Plenary Speakers Cover a Wide Field

Atoms, Crime, and Farming

Navigation technology covered a lot of ground at Tuesday’s night opening of ION GNSS 2012 under the heading, “GNSS Revolution: the Catalyst of the New Information Age”—from the level of atoms and into the field with forensic science and precision agriculture.

Plenary speakers were Stanford University Professor Mark Kasevich, speaking on Precision Navigation Sensors based on Atom Interferometry, police consultant and Professor Emeritus David Last of the UK’s University of Bangor, speaking on technologically innovative exposition entitled “Crime, Punishment, and the Global Positioning System,” and Tony Thelen, director of John Deere’s Intelligent Solutions Group, addressing the theme of “High Precision Agriculture.”

Although the subject was new to many in the ION audience, atom interferometry has been the subject of Professor Kasevich’s attention for more than 20 years. A subject of considerable interest and support from such governmental bodies as the Defense Advanced Research Projects Agency and NASA–Goddard Space Flight Center, atom interferometry holds the promise of major advances in the accuracy of inertial sensors, according to the Stanford professor of physics and applied physics.

Conceptually, atom interferometry works much like optical interferometry in which a beam-splitter divides light into two beams. One beam reflects off a mirror fixed on the arm of an interferometer while the other reflects off a movable mirror. The two beams recombine at the end of the optical path, “interfering” with each other and enabling scientists to measure the small displacement.

Atom interferometry, however, hinges on quantum mechanics, which describes how matter behaves at atomic scales. Atoms can be manipulated into acting like waves if cooled to near absolute zero, which scientists achieve by firing a laser at the atom. The atoms have different momentums defined by the laser beams.

Some sensor accuracy derives from the use of optical wavefronts to determine this relative motion. A kinematic sensor, the atom interferometer directly reads angular and linear displacements.

Professor Kasevich believes that, in the near future, Al sensors could produce profound advances in navigation. For instance, a gyrocompass operating with a 0.00015 degree/hour bias stability, an order of magnitude improvement from the accuracy currently available from the best ring laser gyros or fiber optic gyro.

Professor Kasevich is consulting chief scientist at AOSense, Inc., which is attempting to commercialize the technique, designing and building gravity and inertial sensors based on atom optics (AO) techniques. He was one of the first Ph.D. students of Dr. Steven Chu, currently U.S. Secretary of Energy, when the latter headed a research group at Stanford and coauthored some of Kasevich’s early papers on atomic interferometry.

ION GNSS 2012

Welcome to Nashville and ION GNSS 2012

Today’s schedule offers GNSS program updates, technical sessions, and an exhibitor-hosted reception against the melodic background of Music City USA.

Welcome to ION GNSS 2012 — the 25th International Technical Meeting of the Satellite Division of The Institute of Navigation and the world’s largest international technical meeting and showcase of GNSS technology, products and services.

ION GNSS 2012 brings together international leaders in GNSS and related positioning, navigation and timing fields to present new research, introduce new technologies, and exchange ideas.

Nashville, Tennessee, Music City U.S.A. and the capital of country music, is playing host to this year’s ION GNSS meeting where you'll delight in the many live music events, visit the honky-tomks of Lower Broadway just a block away from the Convention Center, explore Nashville’s Southern history and charm, wander through one-of-a-kind museums, or just soak up the aura of an authentic American City.

As always, ION GNSS 2012 will offer a rich mix of technical content. This year 298 papers will be offered in 39 sessions, backed up by 120 accepted alternate papers. Session categories cover a range of design engineering, applications, program, alternate technology, and operational topics.

Another highlight is today’s GPS Program Update Panel Discussion led by MITRE Corporation’s John Betz and featuring updates on satellite-based navigation systems by leading experts from the GPS Directorate (GPS), Russia’s Central Research Institute of Rosenau (GLONASS), the European Commission’s satellite navigation program office (Gallileo), China’s BeiDou Management Office (Compass), and the Japan Aerospace Exploration Agency (Quasi-Zenith Satellite System, or QZSS). In the following days, the panel discussion track will feature four additional “workshops” on Beidou/Compass, Galileo, GLONASS, and QZSS.

This afternoon you may also want to attend the High Integrity Systems Program Update Panel Discussion led by Mr. Patrick Flueff of the European Space Agency and featuring speakers Deane Bunce, Federal Aviation Administration, USA; Wang Dangwei, Ron Bin and Yang Niantian, Xi’an Research Institute of Navigation Technology, China; Dr. Sergey Karutin, Russian Space Systems, Russia; and Dr. Todd Walter, Stanford University, USA.

As the world’s largest commercial showcase of GNSS and complementary products and services, the ION GNSS exhibition draws companies and technology-related organizations from around the globe. Nearly a dozen new exhibitors are appearing in the hall this year during the two and a half days the venue is open. Luncheons will be served there today and Thursday, and tonight’s exhibitor-hosted reception (6-8 p.m.) is a networking highlight of the conference.

And be sure to enjoy your free time by exploring Nashville. Visitors will find a city of culture and history, of haute cuisine, of pro sports, of outstanding architecture, natural beauty and a place where the past and the future peacefully co-exist and complement one another.

This city is alive. You can feel its pulse when you walk down its sidewalks. And, fortunately, you can also hear it almost anywhere you go.

About Your Hosts

Since its founding at the time of the first ION GPS meeting in Colorado Springs, Colorado, in 1987, the Satellite Division has grown into the ION’s most active division. The ION GNSS conference series has drawn worldwide attention, attendance, and recognition as the forum for announcing new policy and technology developments and applications of global navigation satellite systems. No other conference so aptly illustrates the breadth and depth of GNSS technology or the growth and vitality of the marketplace.

ION GNSS 2012 Program Committee

General Chair: Dr. Dorota Grejper-Brezinska, The Ohio State University; Program Chair: Dr. Jade Morton, Miami University (Ohio); ION President: Dr. Todd Walter, Stanford University; Dr. John Betz, The MITRE Corporation; Dr. Grace Guo, Stanford University;
Random Fixes

Spirient and DLR: Live Demos of Adaptive Antenna Array
Spirient (Book 709) and the German Aerospace Center (DLR) (Book 700) presented what’s believed to be an adaptive antenna array being driven by a multi-RF output constellation simulator. The DLR GPS/ Galileo multi-antenna receiver uses a four-element antenna array for digital beam forming (in the vertical direction), even during periods of time when satellite signals are blocked or unavailable. With shipments beginning this month, NovAtel’s SPAN technology will be supported on OEM615 and OEM628 board level receivers and the FlexPak receiver providing integrators a rugged enclosed platform that can be paired with the company’s complete range of IMU sensors. The OEM615 and 628 boards replace NovAtel’s legacy OEM6 series.

IFEN DEMOS NEW FEATURES IN GNSS SIMULATOR
At ION GNSS 2012, IFEN (Book 700) will partner with WORK Microwave to demonstrate innovative enhancements to their NavX-NCS multi-GNSS, GPS, GLONASS, Galileo, SBAS RF constellation simulator product line. New features include multi-RF output, optimized software, remote control, and NavMig logging and input capabilities. The simulator provides up to nine L-band frequencies and 108 channels.

NEW PRODUCT ANNOUNCEMENTS
NovAtel Inc. (Book 700) announced today the addition of its SPAN GNSS/inertial navigation system (INS) technology to the company’s OEM6 GNSS receiver platform to provide continuously available navigation, position, velocity and attitude (roll, pitch, yaw) even during periods of time when satellite signals are blocked or unavailable. With shipments beginning this month, NovAtel’s SPAN technology will be supported on OEM615 and OEM628 board level receivers and the FlexPak receiver providing integrators a rugged enclosed platform that can be paired with the company’s complete range of IMU sensors. The OEM615 and 628 boards replace NovAtel’s legacy OEM6 series.

TOPCON LAUNCHES DUAL-FREQUENCY GNSS RECEIVER BOARD
At ION GNSS 2012 this week, Topcon Positioning Systems (Book 709) has launched a ultra-compact, dual-frequency positioning engine, the B110 GNSS receiver board. The B110 is the first GNSS board with Topcon’s new Vanguard ASIC, supporting 226 universal channels for GPS, GLONASS, Galileo and satellite augmentation systems (SBAS) tracking and selectable polarization (up to 100-hertz update rate) from sub-meter DGPS to sub-centimeter RTK. The B110 board’s small size (40x55 mm), low power consumption, low power consumption, and flexible communication interfaces are designed to facilitate integration into any precision positioning application, reducing the time-to-market for OEM customers.

SPECTRACOM PRESENTS NEW DUAL-FREQUENCY GNSS SIMULATOR
Spectracom (Book 110) will feature its new L1+L2 dual frequency 32-channel mini-GNSS simulator, the G62-32, which offers multiple frequency operation, multiple GNSS constellation simulation, and expansion capability for more RF bands and channels. The G62-32 is designed for manufacturing and development testing with its ability to simulate all the satellites for the receiver test. With 16 channels for L1 frequency and 16 channels for L2 frequency, channels can be assigned to GPS or GLONASS, P-code or C/A code. Channels may also be used for SBAS simulation of EGNOS, WAAS, GAGAN, or MSAS satellites, or for multipath and interference signals.

LABSAT PRECISION TURNABLE SYSTEM DEMO AT NAVTECHGPS EXHIBIT
NavTechGPS (Book 523), a U.S. distributor for Racelogic, will host: NavTech product manager Mark Sampson, who will be on hand throughout the meeting to answer questions about the LabSat simulator product line and to demonstrate the LabSat Precision Turntable System. These live demos will show how LabSat equipment can be used to simulate real-world scenarios that include a loss of signal — a common problem facing OEM navigation system developers. The turntable solution allows for the replay of dead-reckoning signals as well as those from GPS, along with integrated synchronous video. New LabSat precision sensors will be available to answer questions about LabSat products and any of the hundreds of other high-precision GPS/GNSS products NavTechGPS sells.

EXHIBITORS — Information for the Show Daily: You may drop off press releases, new product announcements and other information for the Show Daily at the ION Membership Booth 324 in the Exhibit Hall or at the Registration Desk in the foyer.
John Nielsenn, Rockwell Collins, Dr. Thomas Parny, IFEN GmbH, Germany; Bernhard Richter, Levin Geosystems, Switzerland; Dr. Frank van Diggelen, Broadstreet Prod. Mark Lohne, University College London, UK

Satellite Division Officers
Chair, Dr. John Raptopol, Air Force Institute of Technology, Vice Chair, Dr. Jade Morton, Miami University (Ohio); Secretary, Timothy Mehl, The Boeing Company; Treasurer, Dr. Paul Kleine, AirLabs; Immediate Past Chair, Dr. Pratap Misra, Tufs University; Pacific Technical Advisor, Dr. Allison Keely, University of Melbourne, Australia; European Technical Advisor, Dr. José Angel Aita Rodriguez, ESA/ESTEC, The Netherlands; Compass Advisor, Dr. Xiancheng Ding, China Baldo Management Office; Chile Galileo Advisor, Dr. Günter W. Heim, ESA/ESTEC, The Netherlands

Dr. Dorota Grejner-Brzezinska, general chair of ION GNSS 2012, is a professor in geodetic science and director of the Satellite Positioning and Inertial Navigation (SPFN) Laboratory at The Ohio State University. Her research interests cover high-accuracy GPS algorithms, GPS/INS and other sensor integration for navigation in GPS-challenged environments, personal navigation, and robust estimation techniques. She is president of the International Association of Geodesy (IAG) Commission 4, Positioning and Applications, and an IAG Fellow. Dr. Brzezinska has been serving on the Institute of Navigation (ION) Council for the past nine years, and is also an ION Felllow. She has published more than 190 peer-reviewed journal and proceedings papers, numerous technical reports, and five book chapters on GPS and navigation and was the recipient of the ION'S 2005 Thomas Thrall Award. She is an ION and IAG Fellow.

Dr. Jade Morton, program chair for ION GNSS 2012, is a professor in electrical engineering at Miami University of Ohio. She received her B.S. in physics from Nanjing University, China, an MSEE from Case Western Reserve University, an M.S.A. in systems analysis at The Ohio State University. She is a post-doctoral research fellow at the University of Michigan. Her current research interests are in advanced GPS receivers and ionosphere effects on GPS performances. Dr. Morton has served the ION as a session chair and technical chair for numerous meetings, including program and general chair of the ION'S International Technical Meeting (ITM) in 2011 and 2012 respectively. Dr. Morton is currently vice chair of the Satellite Division and outreach chair on ION Council.

Visit The ION/AAAS Government Fellows Booth
Wednesday, Sept. 19
5:30 p.m. – 6:30 p.m.
Exhibit Hall Entrance

JOIN OR RENEW YOUR MEMBERSHIP AND SPIN THE WHEEL FOR A FREE PRIZE!
TAKE ADVANTAGE OF THE MEMBERSHIP SPECIAL TODAY!

If you’re not currently a member of The Institute of Navigation (ION), you probably have a yellow badge.
This is your chance to JOIN The Institute of Navigation at a reduced rate! Use our yellow badge.

JOIN OR RENEW YOUR ION MEMBERSHIP during GNSS 2012, you will get a free spin of the prize wheel.
Two easy ways to JOIN OR RENEW:
1) Go to the registration desk and complete the membership or renewal form, then
2) Spin the PRIZE WHEEL for a free prize.

Everyone wins (unless you land on “Loose your Turn”). Prizes include Starbucks gift certificates, ION lapel pins, ION Coins, ION ear buds, and other fun prizes.

This is the best opportunity to JOIN ION at a great price.
Solved.

SAASM compliance is no longer a problem. NovAtel’s new OEM-625S is a simple drop-in replacement for your existing OEMV-2 or OEM628 receiver. In fact, it’s the only SAASM GPS + civil RTK solution available. No surprise it’s from NovAtel.

For the world’s most reliable GNSS technology, visit novatel.com/SAASM.

Integrate success into your...