Location-based Systems & Services SIG

'Precise Location: Myth or Reality'

5 June 2014

This event is kindly sponsored and hosted by CSR

This SIG is championed by Nicolas Graube of CSR, David Bartlett of Omnisense, Andrew Matthews of Nokia Research Center

Venue: CSR, Churchill House, Cambridge Business Park, Cowley Road, Cambridge, CB4 0WZ

AGENDA

12:00	Registration & Networking over Lunch
13:00	Introduction to the Cambridge Wireless Location-based Systems & Services SIG from **Andy Matthews** of **Nokia Research Center**
13:10	Welcome from our sponsor and host, **Nicolas Graube** of **CSR**

All speaker sessions chaired by Nicolas Graube of CSR

13:20 **'Explosion in Satellite Navigation'**

Dr Tony Pratt, Independent Consultant, **Orbstar Consultants**

There has been rapid growth in the number of providers of satellite navigation signals during the past 7 years or so. The providers now are the USA (GPS), Russian Federation (Glonass), European Union (Galileo), China (Beidou), Japan (QZSS), India (IRNSS, GINS). In addition to these primary navigation signals, there are also available a (growing) number of Space-based Augmentation Systems (SBAS) including WAAS, EGNOS, SDCM, MSAS and others. The presentation provides insight into the reasons for this growth, the satellite orbits chosen and the signals available from each. Innovation in the signal structure has encouraged considerations of greater accuracy, partly from the satellite position and clock accuracy, partly from orbit description and modelling and partly from the signal processing techniques in use. Which signals should be used and why? Perhaps, all should be used but this implies increase in receiver complexity. Is it worth it? The presentation will touch upon these critical questions for both the user and receiver designer.

13:40 Q&A

13:45 **'Behind the little blue dot'**

Dr Ramsey Faragher, Senior Research Associate, **University of Cambridge**

We have all become accustomed to the reliability of the little blue dot on our smartphone maps, and the fusion of satellite, cellular and Wi-Fi positioning systems mean that it is rare to find ourselves stuck without a position fix. But what started life as a casual navigation tool for vehicular navigation (benefiting from the assumption that snap-to-the-road algorithms correct the positioning errors) is now being squeezed for more and more performance. Your smartphone will soon confirm which supermarket aisle you are in, and will take you right to your seat at football matches and concerts. That level of accuracy requires a very careful appreciation of what is really going on behind the little blue dot, and mere assumptions have to be left at the door. In this talk we will look at the importance of confidence estimation in the design, implementation and delivery of indoor location systems and its role in providing improved performance, not just better error estimates, for the user. We will look at how system modelling and computational grunt can provide higher positioning performance than measurements alone can, and why app developers can only take their tools so far – the true capabilities lie with the chipset providers.

14:05 Q&A

14:10 **'Precise Indoor Location; Myth or Reality'**

James Brice, Consultant, **PA Consulting Group**

James will be talking about what is meant by the term "precise", presenting a summary of the techniques currently used to provide "precise" indoor location along with a description of their efficacy.

14:30 Q&A

14:35 **Refreshment Break**

15:10	**'Mission of Indoor Location Alliance (ILA)** **Kanji Kerai,** Technologist, **Nokia Corporation** Kanji will be speaking on behalf of the **Indoor Location Alliance (ILA).** Many members have joined the ILA to come up with an indoor system solution with interoperable modules as well as share results from pilot studies.
15:30	Q&A
15:35	**'Industrial Indoor Location'** **Andy Ward,** CTO and VP Engineering, **Ubisense** Much of the recent interest in precision in-building location has focused on consumer-centric applications, but there are many uses for similar technologies in the industrial domain. In this presentation I'll look at why the characteristics of indoor location systems for industrial applications often differ from those targeted at consumer applications, and why precise location is so valuable to industry.
15:55	Q&A
16:00	**Panel Session** with all speakers chaired by **David Bartlett of Omnisense**
16:45	**Event Close** Please Fill in Evaluation Forms

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

Profile of Organiser

Cambridge Wireless (CW)

CW is the leading international community for companies involved in the research, development and application of wireless & mobile, internet, semiconductor and software technologies. With 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 20 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 the annual Future of Wireless International Conference and Discovering Start-ups competition 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. For more information, please visit www.**cambridgewireless**.co.uk

Profile of Sponsor

CSR plc

CSR is a global provider of innovative silicon and software solutions for the location-aware, media-rich, cloud-connected world. Our platforms are optimised for the automotive navigation and infotainment, digital cameras and imaging, connected home infotainment and wireless audio markets. We provide solutions to complex problems in the audio-visual, connectivity and location technology domains across a broad range of markets, with a technology portfolio that includes GPS/GNSS systems, Bluetooth®, Wi-Fi®, FM, NFC, aptX® and CVC™ audio codecs, JPEG, MPEG, H.264 imaging, PDL printing, microcontrollers, DSPs and broadband receivers. CSR's technology solutions and market platforms enable its customers to deliver a superior user experience and are adopted by leaders in the auto, computer, home and mobile markets. For further information, please visit www.**csr**.com.

Profile of SIG Champion

David Bartlett, Omnisense

David Bartlett has specialist knowledge in the fields of location technology, wireless communications and digital imaging. Omnisense supplies real-time location and tracking systems (RTLS), technology and services based on its patented sparse-wideband (SWB) technology. The technology is extremely reliable and the entire system can be deployed without need for wired infrastructure (wireless). As such the system can be deployed rapidly and is fully transportable to different sites. For further information please visit www.**omnisense**.co.uk

Nicolas Graube, CSR plc

Nicolas Graube is leading the advanced location algorithms group at CSR. Directly reporting to the Chief Innovation Officer, this group is tasked to cover all aspects of in-doors location technologies, present and future, within the organization. Expertise in the domain of location has been gained over a period of more than twenty years, starting at Cambridge EuroPARC in the early 90's, using Olivetti's Active Badges, then more recently providing Location Solutions in

the Cellular domains (GSM,UMTS), and presently addressing in-doors challenges using both WiFi and Ble. Particular interest of the group is in the domain of usage of location with constrained infra-structure, in public and enterprise spaces, using stock hardware. For further information, please visit www.**csr**.com

Dr Andrew Matthews, Nokia Research Centre, Eurolab

Andrew Matthews is Director of Technology Management in the Sensors and Materials Laboratory (SML) of Nokia Research Center (NRC). NRC forms the main research arm of Nokia Corporation, looking at longer term technologies and innovations for mobile communications. SML focuses particularly on graphene and other 2D materials, flexible and printed electronics, novel low-power sensors and algorithms for the Internet of Things, and Quantum Computing. The laboratory has research offices in Cambridge, Helsinki, Finland and Moscow, Russia. Andrew graduated in engineering and went on to complete a PhD in Ion implantation, receiving a Royal Society Fellowship to continue his research in RIKEN in Japan. After completing his research, Andrew entered the commercial world and undertook roles in international sales and business development, product development and general management, focussing primarily on sensor and communication technologies. During this period, Andrew has held a variety of director level roles, providing strategic planning and commercial drive to companies ranging from private equity financed start-ups to multi-national corporations. For further information please visit www.**research.nokia**.com

Profile of Speakers

James Brice, PA Consulting Group

I am a Consultant at PA Consulting with over 15 years of experience working with a variety of location technologies. These have included E-OTD, GPS, WiFi and TDOA while working in my current position and previously at Cambridge Positioning Systems Ltd." For more information please visit www.**paconsulting**.com

Dr Ramsey Faragher, University of Cambridge

Dr Ramsey Faragher is a Senior Research Associate at the University of Cambridge working on GNSS-denied positioning, sensor fusion and machine learning. He is also an Associate Editor for the Royal Institute of Navigation journal. Prior to this he was a Principal Scientist at the BAE Systems Advanced Technology Centre where he developed the NAVSOP opportunistic positioning system and other GNSS-denied tracking technologies. In 2009 Ramsey won the BAE Systems Early Career Engineer of the Year award for developing NAVSOP www.**cl.cam**.ac.uk

Kanji Kerai, Nokia Corporation

Kanji Kerai is a Technologist in Nokia Corporation; he has many years of experience in cellular as well as short range wireless technologies. For more information please visit www.**nokia.**com Kanji will be speaking on behalf of the **Indoor Location Alliance (ILA).** For more information please visit www.**in-location-alliance**.com

Dr Tony Pratt, Orbstar Consultants

Dr Tony Pratt was Technical Director of Navstar Ltd - a navigation receiver manufacturer which made Transit, Decca, Loran and GPS instruments. He was a Special Professor at Nottingham University, IESSG until retirement. He is now an independent consultant working for the UK Government, Defence Equipment Manufacturers and the US Government, primarily on Galileo System development and military GPS receiver design. He also provides Expert Witness support to a number of patent litigation cases (past and present), mainly in the USA. Dr Pratt was part of the negotiating team which led to the EU-US Agreement on GPS Galileo cooperation and remains on the resulting WG A. He continues as a member of the EU CSI group (which replaced the Signal Task Force). Dr Pratt is a member of ESA's Space Policy Advisory Committee, advising the DG on the future direction of ESA's programme (HISPAC). He also manages and teaches the navigation course at the University of Delft as part of the SpaceTech programme. For more information please visit www.**insidegnss.com**/node/1160

Dr Andy Ward, Ubisense

Andy has designed, built and worked with in-building location systems for over twenty years. He received a BA in Computer Science and a PhD in 'Sensor-driven Computing' from Cambridge University, and led location technology research at AT&T Laboratories Cambridge. He is currently Chief Technology Officer and VP Engineering of Ubisense, a company he co-founded in 2002 to commercialize ultrawideband in-building tracking technology. For more information please visit www.**ubisense**.net