# The Institute of Navigation
# 2012 International Technical Meeting
# Technical Session Overview
## January 30 – February 1, 2012 Newport Beach, CA

| Mon. Morning<br>8:45 a.m.–12:00 p.m. | Mon. Afternoon<br>2:00 p.m.–5:30 p.m. | Tues. Morning<br>8:30 a.m.–12:00 p.m. | Tues. Afternoon<br>2:00 p.m.–5:30 p.m. | Wed. Morning<br>8:30 a.m.–12:00 p.m. | Wed. Afternoon<br>1:00 p.m.–4:10 p.m. |
|---|---|---|---|---|---|
| **Welcome:**<br>8:45 a.m.–9:00 a.m.<br>**Plenary Session:**<br>9:00 a.m.–10:15 a.m.<br>Pacific Ballroom C/D<br>Challenges of Turning Vision into Reality<br>**BREAK**<br>10:15 a.m.–10:45 a.m.<br>10:45 a.m.–12:00 p.m.<br>Pacific Ballroom C/D<br>Challenges of Realizing a Global Navigation Capability<br>12:00 p.m. – 1:00 p.m.<br>**Informal Luncheon**<br>Rose Garden (outside)<br>(if inclement weather, Pacific Ballroom A/B) | Pacific Ballroom C<br>**A1:** Alternate Sensors & Systems<br>Pacific Ballroom E/F<br>**B1:** Algorithms & Methods 1: Receiver Signal Processing<br>Pacific Ballroom D<br>**C1:** Autonomous Navigation/Robotics | Pacific Ballroom E/F<br>**A2:** Timing Applications<br>Pacific Ballroom D<br>**B2:** Spectrum & Interference Issues<br>Pacific Ballroom C<br>**C2:** Space & PNT Applications<br>12:00 p.m. – 2:00 p.m.<br>**Lunch Is On Your Own** | Pacific Ballroom D<br>**A3:** Urban & Indoor Applications<br>Pacific Ballroom E/F<br>**B3:** Algorithms & Methods 2: Navigation<br>Pacific Ballroom C<br>**C3:** QZSS<br>**ION Annual Awards & Fellows Banquet**<br>Pacific Ballroom A/B<br>6:30 p.m. – 7:00 p.m.<br>Cash Bar<br>7:00 p.m. – 9:00 p.m.<br>Dinner & Program | Pacific Ballroom C<br>**A4:** Maritime Applications<br>Pacific Ballroom E/F<br>**B4:** Atmospheric Effects<br>Pacific Ballroom D<br>**C4:** Remote Sensing Using GNSS<br>12:00 p.m. – 1:00 p.m.<br>**Informal Luncheon**<br>Rose Garden (outside)<br>(if inclement weather, Pacific Ballroom A/B) | Pacific Ballroom E/F<br>**A5:** Aviation Applications<br>Pacific Ballroom D<br>**B5:** GNSS Modernization<br>Pacific Ballroom C<br>**C5:** Receivers & Antenna Technology |

*Note that the photographing of sessions/presentations and/or the audio or video recording of sessions/presentations is prohibited. As a courtesy to others, please set all cell phones to vibrate.*

# Plenary Session
## January 30, 2012 • 8:45 a.m. – 12:00 p.m.
## Pacific Ballroom C/D
### Welcome and Introductions: 8:45 a.m. - 9:00 a.m.

Dr. Todd Walter
**ION President**
*Stanford University*

Dr. Jade Morton
**ION General Chair**
*Miami University, Ohio*

Mr. Douglas Taggart
**ION Program Chair**
*Overlook Systems Technologies, Inc.*

### Plenary Session
**Challenges of Turning Vision into Reality: 9:00 a.m. - 10:15 a.m.**

Mr. Jeff Carlisle, *Executive Vice President, Regulatory Affairs and Public Policy, LightSquared*
Mr. Ray Kolibaba, *VP and OCX Program Manager, Raytheon*
Mr. Jim Geringer, *Director of Policy and Public Sector Strategy, ESRI*
Mr. Jules McNeff, *VP Strategy and Programs, Overlook Systems Technologies, Inc.*

**Break 10:15 a.m. – 10:45 a.m.**

**Challenges of Realizing a Global Navigation Capability: 10:45 a.m.-12:00 p.m.**

Mr. Anthony J. Russo, *Director National Coordination Office for Space-Based PNT*
Mr. Ray Swider, *Director for GPS & PNT, Office of the Secretary of Defense*
Dr. David Last, *Consultant, UK*
Mr. Chuck Schue, *President & CEO, UrsaNav*

**Informal Luncheon, 12:00 p.m. – 1:00 p.m., Rose Garden (outside)**
**In case of inclement weather, this function will be held in the Pacific Ballroom A/B.**

Jules McNeff, *Overlook Systems Technologies, Inc.*

Chris Stout, *UrsaNav*

## Session A1: Alternate Sensors & Systems

**2:00 p.m. – 5:30 p.m., Pacific Ballroom C**

**2:05** 1. **Advanced GNSS Integrity Using Signals of Opportunity:** M. Enright, H. Sridhara, *Quantum Dimension;* T. Nguyen, *AFRL Sensors Directorate*

**2:35** 2. **Autonomous Ground Vehicle Navigation in a Real Traffic Environment with Monocular Camera and Low-Cost Inertial Sensors:** T. Chu, *Peking University, China;* N. Guo, *Beihang University, China;* S. Backen, D. Akos, *University of Colorado at Boulder*

**3:05** 3. **Signal Structure Study for Passive Ranging System Using Existing Distance Measuring Equipment (DME):** S. Lo, P. Enge, *Stanford University*

**Break 3:35 p.m. – 3:55 p.m.**

**4:00** 4. **Flight Test Performance Assessment of eDME for APNT:** K. Li, W. Pelgrum, *Ohio University*

**4:30** 5. **A New Concept of APNT: 3-D Positioning with Even a Single DME Station:** O. Kim, C. Kim, *Seoul National University, South Korea;* T. Lee, *Korea Institute of Science and Technology, South Korea;* C. Kee, *Seoul National University, South Korea*

**5:00** 6. **Integration of Cold-Atom Interferometry INS with Other Sensors:** A.J. Canciani, J.F. Raquet, *Air Force Institute of Technology*

Alternates

1. **A New Local High-Precision Navigation System:** V. Oehler, J. Steffes, M. von Voithenberg, S. Schlotzer, *EADS Astrium GmbH, Germany*
2. **Investigation of Different Maneuvering Modes of The Magnetometer Calibration for Pedestrian Navigation:** A.S. Ali, S. Siddharth, N. El-Sheimy, *University of Calgary, Canada;* Z.F. Syed, C.L. Goodall, *Trusted Positioning, Inc., Canada*
3. **GNSS-based Multi-Sensor System for Structural Monitoring Applications:** M. Figurski, M. Wrona, *Military University of Technology, Poland*

Dr. Michael Enright, *Quantum Dimension, Inc.*

Paul Benshoof, *USAF 746, Test Squadron*

## Session B1: Algorithms & Methods 1: Receiver Signal Processing

**2:00 p.m. – 5:30 p.m., Pacific Ballroom E/F**

**2:05** 1. **Cooperative Code Acquisition Based on the P2P Paradigm:** G. Gabelli, L. Deambrogio, *University of Bologna, Italy;* C. Palestini, *European GNSS Supervisory Authority;* F. Bastia, G.E. Corazza, *University of Bologna, Italy;* J. Samson, *European Space Agency ESA/ESTEC*

**2:35** 2. **Detailed Signal Analysis Without a Dish: A GPS IIF L5 Signal Case Study:** J. York, J. Little, O. Caldwell, S. Nelsen, *ARL University of Texas at Austin*

**3:05** 3. **Dynamics & Performance of a GPS Inspired TRN Tracking Loop:** D. Vaman, *Delft University of Technology, The Netherlands;* P. Oonincx, *Netherlands Defence Academy, The Netherlands*

**Break 3:35 p.m. – 3:55 p.m.**

**4:00** 4. **Folding Techniques for Low Complexity Acquisition of Modern GNSS Signals:** M. Tahir, *Politecnico di Torino, Italy;* M. Fantino, *Istituto Superiore Mario Boella, Italy;* L. Lo Presti, *Politecnico di Torino, Italy*

**4:30** 5. **Characterizing Different Open Loop Fine Frequency Estimation Methods for GNSS Receivers:** M. Tahir, *Politecnico di Torino, Italy;* M. Fantino, *Istituto Superiore Mario Boella, Italy;* L. Lo Presti, *Politecnico di Torino, Italy*

**5:00** 6. **A Compressed Sensing Technique for GPS Signal Acquisition:** S-H. Kong, *Korea Advanced Institute of Science and Technology, South Korea*

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Alternates

1. **Optimized GNSS Signals Acquisition Based on Special Non-uniform Sampling:** B. Bardak, I. Kale, *University of Westminster, UK*
2. **Memory Resource Integration of GNSS Code Acquisition:** C-W. Chen, S-H. Chen, W-L. Mao, H-W. Tsao, *National Taiwan University, Taiwan*

## Session C1: Autonomous Navigation/Robotics

### 2:00 p.m. – 5:30 p.m., Pacific Ballroom D

Prof. Richard J. Hartnett, *USCG Academy*

Dr. Michael Zeitzew, *NavCom/Deere*

**2:05** **1. A Real-time Autonomous Visual Navigation System for Helicopters Based on GPU Accelerated Speeded-Up Robust Features:** H. Bai, *Nanjing University of Science and Technology, China and University of Toronto, Canada;* X. Xue, *Nanjing University of Science and Technology, China;* A. Goldenberg, *Unviersity of Toronto, Canada*

**2:35** **2. Robust Ground Vehicle Constraints for Aiding Stand Alone INS and Determining Inertial Sensor Errors:** J. Ryan, D. Bevly, *Auburn University*

**Break 3:35 p.m. – 3:55 p.m.**

**3:05** **3. The CSUF Robotic Lawnmower: Lessons Learned from Modifying a Riding Lawnmower:** J. Huang, M.J. Yeh, D. Fallah, *California State University, Fullerton*

**4:00** **4. An Autonomous Lawnmower Using Fuel Cell:** B. Karimi, D. Pasko, C. Murphy, C. Ballachino, D. Jervis, M. Folcik, *University of New Haven*

**4:30** **5. Characterizing Local Effects on Protection Level Concept in Urban Environments:** K. Ali, *Politecnico di Torino, Italy;* M. Pini, *Istituto Superiore Mario Boella, Italy;* F. Dovis, L. Lo Presti, *Politecnico di Torino, Italy*

Antonije Radojevic, *C.S. Draper Laboratory*

Chuck Bye, *Honeywell*

## Session A2: Timing Applications

### 8:30 a.m. – 12:00 p.m., Pacific Ballroom E/F

**8:35** **1. Micro Ion Frequency Standard:** P.D. D. Schwindt, Y-Y. Jau, H. Partner, L. Fang, A. Casias, K. Wojciechowski, R. Olsson, D. Serkland, R. Manginell, R. Boye, *Sandia National Laboratories;* J. Prestage, N. Yu, *Jet Propulsion Laboratory*

**9:05** **2. Cold Atom Micro Primary Standard (CAMPS):** J. Strabley, K. Salit, J. Kriz, K. Nelson, *Honeywell Aerospace*

**9:35** **3. All-Optical Integrated Rubidium Atomic Clock:** L. Maleki, A.A. Savchenkov, V.S. IIchenko, W. Liang, D. Seidel, A.B. Matsko, *OEwaves Inc.;* N.P. Wells, J.C. Camparo, B. Jaduszliwer, *The Aerospace Corporation*

**Break 10:05 a.m. – 10:25 a.m.**

**10:30** **4. Ranging/Timing off of the NDGPS Signal: Potential Performance:** P.F. Swaszek, *University of Rhode Island;* R.J. Hartnett, *US Coast Guard Academy;* G.W. Johnson, *Alion Science & Technology*

**11:00** **5. Design and Performance of a Low Frequency (LF) Time and Frequency Dissemination Service:** A. Helwig, G. Offermans, C. Stout, C. Schue, *UrsaNav, Inc.*

**11:30** **6. A GPS Common-View Time Transfer Scheme Considering the Code Bias:** M.Y. Shin, D.J. Cho, S.H. Park, *Korea Ocean Research & Development Institute, South Korea;* S.J. Lee, *Chungnam National University, South Korea*

Alternate

**1. Experimental Results of the Time Comparison Between the QZS-1 and Ground Time Management Stations:** M. Nakamura, Y. Takahashi, J. Amagai, T. Gotoh, M. Fujieda, R. Tabuchi, T. Hobiger, S. Hama, *National Institute of Information and Communication Technology, Japan;* Y. Yahagi, *NEC Engineering, Ltd., Japan;* T. Takahashi, S. Horiuchi, *NEC Corporation, Japan;* H. Noda, *Japan Aerospace Exploration Agency, Japan*

**Lunch is on Your Own**

Dr. John Betz, *The MITRE Corporation*

Dr. Thomas D. Powell, *The Aerospace Corporation*

## Session B2: Spectrum and Interference Issues

**8:30 a.m. – 12:00 p.m., Pacific Ballroom D**

**8:35** **1. Receiver Performance and Adjacent MSS L Band Interference Rejection:** C. Kurby, R. Lee, *Greenwood Telecommunications*

**9:05** **2. Performance Impacts of the LightSquared ATC Reference Stations on High Precision Geodetic Receivers:** K.A. Berstis, G.L. Mader, N.D. Weston, W.A. Stone, G.L. Deangelo, F.E. Marion, *NOAA/National Geodetic Survey*

**9:35** **3. Testing High Precision Space Receivers Versus LightSquared Interference:** S. Esterhuizen, D. Turbiner, D. Stowers, L. Young, *Jet Propulsion Laboratory*

**Break 10:05 a.m. – 10:25 a.m.**

**10:30** **4. Field Observations of Personal Privacy Devices:** J.C. Grabowski, *Zeta Associates*

**11:00** **5. Quantization Effects on GNSS Receivers in Presence of Interference: Analysis and Simulation:** M. Abdizadeh, J. Curran, G. Lachapelle, *PLAN Group, University of Calgary, Canada*

**11:30** **6. The Impact of Uninformed RF Interference on GBAS and Potential Mitigations:** S. Pullen, G.X. Gao, *Stanford University;* C. Tedeschi, J. Warburton, *FAA W.J. Hughes Technical Center*

Alternates

1. **Detection and Mitigation of Spoofing Attack on a Vector Based Tracking GPS Receiver:** A.J. Jahromi, T. Lin, A. Broumandan, J. Nielsen, G. Lachapelle, *PLAN Group, University of Calgary, Canada*
2. **LightSquared Interference on Galileo Signals: A Theoretical Assessment:** D. Fontanella, I. Bartunkova, B. Eissfeller, *University FAF Munich, Germany*

Ray Melusky, *DHS/OPS/CIO/ HSIN*

Charles Daniels, *Overlook Systems Technolgies, Inc.*

## Session C2: Space & PNT Applications

**8:30 a.m. – 12:00 p.m., Pacific Ballroom C**

**8:35** **1. A Combined Numerical-Empirical Orbit Propagation Algorithm for Satellite Tracking and Backup Navigation System:** G. Kim, S. Jeon, C. Kim, C. Kee, *Seoul National University, South Korea;* S. Choi, *Korea Aerospace Research Institute Satellite Information Research Center, South Korea*

**9:05** **2. Optimal Waypoint Scheduling of an Imaging Satellite:** A.H. Zorn, *Stanford University;* M. West, *University of Illinois at Urbana-Champaign*

**9:35** **3. China Compass PNT Service Architecture and Outlook:** Q. Sun, J. Zhang, Y. Zhu, *Beihang University, China*

**Break 10:05 a.m. – 10:25 a.m.**

**10:30** **4. DORIS Observations from Iridium for Atmospheric Science:** D. Rainwater, *ARL, University of Texas at Austin;* B. Barnum, *APL, Johns Hopkins University;* T. Gaussiran, *ARL, University of Texas at Austin*

**11:00** **5. Maneuver Parameter Estimation for TanDEM-X Relative Positioning:** Y. Moon, R. Koenig, G. Michalak, *German Research Centre for Geosciences (GFZ), Germany*

**11:30** **6. Next Generation Scalable Spaceborne GNSS Science Receiver:** J.Y. Tien, B. Bachman, J.A. Dickson, S. Esterhuizen, G.W. Franklin, T.K. Meehan, T.N. Munson, D.E. Robison, D. Turbiner, L.E. Young, *Jet Propulsion Laboratory/Caltech*

Alternate

1. **Tolerance Limits Corresponding Confidence Limits Way for Integrity Budget on Multi-Constellation:** Q. Sun, J. Zhang, Y. Zhu, *Beihang University, China*

**Lunch is on Your Own**

Dr. Di Qiu, *Sigtem Technology, Inc.*

Dr. Dorota Grejner-Brzezinska, *The Ohio State University*

## Session A3: Urban and Indoor Applications

**2:00 p.m. – 5:30 p.m., Pacific Ballroom D**

**2:05** **1. Comparison of Point Features for Vision Based Navigation:** Y. Ma, *Honeywell Aerospace, USA;* S. Rao, *Honeywell Technology Solutions Lab., India*

**2:35** **2. A Movement-Classification Algorithm for Pedestrian Using Foot-Mounted IMU:** M.S. Lee, C.W. Shim, C.G. Park, *Seoul National University, South Korea*

**3:05** **3. Weighting and Mitigation of Multipath Effects in GPS Range Measurements in an Urban Environment for Pedestrian Navigation:** M. Langer, C. Ascher, J. Bauer, G.F. Trommer, *KIT - Institute of Systems Optimization, Germany*

**Break 3:35 p.m. – 3:55 p.m.**

**4:00** **4. Tag-free RSSI Based Indoor Localization:** E.A. Wan, A.S. Paul, *Oregon Health & Science University;* P.G. Jacobs, *EmbedRF LLC*

**4:30** **5. Modeling HSGPS Doppler Errors in Indoor Environments for Pedestrian Dead-Reckoning:** Z. He, M. Petovello, G. Lachapelle, *PLAN Group, University of Calgary, Canada*

**5:00** **6. Theory and Practice of Near-Field Electromagnetic Ranging:** H.G. Schantz, E.A. Richards, *The Q-Track Corporation*

Alternates

1. **Precise Output Error Characterization for Triangulation of Visual Landmarks from Two Views with Noisy Camera Pose:** J. Gorgen, L. Lemay, *SPAWAR Systems Center Pacific;* D. Gebre-Egziabher, *University of Minnesota*
2. **Indoor Positioning System using Single Pseudolite with Multiple Antenna:** C. Kim, O. Kim, *Seoul National University, South Korea;* T, Lee, *Korea Institute of Science and Technology, South Korea;* C. Kee, *Seoul National University, South Korea*
3. **Vector Tracking Loop Implementation and Outdoor Test Results for GPS and Pseudolite System:** S. Jeon, *Seoul National University, South Korea;* H. So, *Agency for Defense Development, South Korea;* G. Kim, C. Kim, C. Kee, *Seoul National University, South Korea;* T. Lee, *Korea Institute of Science and Technology, South Korea*
4. **Fading Modeling and Characterization of Indoor GNSS Channels:** Y. Wang, X. Zhang, X. Cui, M. Lu, *Tsinghua University, China*

Dr. Patrick Henkel, *Technical University Munich, Germany*

Prof. Christian Tiberius, *Delft University of Technology, The Netherlands*

## Session B3: Algorithms & Methods 2: Navigation

**2:00 p.m. – 5:30 p.m., Pacific Ballroom E/F**

**2:05** **1. Coarse Time Navigation: Equivalence of Algorithms and Reliability of Time Estimates:** K. Muthuraman, J. Brown, M. Chansarkar, *Cambridge Silicon Radio*

**2:35** **2. Improved GNSS Heading System with Inertial and Magnetic Field Sensors for Small-sized Launcher Applications:** J. Roth, K. Kaschwich, G.F. Trommer, *Karlsruhe Institute of Technology, Germany*

**3:05** **3. Enhanced Kalman Filter for RISS/GPS Integrated Navigation using Gaussian Process Regression:** M.M. Atia, *Trusted Positioning Inc, and Queen's University, Canada;* A. Noureldin, *Royal Military College and Queen's University, Canada;* M. Korenberg, *Queen's University, Canada*

**Break 3:35 p.m. – 3:55 p.m.**

**4:00** **4. Monitoring Measurement Noise Variance for High Integrity Applications:** S. Khanafseh, S. Langel, F-C. Chan, M. Joerger, B. Pervan, *Illinois Institute of Technology*

*continued on page 7*

**ION Annual Awards & Fellows Banquet, 7:00 p.m. – 9:00 p.m., Pacific Ballroom A/B**

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**4:30 5. Carrier Phase Based Attitude Determination and Integer Ambiguity Resolution with Gaussian Distributed a Priori Information and Kalman Filtering:** P. Jurkowski, *Advanced Navigation Solutions – AMCONAV, Germany;* P. Henkel, *Technical University Munich, Germany;* C. Guenther, *German Aerospace Center, Germany*

**5:00 6. Desensitized Unscented Kalman Filter About Uncertain Model Parameters:** H. Shen, C.D. Karlgaard, *Analytical Mechanics Associates, Inc.*

Alternates

1. **Assessing the Accuracy of Hyperbolic Multilateration Systems:** D. Qiu, *Sigtem Technology, Inc.;* T. Nguyen, *AFRL/RYMN;* C. Yang, *Sigtem Technology, Inc.*
2. **A New Multipath-induced Ranging Measurement Error Mitigation Method for Terrestrial Time-of-Arrival Positioning System in Urban/indoor Environments:** H. Tang, *Stanford University;* C. Meng, A. Sendonaris, A. Raghupathy, S. Meiyappan, G. Pattabiraman, *NextNav Inc.;* J.D. Powell, *Stanford University*

## Session C3: QZSS

### 2:00 p.m. – 5:30 p.m., Pacific Ballroom C

Dr. Takeyasu Sakai, *Electronic Navigation Research Institute, Japan*

Dr. Hiroaki Maeda, *Lighthouse Technology and Consulting, Japan*

**2:05 1. Technical Verification Status of Quasi-Zenith Satellite System:** M. Kishimoto, E. Myojin, K. Kawate, M. Miyoshi, S. Kogure, H. Noda, *Japan Aerospace Exploration Agency (JAXA), Japan*

**2:35 2. QZSS L-Band Navigation Payload:** T. Takahashi, T. Moriguchi, *NEC Corporation, Japan;* K Ohara, *NEC Engineering Ltd., Japan;* H. Noda, S. Kogure, M. Kishimoto, *Japan Aerospace Exploration Agency, Japan*

**3:05 3. Ranging Quality of QZSS L1-SAIF Signal:** T. Sakai, H. Yamada, S. Fukushima, K. Ito, *Electronic Navigation Research Institute, Japan*

**Break 3:35 p.m. – 3:55 p.m.**

**4:00 4. Orbit and Clock Determination of QZS-1 Based on the CONGO Network:** P. Steigenberger, *Technical University Munich, Germany;* A. Hauschild, O. Montenbruck, *German Aerospace Center DLR, Germany;* C. Rodriguez-Solano, U. Hugentobler, *Technical University Munich, Germany*

**4:30 5. Operation of Sub-Meter Class Augmentation System and Demonstration Experiments with Quasi-Zenith Satellite "MICHIBIKI":** R. Iwama, *SPAC, Japan;* H. Soga, K. Odagawa, *NEC, Japan;* Y. Masuda, T. Osawa, A. Ito, M. Matsumoto, *TECS, Japan*

**5:00 6. Regional Satellite Navigation System with MSAS and QZSS:** H. Yamada, T. Sakai, K. Ito, *Electronic Navigation Research Institute, Japan*

Alternate

1. **Examination of the GPS Receiver for Small Drifting Buoys Using QZS:** *H. Irie, Nagaoka University of Technology, Japan;* M. Shimada, *The Tsurumi Seiki Co. Ltd., Japan;* K. Morishita, *Kumamoto University, Japan*

**ION Annual Awards & Fellows Banquet, 7:00 p.m. – 9:00 p.m., Pacific Ballroom A/B**

Prof. Peter Swaszek, *University of Rhode Island*

CDR Joe Chop, *U.S. Coast Guard*

## Session A4: Maritime Applications

**8:30 a.m. – 12:00 p.m., Pacific Ballroom C**

**8:35 1. Optimal Waterway and Harbor Navigation of Large Vessels:** A.H. Zorn, *Stanford University;* M. West, *University of Illinois at Urbana-Champaign*

**9:05 2. Performance Assessment of the Recent NDGPS Recap – Initial Static Results:** G.W. Johnson, *Alion Science & Technology; P.F. Swaszek, University of Rhode Island;* R.J. Hartnett, *US Coast Guard Academy*

**9:35 3. Precise Positioning System for Maritime Applications:** D-J. Cho, S-G. Park, S-H. Park, *Korea Ocean Research & Development Institute, South Korea*

**Break 10:05 a.m. – 10:25 a.m.**

**10:30 4. The Propagation Characteristic of DGPS Correction Data Signal in Japan – Propagation Characteristic Near Big Bridge:** S. Okuda, Y. Arai, M. Toba, *Marine Technical College, Japan*

**11:00 5. The Preliminary Study on Development of DGPS Service Techniques Based on Terrestrial Digital Multimedia Broadcasting:** K-T. Kim, K-D. Park, H-I. Kim, *Inha University, South Korea*

**11:30 6. Sandoway House Nature Center - Geomatics Support for Quantifying Ground Water Seepage to the Coast:** T. Walker, E. Watts, C. Crouzet, *Florida Atlantic University;* S. Krupa, *South Florida Water Management District;* D. Leone, L. Gibson, M. Berber, *Florida Atlantic University*

Patricia Doherty, *Institute for Scientific Research*

Dr. Attila Komjathy, *NASA, Jet Propulsion Laboratory*

## Session B4: Atmospheric Effects

**8:30 a.m. – 12:00 p.m., Pacific Ballroom E/F**

**8:35 1. Precise Measurements of Ionospheric Delay Gradient at Short Baselines Associated with Low Latitude Ionospheric Disturbances:** S. Saito, S. Fujita, T. Yoshihara, *Electronic Navigation Research Institute, Japan*

**9:05 2. Results from Automated Ionospheric Data Analysis for Ground-Based Augmentation Systems (GBAS):** J. Lee, *Tetra Tech AMT, USA;* S. Jung, M. Kim, *Korea Advanced Institute of Science and Technology, South Korea;* J. Seo, S. Pullen, *Stanford University*

**9:35 3. GPS Carrier Phase Detrending Methods and Performances for Ionosphere Scintillation Studies:** F Niu, Y. Morton, W. Pelgrum, *Miami University*

**Break 10:05 a.m. – 10:25 a.m.**

**10:30 4. Electron Density Distribution Over Equatorial Ionosphere: Assimilation of GPS Observation into NeQuick Model:** E.T. Desta, G. Mengistu, *Addis Ababa University, Ethiopia*

**11:00 5. Decadal, Seasonal, and Diurnal Variability of Ionospheric Total Electron Content (TEC) Over the Indian Subcontinent Derived from Geodetic GPS Network:** M.S.M. Vijayan, K. Shimna, S. Jade, *CSIR C-MMACS, India*

**11:30 6. Improving GPS Application in Nigeria: A Case for DGPS Reference Stations:** L.L.N. Amaeshi, A.S.O. Soneye, *University of Lagos, Nigeria*

**Informal Luncheon, 12:00 p.m. – 1:00 p.m., Rose Garden (outside)**
**In case of inclement weather, this function will be held in the Pacific Ballroom A/B.**

Dr. Grace Xingxin Gao, *Stanford University*

Larry Hothem, *U.S. Geological Survey*

## Session C4: Remote Sensing Using GNSS

**8:30 a.m. – 12:00 p.m., Pacific Ballroom D**

**8:35 1. Development and Testing of a Miniaturized Dual-Frequency Software-Defined GPS Receiver for Space Applications:** A.J. Joplin, T.E. Humphreys, E.G. Lightsey, *University of Texas at Austin*

**9:05 2. Development of a Prototype Texas Ionospheric Ground Receiver (TIGR):** J. York, D. Munton, M Mayo, *The University of Texas at Austin;* T. Sump, *Texas A&M University*

**9:35 3. Ionosphere Real Time Monitoring System using Septentrio GNSS Receivers:** G. Nykiel, M. Figurski, *Military University of Technology, Poland*

**Break 10:05 a.m. – 10:25 a.m.**

**10:30 4. Improved Ionosphere Scintillation Event Detection and Automatic Trigger for GNSS Data Collection Systems:** S. Taylor, Y. Morton, W. Pelgrum, J. Triplett, *Miami University*

**11:00 5. Automated Ionospheric Front Velocity Estimation Algorithm for Ground-Based Augmentation Systems:** E. Bang, S. Jung, J. Lee, *Korea Advanced Institute of Science and Technology, South Korea;* J. Seo, S. Pullen, *Stanford University*

**11:30 6. On Using Traveling Ionospheric Disturbances to Detect Underground Nuclear Tests:** J. Park, D.A. Grejner-Brzezinska, R.R.B. von Frese, *The Ohio State University;* Y. Morton, *Miami University;* L.R. Gaya-Pique, *On-Site Inspection Division, CTBTO PrepCom, Vienna International Centre, Austria*



**Informal Luncheon, 12:00 p.m. – 1:00 p.m., Rose Garden (outside)**
**In case of inclement weather, this function will be held in the Pacific Ballroom A/B.**

Dr. Samer Khanafseh, *Illinois Institute of Technology*

Larry Vittorini, *Northrup Grumman*

## Session A5: Aviation Applications

**1:00 a.m. – 4:10 p.m., Pacific Ballroom E/F**

**1:05** **1. A Gaussian Mixture Model for Error Distributions Used in Assessing RAIM Performance:** C.A. Shively, *The MITRE Corporation/CAASD*

**1:35** **2. Optimal Positioning for Advanced RAIM:** J. Blanch, T. Walter, P. Enge, *Stanford University*

**2:05** **3. An Avionics-Based GNSS Integrity Augmentation System for Safety-Critical and Mission-Critical Applications:** R. Sabatini, *Cranfield University, UK;* T. Moore, C. Hill, *University of Nottingham, UK*

**2:40** **4. A Tool for GNSS Integrity Verification Based on Statistical Extreme Value Theory:** C.C.J.M. Tiberius, *Delft University of Technology, The Netherlands;* H.P.J. Veerman, *National Aerospace Laboratory, The Netherlands;* P.B. Ober, *Integricom;* A.L. Mieremet, *Science & Technology;* A.A. Verhagen, *Delft University of Technology, The Netherlands;* A.J.P. van Kleef, F.J.P. Wokke, *National Aerospace Laboratory, The Netherlands;* A. Bos, *Science & Technology, The Netherlands*

**3:10** **5. Bounding Integrity Risk in the Presence of Parametric Time Correlation Uncertainty:** S. Langel, S. Khanafseh, B. Pervan, *Illinois Institute of Technology*

**3:40** **6. Enhanced Low Visibility Operations – Increasing Flight Operations Services in the National Airspace Systems in Low Visibility Conditions:** S.L. Frodge, C. Hope, *Federal Aviation Administration;* R. Houghton, *Houghton Associates*

Alternates

1. **Towards Full GAST-D Capability - Flight Testing DLR's Experimental GBAS-Station:** M. Felux, T. Dautermann, B. Belabbas, *German Aerospace Center, Germany*
2. **Algorithm for the Detection and Isolation of Multiple Corrupt Measurements in Vision Systems:** N.A. Baine, K.S. Rattan, *Wright State University*

Karl Kovach, *The Aerospace Corporation*

Dr. Srini Raghavan, *The Aerospace Corporation*

## Session B5: GNSS Modernization

**1:00 a.m. – 4:10 p.m., Pacific Ballroom D**

**1:05** **1. Study of Multiplex Techniques for Compass B1-C Signal Design:** L. Zhu, Z. Yao, M. Lu, Z. Feng, *Tsinghua University, China*

**1:35** **2. New Effective ARAIM Providing Integrity In the Presence of Consistent Faults With Minimal Loss of Availability, Using Two Independent Constellations:** Y.C. Lee, *The MITRE Corporation/CAASD*

**2:05** **3. Application of Kalman Filter to Beidou/GPS Joint-Positioning for Software Receiver:** X. Zhang, Y. Wang, X. Cui, Z. Feng, *Tsinghua University, China*

**2:40** **4. Real Time Advanced Receiver Autonomous Integrity Monitoring in the DLR's Multi-Antenna GNSS Receiver:** M. Rippl, *German Aerospace Center DLR, Germany*

**3:10** **5. Independent URA Monitor With RAIM for LPV-200 Using GPS or/and Galileo:** C.A. Shively, B. Bian, R. Braff, R. Conker, M. Bakry El-Arini, *The MITRE Corporation/CAASD*

**3:40** **6. Architecture Alternatives for Command & Control of GPS Satellites:** V. Lin, R. Haddad, M. Riccio, P. Li, V. Nuth, B. Feess, *The Aerospace Corporation*

Alternates

1. **Estimation and Precision Analysis of Earth Rotation Parameters from GPS Measurements:** Z. He, X. Yang, Z. Li, *National Time Service Center, Chinese Academy of Sciences, China;* Z. Cheng, *Shanghai Astronomical Observatory, CAS, China*

*continued on page 11*

**Refreshments will be available in the registration area at 2:30 p.m.**

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2. **Statistical Characterization of GLONASS Broadcast Clock Errors and Signal-In-Space Errors:** L. Heng, G.X. Gao, T. Walter, P. Enge, *Stanford University*
3. **Around the World for 26 Years – A Brief History of the NGA Monitor Station Network:** B.A. Renfro, D. Munton, R.G. Mach, *ARL, The University of Texas at Austin;* R. Taylor, *National Geospatial-Intelligence Agency*

Dr. Keith McDonald, *The MITRE Corporation*

Kevin E. Rudolph, *Raytheon*

## Session C5: Receivers & Antenna Technology

### 1:00 a.m. – 4:10 p.m., Pacific Ballroom C

**1:05** 1. **An Outlier Detection and Correction Algorithm for the Direction of Arrival Estimation of GNSS Satellites:** U. Engel, L. Broetje, *Fraunhofer FKIE, Germany*

**1:35** 2. **Beam Pointing in Rotorcraft Mounted GPS Receivers:** Y.C. Chuang, A.J. O'Brien, I.J. Gupta, *The Ohio State University;* Y. Bayram, *PaneraTech Inc.,*

**2:05** 3. **Multi Constellation and BOC-Signal Problems with Group Delay:** P.G. Mattos, *STMicroelectronics, Bristol, UK*

**2:40** 4. **A Novel Software Defined GNSS Receiver for Performing Detailed Signal Analysis:** J. York, J. Little, S. Nelsen, O. Caldwell, D. Munton, *ARL, University of Texas*

**3:10** 5. **Real-time Implementation of VDLL in an Open Source GNSS Receiver – Design, Tests and Results:** X. Zhang, X.Q. Zhan, *Shanghai Jiao Tong University, China*

**3:40** 6. **High Resolution Acquisition Algorithm Using Multi-Rate Approach for Efficient FFT Implementation:** S.R. Babu, P. Selvam, *Wipro Technologies, India*

Alternates

1. **Vector Tracking Based Architecture for Robust and High-Sensitivity GNSS Receivers:** K. Sun, *Hefei University of Technology, China*
2. **Performance Analysis and Verification of Novel FLL GNSS Signal Tracking Loop Architecture:** Y. Liu, J. Zhang, T. Jin, R. Xue, *BeiHang University, China*
3. **GPS-L1C Leading to the All-Constellation GNSS Receivers:** P.G. Mattos, *STMicroelectronics, UK;* F. Pisoni, *STMicroelectronics, Italy*



**Refreshments will be available in the registration area at 2:30 p.m.**

**The Institute of Navigation**

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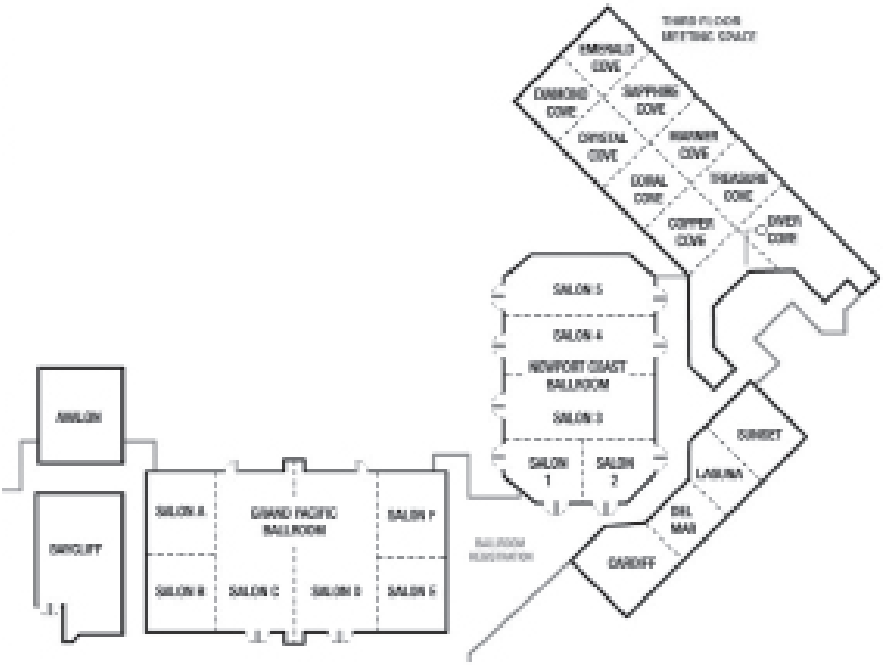


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