CW Location SIG
'Positions of Trust'
10th December 2019

This SIG is championed by This SIG is championed by David Bartlett, **u-blox**; Bob Cockshott, **The KTN** and Ben Tarlow, **Qualcomm Technologies International**

Venue: Paston Brown Room, Homerton College, Hills Road, Cambridge, CB2 8PH.

AGENDA	
13:30	Registration and networking over refreshments
14:00	Introduction to the CW from Simon Mead, CEO, Cambridge Wireless.
14:05	Introduction to the event by Location Group SIG Champion **Ben Tarlow, Qualcomm Technologies International**
14:10	**'Can we trust software we struggle to understand?'** **Ramsey Faragher, CEO, Focal Point Positioning Ltd.** Ramsey's talk will cover how the steady pace of ever-smarter software is being used to overcome some major challenges in positioning and autonomy. With the boom in Deep Neural Networks however comes a significant challenge in being able to understand - and therefore trust - how these systems achieve the results they do. This talk will highlight some of the benefits and challenges that come with increasing the complexity of software and looks at how to use fundamentally opaque "black box" systems within high-integrity, trustable systems.
14:35	Q&A
14:40	**'Integrity monitoring for high accuracy positioning'** **Ma'mon Alghananim, Faculty of Engineering, Department of Civil and Environmental Engineering, Imperial College, London** @MamonAlghananim A case study: Carrier phase-based integrity monitoring for GNSS location-based applications. In his talk Mamon will provide an overview of integrity monitoring high accuracy positioning.
15:05	Q&A
15:10	**'Distance-bounding protocols'** **Dr Markus Kuhn, Department of Computer Science and Technology, University of Cambridge** Attacks against card payment systems, door access-control readers and car thefts that involved relaying wireless signals helped to illustrate that, in some applications, authentication protocols not only need to confirm the identity of a communication partner, but also their proximity. Dedicated distance-bounding protocols perform authentication at the speed of light, to provide an upper bound on the distance to the other side. They pose tight latency requirements on communications channels and often require dedicated physical-layer support.
15:35	Q&A
15:45	**Refreshment break**
16:15	Session chaired by Location Group SIG Champion **David Bartlett, u-blox** **'A new way to fly drones'** **Eduardo Aldaz Carroll, CTO, Sees.ai** In this talk Eduardo will present the technology Sees.ai are developing that enables remote operation of drones from a central control room, facilitating the delivery of drone services at enterprise scale. sees.ai's solution combines highly-automated drones on the client site with human pilots working beyond-visual-line-of-sight (BVLOS) in a central control room. The result is more consistent, more immediate and more efficient - and hence radically more scaleable - than current state-of-the-art (VLOS). This 'augmented human' approach is also the fastest route to full autonomy.
16:40	Q&A

16:45	**'Getting the Right Time Right'**
	Chris Farrow, Chronos @Chronos_ChrisF
	This talk will consider global reliance on a coded radio signal that was state-of-the-art when it was specified in the 1970s as it becomes trivially spoofable today with battery powered COTS hardware & software. Spoofing GPS to fool location & timing receivers is nothing new, but how can we engineer the very technology that enables the spoofers to build defences that protect critical infrastructure?
17:10	Q&A
17:15	**Closing remarks provided by** Location Group SIG Champion **Bob Cockshott, The KTN**
17:20	**Delegates are then invited to the networking drinks reception of the CW Founder Dinner.**

With the permission of the speakers, presentations will be loaded to the CW website on the day following the event

Profile of organisers

Cambridge Wireless (CW)

CW is the leading international community for companies involved in the research, development and application of wireless and mobile, internet, semiconductor and software technologies. With over 400 members from major network operators and device manufacturers to innovative start-ups and universities, CW stimulates debate and collaboration, harnesses and shares knowledge, and helps to build connections between academia and industry. CW's 19 Special Interest Groups (SIGs) provide its members with a dynamic forum where they can network with their peers, track the latest technology trends and business developments and position their organisations in key market sectors. CW also organises major conferences and start-up competitions along with other high-quality industry networking events and dinners. 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**

Profile of SIG Champions

David Bartlett, Senior Principal Engineer Positioning, u-blox

David Bartlett works in the positioning technology (R&D) group at u-blox with a focus on hybrid positioning: bringing together GNSS with terrestrial systems such as UWB and V2X, primarily in support of future autonomous vehicle, driverless car and robotics applications but also for IoT and indoor positioning. Prior to this he was CTO and co-founder of Omnisense delivering high precision indoor IoT tracking solutions. He also worked at Cambridge Positioning systems with a focus on cellular positioning and network aided GNSS techniques. **www.u-blox.com**

Bob Cockshott, PNT Lead; Quantum Lead, The KTN

After 25 years in the space industry working mainly on electro-optical payloads, Bob has spent the last 13 years in the government-funded Knowledge Transfer Network, supporting business in position, navigation and timing, and more recently also quantum technology. Bob has taken a special interest in GNSS vulnerability, and has organised international conferences on vulnerability and its mitigation. Bob is a member of the Cabinet Office PNT Technical Group and chairs the Royal Institute of Navigation's Technical Committee. Bob is a member of the International Time and Sync Forum Steering Group and is also a Cambridge Wireless Location Based Services SIG Champion. **www.ktn-uk.co.uk**

Ben Tarlow, Senior Staff Engineer, Qualcomm Technologies International

Ben has worked in positioning for 15 years, developing algorithms for satellite, cellular and other terrestrial RF technologies. At Qualcomm, Ben works in the Advanced Algorithms group, where current research areas in location are data fusion, use of sensor data for positioning and fitness applications; one day, he hopes to be given the remit to explore the area of olfactory positioning. Ben has a background in Pure Mathematics and a PhD in Combinatorics. He has over 20 different patents filed or granted, mostly on subjects relating to positioning. **www.qualcomm.com**

Profile of speakers

Mr Mamon Alghananim Faculty of Engineering, Department of Civil and Environmental Engineering, Imperial College, London

Mamon has been a PhD student in the Centre for Transport Study Imperial College London since December 2017. His research is developing techniques and models for the monitoring of the integrity of satellite-based technology for high accuracy positioning and navigation. **www.imperial.ac.uk**

Ramsey Faragher, CEO, Focal Point Positioning Ltd.

Dr Ramsey Faragher is a world-leading expert in GNSS-denied positioning, sensor fusion, and machine-learning for navigation systems. He is the Founder and CEO of Focal Point Positioning Ltd. and is leading the development of game-changing new technologies to set new standards in indoor positioning and autonomous positioning systems. He is also a Fellow of the Royal Institute of Navigation, and a Bye Fellow of Queens' College, Cambridge. Previously he was a Senior Research Associate at the University of Cambridge, where he developed the first online SLAM-based indoor positioning system for smartphones.Previously he was a Principal Scientist at the BAE Systems Advanced Technology Centre where he developed the award-winning and patented NAVSOP opportunistic positioning suite and other GNSS-denied tracking technologies. In 2009 he won the BAE Systems Early Career Engineer of the Year award for developing NAVSOP. Ramsey has developed and recommended state-of-the-art improvements to the navigation systems of manned and autonomous platforms in the land, air and sea domains working with BAE Systems, MOD, ESA, RSSB and a number of SMEs. He regularly contributes to BBC Naked Scientists broadcasts and has also provided science advice for two television production companies. **www.focalpointpositioning.com**

Dr Markus Kuhn, Department of Computer Science and Technology, University of Cambridge

Markus Kuhn is a Senior Lecturer at the University of Cambridge Department of Computer Science and Technology. His research interests focus on computer security and distributed systems, in particular hardware and signal-processing aspects of computer security, including compromising emanations, side-channel attacks, distance-bounding protocols, and the security of RFID and navigation systems. He graduated from the University of Erlangen-Nürnberg (Germany) in 1996, got an MSc from Purdue University (Indiana) in 1997, and a PhD from the University of Cambridge (England) in 2002, all in Computer Science. **www.cl.cam.ac.uk**

Eduardo Aldaz Carroll, CTO, Sees.ai

Previously, Manager Touch & Sensing Innovation Team at Apple Cupertino; 2x Winner of the America's Cup with Oracle Racing (personally designed the mechatronic daggerboard control system that contributed to Oracle winning the Cup in 2013); Electronic & Controls Engineer at CERN (European Laboratory for Particle Physics). Eduardo has 15+ years experience in electronic system design and implementation, with in-depth knowledge of robotics, embedded systems. **https://sees.ai**

Chris Farrow, Chronos

Chris has been 'in sync' since the mid-1990s when he was involved in significant upgrades with the UK's major telecom operators as they rolled out SDH and their first dedicated Sync Networks. At Chronos Chris is responsible for professional services focused on the sync product area including delivery of the Synchronisation MasterClass, Sync Audits, network planning consultancy and acts as a system architect for product development. Chris has extensive practical knowledge of precise time & timing generation and distribution systems from atomic clocks to GNSS and networked distribution technologies. Chris is an active member of standards groups focused on sync & timing including the ITU (SG15/Q13). Chris joined Chronos from Marconi's UK Technical Assistance Centre where he was a sync product specialist and emergency support engineer for the entire product portfolio – from PSTN to optical & packet. **www.chronos.ltd.uk**