a key enabler for enhancing the performance of PNT systems operating in complex, contested, and GNSS-challenged environments. In this talk, we will discuss scenarios for AI use in PNT applications for autonomous transport, aerial and maritime systems, emerging non-terrestrial networks, and timing. Alongside the opportunities offered by AI, the discussion will also cover practical challenges associated with deploying AI-based solutions, such as data quality and representativeness, model robustness and explainability, performance validation, and simulation and Hardware-in-the-Loop testing requirements.
14:45	**Machine Learning Challenges in Navigation: Technical and Business** **Robert Schoonmaker, BootINS Ltd.** The goal of a commercial ML project is the successful delivery of a product to a happy customer. The nature of the problems typically solved by machine learning are difficult to describe and enumerate, and this changes the nature both of product development and customer interaction. In this presentation I will discuss in particular challenges around: • Cultural expectations around how products and problems to solve are discussed and addressed. • Technical challenges for the development of a *robust* product, in particular validity or self-error estimation. • Customer feedback and product refinement. These will be illustrated with the use of some case studies, and some interesting potential navigation solutions currently in development.
15:15	**Refreshment break**
15:45	**Session Chair: David Bartlett, Cambridge Wireless SIG Champion**
15:45	**Robust and resilient AI for safety critical systems** **Bob Oates & Rebecca Middleton, Cambridge Consultants**

16:00	**Reinforcement learning-based adaptive control algorithm for PNT** **Dr. Iñigo Cortés, CTO and co-founder, RobNav** A robust navigation engine is critical to ensure a reliable PNT solution, especially in environments where sensor quality and availability vary over time. One of the primary challenges is determining the appropriate level of trust to assign to each sensor. Effectively managing this trade-off is necessary to maintain the overall robustness of the PNT solution. Fixed-configuration systems often struggle in time-varying scenarios. These include deep urban canyons, dense forests, and highly dynamic platforms such as launch vehicles. Most efforts have been focused on the dynamic adjustment of measurement and process covariance matrices. In many cases, measurement covariance is adjusted based on the carrier-to-noise density ratio (C/N_0) of incoming pseudorange signals. This presentation introduces a reinforcement learning–based adaptive control algorithm that dynamically adjusts the covariance matrices of a navigation unit to achieve robust PNT solutions. The approach builds upon recent work that developed an RL-based adaptive control solution to optimise the response time of tracking loops in a GNSS receiver and now extends this technique to navigation engines. In this framework, the environment represents the navigation unit of the GNSS receiver, while the agent embodies the adaptive control mechanism. The reinforcement learning algorithm learns the optimal parameters for the adaptive control system by leveraging selected features extracted from the environment. To optimise the policy parameters (i.e., weights of the control algorithm), the REINFORCE method is used. Overall, this work highlights the significant potential of reinforcement learning to enhance adaptive control strategies in PNT systems.
16:15	**IMU augmentation using Deep Learning** **Freddy Saunders, Senior Consultant, Plextek** This talk discusses how low-cost MEMS based Inertial Measurement Units (IMUs) can be improved by applying ML techniques to reduce accelerometer and gyroscope errors.
16:30	**Before GNSS Fails: Lessons from Ukraine** **Stephen Clemmet, Silogic Technology Limited** Drawing on operational PNT work in Ukraine, Stephen Clemmet of Silogic Technology will examine how GNSS jamming and spoofing affect real-world users, and how those observations have informed earlier warning of deteriorating navigation conditions. The talk will explore the value of a degradation alert: what it indicates, how users should respond, and how recognising GNSS degradation before complete loss or deception can help preserve the integrity of PNT.
16:45	Panel Session with all speakers Chaired by **Ramsey Faragher, Royal Institute of Navigation** & Cambridge Wireless SIG Champion
17:15	Closing remarks and **event closes**

With the permission of the speakers a pdf of the presentations will be available after the event.

Cambridge Wireless

Cambridge Wireless (CW) is a global not-for-profit membership organisation at the forefront of innovation in connectivity and digital technology. Since 2000, CW has united industry leaders across connected devices, networks, software, data analytics, telecoms, satellites, and more. CW exists to champion and connect the global connectivity and digital technology community. We bring our members together to foster innovation, enable collaboration, and provide opportunities for continuous learning and professional growth. From flagship conferences and Special Interest Groups (SIGs) to networking events, strategic innovation projects, and skills development, our programmes create valuable opportunities for members. With headquarters at the heart of Cambridge, UK, CW partners with other international industry clusters and organisations to extend its reach and remain at the forefront of global developments and business opportunities. **www.cambridgewireless.co.uk**

The **Cambridge Wireless Location SIG's** purpose is to promote and further the adoption of location as a value-added facility for a range of applications. Location Based Services are not about position – they are primarily about the use of location and position information as a value-add to service or product the end-user buys. This group is led by

- David Bartlett
- Bob Cockshott
- Dr Ramsey Faragher, Royal Institute of Navigation - **https://rin.org.uk**
- Ben Tarlow, Qualcomm Technologies International - **www.qualcomm.com**
- With additional support for the creation of this event from **Matteo Ciprian**

To learn more about the activities of this group and its Industry Champions please visit here.

The Royal Institute of Navigation

The Royal Institute of Navigation (RIN) is a learned society with charitable status and aims to advance the art, science and practice of navigation. Formed in 1947, its aims have always been threefold:

- To unite in one body those interested in navigation
- To advance the art, science and practice of navigation
- To promote knowledge in navigation and its associated sciences, including positioning, timing, tracking and conduct of a journey, whether on, in, over or under land, sea, air or space

Our vision is to be an inclusive group of diverse disciplines working together for a more navigable world. Navigation encompasses the science, the technology and the practice of getting from A-B on land, in the air, on seas and rivers, and in space. The RIN exists to study, to practice and to inform the public about one of the broadest and most diverse subjects in the world. https://rin.org.uk

Profile of speakers

Professor Paul Groves, Professor of Positioning and Navigation, University College London (UCL) - www.ucl.ac.uk
Paul Groves is Professor of Positioning and Navigation. He specialises in robust positioning and navigation techniques for challenging environments. These are a key enabler for many different engineering problems. He is interested in all navigation and positioning technologies, including global navigation satellite systems (GNSS), inertial sensors and environmental feature matching. Particular focuses include exploring novel positioning techniques, developing reliable urban positioning and integrating complex sensor combinations in multiple contexts. He is also author of the ~800-page book Principles of GNSS, Inertial, and Multisensor Integrated Navigation Systems (Artech House, 2008 and 2013). Paul joined UCL's Space Geodesy and Navigation Laboratory (SGNL) in 2009 after 12 years at DERA and QinetiQ. He is an inventor of the GNSS shadow-matching technique and other approaches to 3D-mapping-aided GNSS. He has contributed to innovations in terrain-referenced navigation, visual navigation, positioning using Wi-Fi signals and AM radio broadcasts, heterogeneous feature-matching, detection of GNSS NLOS reception and multipath interference, and context-adaptive navigation. Paul is a Fellow of the Royal Institute of Navigation (RIN), a member of the Institute of Navigation (ION), a Chartered Physicist. He is the recipient of the 2016 ION Thurlow Award and the 2024 RIN Harold Spencer Jones Medal.

Prof Ivan Petrunin, Professor of Signal Processing and Intelligent Systems in the Centre for Space Systems at Cranfield University - www.cranfield.ac.uk
Prof. Ivan Petrunin received the MSc degree in design of electronic equipment from the National Technical University of Ukraine, in 1998, and the Ph.D. degree in Applied Signal Processing from Cranfield University, in 2012. He is currently a Professor of Signal Processing and Intelligent Systems with the Centre for Space Systems, Faculty of Engineering and Applied Sciences of Cranfield University. His expertise covers areas of signal processing and artificial intelligence with application to resilient navigation and timing solutions for ground and aerial systems, perception and situational awareness for autonomous systems operations. Ivan's research has a particular emphasis on the enhancement of performance and safety aspects of operations by developing and employing techniques based on Artificial Intelligence.

Robert Schoonmaker, BootINS Ltd.
Bio to follow.

Bob Oates, Associate Director, Cambridge Consultants - www.cambridgeconsultants.com
Bob Oates is a specialist in the interaction between safety and security for operational technology, critical infrastructure, and IoT devices. He works within the Engineering Assurance Team at Cambridge Consultants, ensuring that intelligent, AI-enabled systems are safe and secure. In addition to his academic background, Bob has over a decade of industrial experience working in the critical national infrastructure, defence, aerospace, nuclear, and maritime domains, including acting as the head of security for the development of the world's first commercial remotely operated ship. He holds an Honorary Professorship in Safety and Security at De Montfort University.

Rebecca Middleton, AI Assurance Specialist, Cambridge Consultants - www.cambridgeconsultants.com
Rebecca Middleton is an AI Assurance Specialist with expertise in responsible AI, governance, risk management, and compliance. She has spent several years helping organisations implement practical approaches to AI assurance, ensuring that AI systems are safe, trustworthy, and aligned with regulatory and ethical expectations. Rebecca's

work focuses on bridging the gap between technical teams, policymakers, and business leaders, translating complex AI risks into clear, actionable governance and assurance practices. She is particularly interested in human oversight, AI safety, and building trust in emerging technologies.

Dr. Iñigo Cortés, CTO and co-founder, RobNav - www.robnav.com
Iñigo Cortés received his M.Sc. degree in Telecommunication Engineering from the School of Engineering at the University of Navarra, San Sebastián, Spain, in April 2018. Since then, he has been working in the Satellite-based Localization Systems department at the Fraunhofer Institute for Integrated Circuits IIS (Fraunhofer IIS), Nuremberg, Germany. In September 2022, he was promoted to Senior Scientist at Fraunhofer IIS. He received his Ph.D. in Computing and Electrical Engineering from Tampere University, Finland, in June 2024. His doctoral research focused on signal processing methods for robust tracking and their implementation on resource-constrained hardware using hardware/software co-design techniques. He was awarded the ICT Dissertation Award 2025 by the Fraunhofer Group for Information and Communication Technology (IUK-Technologie). In July 2024, he co-founded RobNav, where he is the Chief Technology Officer (CTO), developing robust navigation, guidance, and control systems for aerospace and defence applications.

Freddy Saunders, Senior Consultant, Plextek - www.plextek.com
Freddy is a Chartered Physicist, who graduated from the University of Exeter in 2018 with a first-class honours degree in Physics. During his studies, he received the Exeter Physics Award, the Dean's Commendation, and completed a year-long placement at the Home Office Centre of Applied Science and Technology. Freddy joined Plextek in 2018, undertaking low-to-mid-TRL research primarily for defence applications, including: applying Deep Learning methods to exploit micro-Doppler signatures for UAV classification, demonstrated transfer-learning approaches across different sensor modalities, and helped develop a machine-learning-based RF propagation model.

Stephen Clemmet, Silogic Technology Limited - www.silogictechnology.com
Stephen Clemmet is the founder of Silogic Technology and a Chartered Electronics Engineer with more than 30 years of experience in electronic systems design, EMC and applied technology development. His current work focuses on PNT integrity, including the detection and interpretation of GNSS jamming, spoofing and degradation in operational environments. Through Silogic Technology, he has developed and deployed systems used to gather real-world evidence, with the aim of improving early warning, operational understanding and resilience when GNSS cannot be fully trusted.

Delegate List

Name	Organisation
Anas Al Rawi	Ofcom
Tom Allan	Qualcomm Technologies International
Darendra Appanah	Independant Consultant
David Atkins	University of Suffolk
David Baker	Cambridge Consultants
Neil Baker	TTP plc
David Bartlett	u-blox
Paul Baxter	Cambridge Consultants
Steve Beck	Sony Europe Limited
Alex Bienek	CRFS
Lindsay Bliss	Cambridge Wireless
Chris Boulton	Chronos Technology
Hugh Burchett	Cambridge Consultants
Silvana Capasso	Septentrio
Elliot Capell	GMV

Aled Catherall	Plextek
Shuaib Choudhry	VIAVI Solutions
Stef Church	Engineering the Blue Limited
Matteo Ciprian	
Phil Claridge	Mandrel Systems
Mary-Ann Claridge	Mandrel Systems
Stephen Clemmet	Silogic Technology
Bob Cockshott	Royal Institute of Navigation
Brian Collins	BSC Associates
Paul Cooper	Cambridge Consultants
Iñigo Cortés	RobNav
Tibor Dome	GMV
Gavin Doyle	Cambridge Consultants
Marsh Dsouza	Anritsu
Lukasz Dziobek	Velowoo Ltd.
Gail Edmans	BSI Group
Keith Edwards	Spectrum Insight Ltd
Michaela Eschbach	Cambridge Wireless
Ramsey Faragher	Royal Institute of Navigation
Larissa Fradkin	Sound Mathematics
Phil Froom	BAE Systems
Tom Game	Cambridge Consultants
Doug Gargin	Samsung Cambridge Solution Centre
Donatien Garnier	Blecon Ltd
Renato Goodfellow	Commercis
Raymond Green	Focus Data Services Ltd
Ali Grey	PA Consulting Services Limited
Paul Groves	University College London (UCL)
Sam Hooke	Cambridge Consultants
Murray Jarvis	Swift Navigation
Clare Kettle	Cambridge Wireless
Aravindh Krishnamoorthy	University of Cambridge
Yuhui Luo	National Physical Laboratory (NPL)
Allan MacLean	Amdeo
Angelos Malandrakis	Imperial College London
Henry Martin	FocalPoint
Maria Mehmood	FocalPoint
Rebecca Middleton	Cambridge Consultants
Tony Milbourn	u-blox

Hery Mwenegoha	Focal Point Positioning
Sorin Andrei Negru	Cranfield University
Bob Oates	Cambridge Consultants
Phil O'Donovan	Twelve Winds Ltd
Deepak Kumar Panda	Cranfield University
Ed Parsons	
Pekka Peltola	Telespazio
Bo Peng	Spirent Communications
Cristina Penine	IP21
Achilles Petras	BT
Ivan Petrunin	Cranfield University
Andy Proctor	RIN
Olaf Rostbakken	ALL.SPACE
Chandni Saha	Cranfield University
Freddy Saunders	Plextek
Abu Sayed	Daintta
Robert Schoonmaker	FocalPoint
Anand Sharma	Cambridge Consultants
Raj Mani Shukla	Anglia Ruskin University
James Slater	Laser 2000 UK
Alex Smith	Antevia Networks
Justin Smith	Cambridge Wireless
Chris Smyth	National Physical Laboratory (NPL)
Danilo Spano	Satellite Applications Catapult
Amy Stephens	Cambridge Consultants
Soujana Syamal	Cranfield University
Tarafder Elmi Tabassum	Cranfield university
Ben Tarlow	Qualcomm Technologies International
Rupert Thomas	Cambridge Consultants
Fei Tong	Samsung Cambridge Solution Centre
Anvar Tukmanov	BT
Ross van der Merwe	
Bradley Wilks	Prudentia Health Group
Stephen Wiseman	TE Connectivity
Matt Zagni	JTML