PACIFIC PNT

April 22-25, 2013 • Tutorials April 22 • Marriott Waikiki Beach, Honolulu, Hawaii

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Pacific PNT 2013 Conference Hours

Registration Only
Sunday, April 21......................4:00 p.m. – 7:00 p.m.

Tutorials
Monday, April 22 .... 9:00 a.m. – 12:30 p.m. and
.... 1:30 p.m. – 5:00 p.m.

Technical Sessions
Tuesday, April 23 .... 9:00 a.m. – 12:30 p.m. and
.... 1:30 p.m. – 5:00 p.m.
Wednesday, April 24 .... 9:00 a.m. – 12:30 p.m. and
.... 1:30 p.m. – 5:00 p.m.
Thursday, April 25 .... 9:00 a.m. – 12:30 p.m. and
.... 1:30 p.m. – 5:00 p.m.

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Prof. Akio Yasuda
The Institute of Positioning, Navigation and Timing of Japan, Graduate School of Tokoyo University of Marine Science and Technology, Japan

Prof. Patricia Doherty
Institute for Scientific Research, Boston College

SPECIAL EVENTS:

Tuesday, April 23
Informal Luncheon
12:30 p.m. – 1:30 p.m., Waikiki Ballroom
This event is included in the price of a Full Registration. Tickets may be purchased for student registrants and guests for $70 each.

Wednesday, April 24
Informal Luncheon
12:30 p.m. – 1:30 p.m., Waikiki Ballroom
This event is included in the price of a Full Registration. Tickets may be purchased for student registrants and guests for $70 each.

Thursday, April 25
Informal Luncheon
12:30 p.m. – 1:30 p.m., Waikiki Ballroom
This event is included in the price of a Full Registration. Tickets may be purchased for student registrants and guests for $70 each.

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Tutorials

Technical Session Overview — April 23-25, Honolulu, Hawaii

	Mon. Morning 9:00 a.m.–12:30 p.m.	Mon. Afternoon 1:30 p.m. – 5:00 p.m.	Tues. Morning 9:00 a.m. – 12:30 p.m.	Tues. Afternoon 1:30 p.m. – 5:00 p.m.	Wed. Morning 9:00 a.m. – 12:30 p.m.	Wed. Afternoon 1:30 p.m. – 5:00 p.m.	Thurs. Morning 9:00 a.m. – 12:30 p.m.	Thurs. Afternoon 1:30 p.m. – 5:00 p.m.
A	Fundamentals of GNSS: Signals and Systems Dr. Chris Bartone *Kona Moku A*	Sensor Integration for Personal Navigation Dr. Dorota Grejner-Brzezinska and Dr. Charles Toth *Kona Moku A*	A1: Earthquake, Tsunami Prediction and Monitoring with GNSS *Kona Moku A*	A2: GNSS Policy/Status Updates *Kona Moku A* (ends at 5:20 p.m.)	A3: Spectrum, Interference and Authentication *Kona Moku A*	A4: Time and Frequency Distribution *Kona Moku A*	A5: Ionosphere Monitoring with GNSS *Kona Moku A*	A6: Aviation Applications of GNSS *Kona Moku A*
B	Inertial Navigation Dr. Wouter Pelgrum and Dr. James L. Farell *Kona Moku B*	RTK GNSS Positioning Dr. Mark Petovello *Kona Moku B*	B1: GNSS Signal Structures *Kona Moku B*	B2: GNSS Correction and Monitoring Networks *Kona Moku B*	B3: Terrestrial and Maritime Navigation Technologies *Kona Moku B*	B4: Signals of Opportunity and Augmentations *Kona Moku B*	B5: Collaborative Navigation Topics *Kona Moku B*	B6: Inertial Navigation Technology and Applications *Kona Moku B*
C			C1: Agricultural and Land Vehicle Applications *Kona Moku C*	C2: Image Aided and Terrain-Referenced Navigation *Kona Moku C*	C3: First Responder, Indoor/Urban Navigation *Kona Moku C*	C4: Algorithms and Methods *Kona Moku C*	C5: Air Vehicle Navigation and Surveillance *Kona Moku C*	C6: Challenging Navigation Topics *Kona Moku C*
Luncheon			Informal Luncheon 12:30 p.m. – 1:30 p.m. *Waikiki Ballroom*		Informal Luncheon 12:30 p.m. – 1:30 p.m. *Waikiki Ballroom*		Informal Luncheon 12:30 p.m. – 1:30 p.m. *Waikiki Ballroom*	

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.

Dr. Yehuda Bock,
*Scripps Institution
of Oceanography,
University of California*

Prof. Kosuke Heki,
*Hokkaido University,
Japan*

Session A1: Earthquake, Tsunami Prediction and Monitoring with GNSS
Room: Kona Moku A

9:05   1. A Seismogeodetic Earthquake and Tsunami Early Warning System for Western North America: Y. Bock, J. Geng, D. Melgar, B. Crowell, J. Haase, Scripps Institution of Oceanography

9:35   2. Assessment of GPS Ionosphere Observation and Earthquake: A-L. Tao, S-S. Jan, National Cheng Kung University, Taiwan

10:05 3. A Conceptual Study of Land-based Tsunami Monitoring System using Code Correlation Measurements of GNSS Signal Reflected by the Sea Surface: T. Yoshihara, S. Saitoh, N. Fujii, T. Sakai, Electronic Navigation Research Institute, Japan

Break 10:35 a.m. – 10:55 a.m.

11:00 4. Assessment of Regional Satellite Navigation Systems in GNSS Reflection Experiments: J-C. Juang, National Cheng Kung University, Taiwan

11:30 5. Advantages and Drawbacks of the Precise Point Positioning (PPP) Technique for Earthquake, Tsunami Prediction and Monitoring: M.D. Laínez Samper, M.M. Romay Merino, GMV, Spain

12:00 6. On Detecting Underground Nuclear Explosions with GNSS and Radio Astronomical Observations: J. Park, The Ohio State University; J. Helmboldt, U.S. Naval Research Laboratory; D.A. Grejner-Brzezinska, R.R.B. von Frese, The Ohio State University; T. Wilson, U.S. Naval Research Laboratory

Alternates

1. Earthquake Analysis by 3-D Affine Deformations: J.L. Farrell, VIGIL, Inc.

2. Processing of GPS Station Data for Prediction Algorithm Analysis of the 2011 Tohoku Earthquake: F. van Graas, R. Kollar, Ohio University, Avionics Engineering Center

Dr. John Betz,
The MITRE Corporation

Mr. Thomas Stansell,
Stansell Consulting

Dr. Xiancheng Ding,
*Beidou Management
Office, China*

Session B1: GNSS Signal Structures
Room: Kona Moku B

9:05   1. Signal Structures for Satellite-Based Navigation: Past, Present, and Future*: J.W. Betz, The MITRE Corporation

9:35   2. An Analysis of Combined COMPASS/BeiDou-2 and GPS Single- and Multiple-frequency RTK Positioning: R. Odolinski, Curtin University, Australia; P.J.G Teunissen, Curtin University, Australia and Delft University of Technology, The Netherlands; D. Odijk, Curtin University, Australia

10:05 3. Interoperability and Compatibility Analysis of GNSS L1/B1/E1 Open Signals: Z. Liu, Beijing Satellite Navigation Center, China; J. Tang, China National Administration of GNSS and Applications, China; J. Shen, R. Wen, Beijing Satellite Navigation Center, China

Break 10:35 a.m. – 10:55 a.m.

11:00 4. Semi-Coherent and Differentially Coherent Integration for GPS L1C Acquisition: K.C. Seals, United States Coast Guard Academy; W.R. Michalson, Worcester Polytechnic Institute

11:30 5. Real-Time Validation of BeiDou Observations in a Stand-alone Mode: A. El-Mowafy, Curtin University, Australia.

12:00 6. Research on GNSS Interoperable Parameters: T. Han, National Time Service Center, Chinese Academy of Sciences (CAS), China; W. Hao, Academy of Opto-electronics, CAS, China; X. Lu, National Time Service Center, CAS, China

Alternates

1. Quasi-coherent Joint Processing Technique of Modernized GNSS Multiplexing Signals: Z. Yao, M. Lu, Tsinghua University, China

2. The Concept of PNT Engine: H. Wu, X. Lu, D. Zou, T. Han Tao, Chinese Academy of Sciences, China

3. The Design of BOC Family Modulation Signal Parameters Optimization in Compass: C. Xiaoqiu, C. Yonggang, Harbin Institute of Technology, China

4. **Advantages of POCET Modulation for GPS L1 Signals:** P. Dafesh, The Aerospace Corporation; C.R. Cahn, Consultant to The Aerospace Corporation

5. **Effect of GPS NAV Message Truncation Error on UERE and UNE:** Y. Liu, Beijing Institute of Tracking and Telecommunication Technology, China

Session C1: Agricultural and Land Vehicle Applications
Room: Kona Moku C

Dr. Liwen Dai,
NavCom Technology, Inc.

Dr. Charles Toth,
The Ohio State University

9:05   1. **Sensor Error Compensation Methods for Performance Enhancement of a Low-cost INS/GPS Navigation Algorithm used in Severe Urban Environments:** P. Lavoie, R. Jr. Landry, D.M. Shroff, École de Technologie Supérieure, Canada

9:35   2. **In-The-Field Trials for Real-Time Precise Positioning and Integrity in Advanced Applications:** M.D. Laínez Samper, M.M. Romay Merino, GMV, Spain

10:05   3. **A Method to Produce Network Configuration of GNSS Receiving Station for Optimizing Performance of Precise Positioning:** M-H. Son, G-H. Kim, E. Lee, S. Im, G.W. Nam, M-B. Heo, Korea Aerospace Research Institute, Republic of Korea

Break 10:35 a.m. – 10:55 a.m.

11:00   4. **Ambiguity Level Adjustment Among Networks of Compact Network RTK for Land Vehicle Users:** J. Song, B. Park, Seoul National University, Republic of Korea; Sejong University, Republic of Korea; C. Kee, Seoul National University, Republic of Korea

11:30   5. **New Indicator of Signal Blocking Degree to Describe GNSS Signal Receiving Environment in Land Road:** W. Hong, E. Lee, K. Choi, S. Im, G.W. Nam, M. Heo, Korea Aerospace Research Institute, Republic of Korea

12:00   6. **Low-cost Single-frequency GPS/GLONASS RTK for Road Users:** S. Carcanague, ENAC/M3SYSTEMS, France; O. Julien, ENAC, France; W. Vigneau, M3SYSTEMS, France; C. Macabiau, ENAC, France

Alternates

1. **Particle Filters Using Position Samples and GNSS Carrier-Phase for Attitude Determination of Ground Vehicle:** S.S. Hwang, Novariant

2. **Precision Navigation and Control Techniques for Autonomous Ground Vehicles:** N.A. Baine, J. Moll, K.S. Rattan, Wright State University

3. **Performance Analysis of Collaborative Agricultural Robot for Greenhouse Crop Production:** C-L. Chang, C. Yang, Y-C. Huang, National Pingtung University of Science and Technology, Taiwan

4. **Three-dimensional Integration of Low-cost Carrier-smoothed GPS and DR Sensors for Vehicle Application:** J-M. Lim, K-J. Lee, S-H. Yoo, T-K. Sung, Chungnam National University, Republic of Korea

Mr. David Turner,
U.S. Department of State

Session A2: GNSS Policy/Status Updates
Room: Kona Moku A

1:35	1.	**GNSS Policy and Program Update (Keynote):** David A. Turner, U.S. Department of State
1:57	2.	**Adoption of GNSS Technologies in Singapore:** Considerations and Concerns: P.E. Kee, Nanyang Technological University, Singapore
2:20	3.	**Basic Service Performance of BeiDou/COMPASS II:** Y. Yang, China National Key Laboratory of Geo-Information Engineering/ China National Administration of GNSS and Applications (CNAGA), China; J. Li, Institute of Surveying and Mapping of Information Engineering University, China; J. Xu, Institute of Surveying and Mapping of Information Engineering University/Xian Institute of Surveying and Mapping Information, China; H. He, H. Guo, Beijing Global Information Center of Application and Exploitation, China; J. Tang, CNAGA, China
2:42	4.	**Beidou System Update and Region Service in Asia and Pacific:** X. Ding, Senior Adviser China Satellite Navigation Office, China

Break 3:05 p.m. – 3:25 p.m.

3:30	5.	**FAA's Navigation Program Status:** D. Lawrence, Federal Aviation Administration
3:52	6.	**GNSS Activities in Taiwan:** J-C. Juang, National Cheng Kung University, Taiwan
4:15	7.	**Korean SBAS Development Status and Plan:** C. Kee, H. Yun, Seoul National University, South Korea
4:37	8.	**QZSS Present Status and the Future PLAN (TBC):** H. Noda, Office of National Space Policy, Japan
5:00	9.	**The IGS MGEX Experiment as a Milestone for a Comprehensive Multi-GNSS Service:** C. Rizos, University of New South Wales, Australia; O. Montenbruck, German Aerospace Center DLR/GSOC, Germany; R. Weber, Vienna University of Technology, Austria; G. Weber, BKG, Germany; R. Neilan, IGS, USA; U. Hugentobler, TUM/IAPG, Germany

Dr. Hongping Zhang,
Wuhan University, P.R. China

Session B2: GNSS Correction and Monitoring Networks
Room: Kona Moku B

1:35	1.	**Mitigation Model and Method of Ionospheric Time Delay for Compass/GNSS:** Y. Yuan, Z. Li, X. Huo, N. Wang, Institute of Geodesy and Geophysics, CAS, China
2:05	2.	**Eliminating Obliquity Error from the Estimation of Ionospheric Delay in a Satellite-based Augmentation System:** L. Sparks, Jet Propulsion Laboratory, California Institute of Technology
2:35	3.	**Constructing Ionospheric Irregularity Threat Model for Korean SBAS:** E. Bang, J. Lee, J. Lee, Korea Advanced Institute of Science and Technology, Republic of Korea; J. Seo, Yonsei University, Republic of Korea; T. Walter, Stanford University, USA

Break 3:05 p.m. – 3:25 p.m.

3:30	4.	**Prediction of Regional Ionospheric Delays with Spherical Cap Harmonic Analysis and Regression Model:** M. Ohashi, K. Nishimoto, Y. Kubo, S. Sugimoto, Ritsumeikan University, Japan
4:00	5.	**Integrity Monitoring Technology on Reference Stations for the Network RTK:** M.Y. Shin, D.J. Cho, S.H. Park, Korea Institute of Ocean Science and Technology, Republic of Korea
4:30	6.	**The Global Characteristic of Tropospheric Delay and Modelling:** S. Song, J. Zhao, W. Zhu, Q. Chen, SHAO, China

Dr. Todd Walter,
Stanford University

Alternates

1. **Fixed Ambiguity Precise Point Positioning (PPP) Using Tropospheric Corrections Based on Numeric Weather Modeling (NWM):** A. Jokinen, S. Feng, W. Schuster, W. Ochieng, Imperial College London, UK; L. Yang, C. Hide, T. Moore, C. Hill, University of Nottingham, UK

2. **Preliminary Accuracy Assessment of PWV Derived with CNES Real-time Orbit and Clock Product:** M. Wang, H. Chai, Zhengzhou Institute of Surveying and Mapping, China

3. **Progress on International GNSS Monitoring and Assessment System:** D. Xurong, J. Wenhai, H. Xiaorui, S. Xiaoli, Test & Assessment Research Center, CSNO, China

Dr. Timothy J. Klausutis,
Air Force Research Laboratory

Prof. Allison Kealy,
University of Melbourne, Australia

Session C2: Image Aided and Terrain-Referenced Navigation
Room: Kona Moku C

1:35   1. **Seeing is Believing: Vision Based Navigation:** M. Miller, Air Force Research Laboratory

2:05   2. **DOP Controlled GNSS/Vision/INS Integrated Navigation under GNSS Degraded Environments:** D.H. Won, J. Ahn, S. Sung, Y.J. Lee, Konkuk University, Republic of Korea

2:35   3. **Comparing Traditional and Motion Constraint Methods for EKF-Based SLAM:** K. Brink, E. Doucette, AFRL/RW

Break 3:05 p.m. – 3:25 p.m.

3:30   4. **Computer Vision Navigation Based on Fiducial Markers of Opportunity:** M.A. Lakhani, J. Nielsen, G. Lachapelle, University of Calgary, Canada

4:00   5. **Design of Mode Switching Logic for EKF/Batch Processing TRN:** W. Lee, Y.M. Yoo, Seoul National University, Republic of Korea; C.G. Park, ASRI/Seoul National University, Republic of Korea

4:30   6. **Inter-frame Registration using Kalman Filter for Vision Based Navigation:** J.C. Yao, DSO National Laboratories, Singapore; E.K. Poh, Nanyang Technological University, Singapore

Alternates

1. **Positioning in Urban Area by GPS and Monocular Vision Sensor:** J.H. Lim, K.H. Choi, H.S. Kim, J.Y. Lee, H.K. Lee, Korea Aerospace University, Republic of Korea

2. **New Terrain Roughness Index for Update of Profile Based TRN:** Y.M. Yoo, S.M. Lee, C.G. Park, Seoul National University, Republic of Korea

Dr. Andrew Dempster,
University of New South Wales, Australia

Dr. Dinesh Manandhar,
GNSS Technologies Inc., Japan

Session A3: Spectrum, Interference and Authentication
Room: Kona Moku A

9:05   1. **Radio Navigation Satellite Service (RNSS) and the ITU Radio Regulations:** A. Matas, International Telecommunication Union (ITU), Switzerland

9:35   2. **Analysis of Anti-jamming Technique using SVD in Acquisition and Tracking:** K. Yoo, S-H. Kong, KAIST, Republic of Korea

10:05   3. **Transform Domain Interference Suppression in GNSS Receiver Based on FrFT:** H. Wu, Y-X. Zhang, Y-Z. Zheng, Y-G. Sun, MXTronics Corporation, China

Break 10:35 a.m. – 10:55 a.m.

11:00   4. **Pushing the Boundary of GNSS Inertial Systems into Interference and Jamming Environments:** G. Gao, M. Bobye, NovAtel Inc., Canada

11:30   5. **Implementation of a Jammer Localization System Based on TDOA/AOA Algorithm:** D.W. Lim, H.W. Kang, Korea Aerospace Research Institute, Republic of Korea; H.H. Choi, S.J. Lee, Chungnam National University, Republic of Korea; M.B. Heo, Korea Aerospace Research Institute, Republic of Korea

12:00   6. **High Latitude and Equatorial Ionosphere Scintillation Spectrum Analysis:** J. Wang, Y. Morton, Miami University; W. Pelgrum, Ohio University

Alternate

1. **A Time-Frequency Based GNSS Interference Detection and Mitigation Method for GNSS Receivers:** K. Sun, Hefei University of Technology, China

Prof. Wouter Pelgrum,
Ohio University

Prof. Jiwon Seo,
Yonsei University, South Korea

Session B3: Terrestrial and Maritime Navigation Technologies
Room: Kona Moku B

9:05   1. **DME/N Error Budget Allocation and DME-Next Proof-of-Concept Flight Test and Performance Evaluation:** K. Li, W. Pelgrum, Ohio University

9:35   2. **eLoran in the UK - Leading the Way:** P. Williams, D. Last, N. Ward, General Lighthouse Authorities, UK

10:05   3. **On an Autonomous Navigation System for Collision Avoidance of Unmanned Surface Vehicle:** N-S. Son, MOERI/KIOST, Republic of Korea

Break 10:35 a.m. – 10:55 a.m.

11:00   4. **Resilient PNT for e-Navigation:** P. Williams, M. Bransby, N. Ward, D. Last, General Lighthouse Authorities, UK

11:30   5. **Mine Machinery Automation Using Locata-Augmented GNSS:** C. Rizos, University of New South Wales, Australia; N. Gambale, Locata Corporation, Australia; B. Lilly, Leica Geosystems, Australia

12:00   6. **The Secluded Navigational Spatial Modeling of Underwater Vehicles:** G. Yuan, X. Du, G. Li, Y. Gao, Harbin Engineering University, China

Mr. Jalal Mapar,
Department of Homeland Security

Mr. Wes Hawkinson,
Honeywell, Inc.

Session C3: First Responder, Indoor/Urban Navigation
Room: Kona Moku C

9:05   1. **Geospatial Location and Navigation System for Early Responders (GLANSER) System Design and Testing:** W. Hawkinson, P. Samanant, R. McCroskey, R. Ingvalson, A. Kulkarni, Honeywell, Inc.

9:35   2. **Performance Analysis of Kinect Sensor Trajectory Reconstruction:** C. Toth, D. Grejner-Brzezinska, The Ohio State University

10:05   3. **Indoor Localization Through the Integration of RGB and Depth Data from Microsoft Kinect Sensor:** L. Magasweran, J. Huang, California State University Fullerton

<div align="center">Break 10:35 a.m. – 10:55 a.m.</div>

11:00   4. **Integration of Floor Plan, Vision and Inertial Sensors for Pedestrian Navigation in Indoor Environments:** S. Du, B. Huang, Y. Gao, University of Calgary, Canada

11:30   5. **Assessment of the Multipath Mitigation Effect of Vector Tracking in an Urban Environment:** L-T. Hsu, National Cheng Kung University, Taiwan; P.D. Groves, University College London, UK; S-S. Jan, National Cheng Kung University, Taiwan

12:00   6. **Using Doppler Measurements for Static Indoor Positioning:** M.G. Petovello, University of Calgary, Canada

<div align="center">Alternates</div>

1. **An Indoor Positioning System Using Vision Aided Advanced PDR Technology without Image DB and with Motion Recognition:** T. Lee, B. Shin, J. Lee, H. Lee, J. Kim, C. Kim, Korea Institute of Science and Technology, Republic of Korea; D. Yun, Korea Communications Commission, Republic of Korea/Exchange Researcher at Bell Laboratories, Alcatel-Lucent, USA; S. Lee, Korea Institute of Science and Technology, Republic of Korea.

2. **An Indoor Robotic Platform for Human Servicing using Inverted Pendulum Design with Laser Ranging Aided Odometer:** M. Yeh, J. Huang, California State University Fullerton

3. **Urban Operation with the Enhanced Prototype Personal Inertial Navigation System:** Y. Ma, R. Ingvalson, C. Matthews, C. Albrecht, P. Samanant, J. Syrstad, T. Ryno, Honeywell Aerospace

4. **3D-Map Aided Multipath Mitigation for Urban GNSS Positioning:** I-W. Chu, J-C. Juang, National Cheng Kung University, Taiwan

5. **Research of Signal-processing Algorithm in Indoor Positioning using IMES:** Y. Yamada, A. Yasuda, Tokyo University of Marine Science and Technology, Japan

Dr. Demetrios Matsakis,
U.S. Naval Observatory

Session A4: Time and Frequency Distribution
Room: Kona Moku A

1:35   1.   **Satellite Bias Corrections in Geodetic GPS Receivers:** D. Matsakis, S. Mitchell, E. Powers, U.S. Naval Observatory

2:05   2.   **In-Flight Measurements and Correction Model for Rubidium Oscillator Gravity Sensitivity and Magnetic Field Susceptibility:** S. Craig, F. van Graas, Ohio University

2:35   3.   **Development of an Experimental Software GPS Receiver for Time and Frequency Transfer:** T. Gotoh, J. Amagai, T. Hobiger, H-B. Li, NICT, Japan

Break 3:05 p.m. – 3:25 p.m.

3:30   4.   **Using GPS/GNSS Simulators in Development, Debug and Testing:** P. Myers, Spectracom

4:00   5.   **Sub-nanosecond Timing with RTK Receivers:** J. Fischer, P. Myers, Spectracom

4:30   6.   **Synchronization and Syntonization of Formation Flying Cubesats Using the Namuru V3.2 Spaceborne GPS Receiver:** E. Glennon, J. Gauthier, M. Choudhury, A. Dempster, University of New South Wales, Australia

Alternate

1.   **A Simple GEO Satellite Two-way Timing Corrected Method:** J. Qu, H. Yuan, B. Liu, X. Luo, Academy of OPTO-Electronics, CAS, China

Dr. Michael Enright,
Quantum Dimension, Inc.

Session B4: Signals of Opportunity and Augmentations
Room: Kona Moku B

1:35   1.   **Using Combined IMU / Stereo Vision / Cooperative GNSS System for Positioning of UxV Swarms within Catastrophic Urban Scenarios:** S. Batzdorfer, U. Bestmann, M. Becker, A. Schwithal, J. Schattenberg, T. Lang, Technische Universität Braunschweig, Germany; F. Andert, J. Dittrich, German Aerospace Center (DLR), Germany

2:05   2.   **WARP-P: Wireless Signal Acquisition with Reference Point by using Simplified PDR – System Concept and Performance Assessment:** Y. Cho, M. Ji, J. Kim, Y. Lee, S. Park, Electronics and Telecommunications Research Institute, Republic of Korea; B. Shin, T. Lee, Korea Institute of Science and Technology, Republic of Korea

2:35   3.   **Compact Atomic Magnetometer for Global Navigation (NAV-CAM):** M.D. Bulatowicz, M.S. Larsen, Northrop Grumman

Break 3:05 p.m. – 3:25 p.m.

3:30   4.   **Preliminary Test Results of Pseudolite-Based Augmentation System (PBAS):** H. Yun, D. Han, C. Kee, Seoul National University, Republic of Korea

4:00   5.   **A Optimization Model for the Additional AP Placement in the Existing Wi-Fi Indoor Positioning System:** Y. Du, D. Yang, C. XIu, Z. Huang, Beihang University, China

4:30   6.   **Improved ZigBee Fingerprint Method for Indoor Positioning:** X.K. Liu, H. Guo, Nanchang University, China; M. Yu, Jiangxi Normal University, China; Y. Li, Nanchang University, China

Alternates

1.   **Hybrid Differential Phase and Carrier Phase RF Ranging System for Sub-Centimeter Accuracies in Indoor Environments using Low-Cost COTS Components:** T. Schmid, J. Pulsipher, D. Lee, Greina Technologies

2.   **Indoor Positioning using Femtocell:** C.E. Lin, J-S. Shie, S-C. Liu, S. Ke, National Cheng Kung University, Taiwan; J. Chang, Askey Computer Corp., Taiwan

3.   **New GPS Based Distributed Radar Technology:** P.A. Molchanov, AMPAC Inc.; V.M. Contarino, Seamatica Aerospace Ltd.; O.V. Asmolova, AETHER Inc.

Session C4: Algorithms and Methods
Room: Kona Moku C

Prof. Peter Teunissen,
*Curtin University of
Technology, Australia*

Prof. Richard Langley,
*University of New
Brunswick, Canada*

1:35   1. **GNSS Integer Ambiguity Validation: Overview of Theory and Methods:** P.J.G. Teunissen, Curtin University of Technology, Australia and Delft University of Technology, The Netherlands

2:05   2. **FFT Based two Dimensional Compressed Correlator for Fast Acquisition in GNSS:** B. Kim, S-H. Kong, KAIST, Republic of Korea

2:35   3. **De-spreading Delay-and-multiplication Method for GPS Signal Acquisition:** J. Fan, G. Ma, National Astronomical Observatories, Chinese Academy of Sciences, China

Break 3:05 p.m. – 3:25 p.m.

3:30   4. **Design and Performance Evaluation of Model-Based Multipath Estimation Technique for GNSS Receivers:** D.W. Lim, Korea Aerospace Research Institute, Republic of Korea; H.H. Choi, S.J. Lee, Chungnam National University, Republic of Korea; M.B. Heo, Korea Aerospace Research Institute, Republic of Korea

4:00   5. **Carrier-Smoothing (Hatch) Filter Performance Analysis and Algorithm Enhancement on Ionosphere-Free Carrier-Smoothed Pseudo-Range Estimation in Multiple Frequencies Context:** J. Qiu, Seekon Microwave, China Electronics Technology Group Corporation; G. Mao, Unicore Communications Incorporation, China; Y. Li, Seekon Microwave, China Electronics Technology Group Corporation

4:30   6. **Enhanced RAIM Based on Weighted and Subset Schemes for GNSS Receiver:** L. Yang, Y. Zhang, Beijing Microelectronics Technology Institute, China Y. Gao, University of Calgary, Canada

Alternates

1. **Ionosphere TEC Correction for Single Frequency GNSS Receivers:** H. Bourne, Y. Morton, Miami University

2. **A Method of Determining Measurement Weights for Mixed Constellation Navigation System:** L. Yang, J. Chen, M. Wang, Beijing Satellite Navigation Center, China

3. **A New GEO Broadcast Ephemeris Based on the Second Class of Nonsingular Elements:** L. Du, Z. Zhang, I. Song, X. Zhang, Zhengzhou Institute of Surveying and Mapping, China; L. Liu, C. Zhang, R. Guo, F. He, Beijing Global Information Application and Development Center, China

4. **Minimum of GDOP of Satellite Navigation and its Applications in Analysis of the Compatibility of Satellite Navigation System:** S. Han, P. Chen, J. Li, Q. Gui, Surveying and Mapping Insititute of Zhengz, China

5. **An Approach to Increase Positioning Accuracy of Single Frequency GPS Receiver:** L. Kozienko, C. Konstantin, Irkutsk State Transport University, Russia

6. **Analysis on Integrity Risk of Compass Users Based on Non-Least-Square Estimator:** F. Niu, J. Chen, L. Yang, Beijing Satellite Navigation Center, China
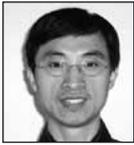
Prof. Shuanggen Jin,
Chinese National Academy of Science, Shanghai Astronomical Observatory, P.R. China

Prof. Susan Skone,
University of Calgary, Canada

Session A5: Ionosphere Monitoring with GNSS
Room: Kona Moku A

9:05   1.   Ionosphere Scintillation Receivers Performances Based on High Latitude Experiments: S. Taylor, Y. Morton, R. Marcus, H. Bourne, Miami University; W. Pelgrum, Ohio University; A.J. Van Dierendonck, AJ Systems

9:35   2.   Observations of Global and Regional Ionospheric Irregularities and Scintillation Using GNSS Tracking Networks : X. Pi, A.J. Mannucci, JPL, California Institute of Technology; B. Valant-Spaight, Propagation Research Associates; Y. Bar-Sever, L. J. Romans, JPL, California Institute of Technology; S. Skone, University of Calgary, Canada; L. Sparks, JPL, California Institute of Technology; G. Martin Hall, Propagation Research Associates

10:05   3.   First Results of Phase Scintillation from a Longitudinal Chain of ASTRA's SM-211 GPS TEC and Scintillation Receivers in Alaska: I. Azeem, G. Crowley, A. Reynolds, J. Santana, ASTRA LLC.; D. Hampton, University of Alaska, Fairbanks

Break 10:35 a.m. – 10:55 a.m.

11:00   4.   A Comparison of GNSS-based Ionospheric Scintillation Observations in North and South Hong Kong: Z. Liu, R. Xu, The Hong Kong Polytechnic University, Hong Kong; J. Morton, Miami University, USA; J. Xu, Wuhan University, China; W. Pelgrum, Ohio University, USA; S. Taylor, Miami University; W. Chen, X. Ding, The Hong Kong Polytechnic University, Hong Kong

11:30   5.   Determination of the Parameters of a Japanese-Regional Klobuchar Ionospheric Model Based on GR Models and SCH Analysis by GEONET Data: K. Nishimoto, M. Ohashi, Y. Kubo, S. Sugimoto, Ritsumeikan University, Japan

12:00   6.   Automated Processing of Global Ionospheric Map Based on SHPTS in WHIGG: Z. Li, Y. Yuan, X. Huo, N. Wang, H. Li, Institute of Geodesy and Geophysics,CAS, China

Alternates

1.   Analysis of Ionospheric Depletion Over the Indian Region: P. Joshi, P.R. Mahapatra, Indian Institute of Science, India; A.S. Ganeshan, S. Nirmala, ISAC, India

2.   Assessment of CODE GIM Over China: J. Xue, S. Song, W. Zhu, Shanghai Astronomical Observatory, China

3.   A COMPASS Ionospheric Delay Grid Correction Algorithm for China: X. Zhang, X. Wu, H. Yuan, G. Ouyang, Academy of Opto-Electronics, Chinese Academy of Sciences, China

4.   Ground and Space Based GPS Measurements of Ionospheric Behavior During the 1st August 2010 Solar Storm Over the Earth: H. Wang, Chinese Academy of Surveying and Mapping, China; Q. Wang, Chinese Academy of Surveying and Mapping and State Key Laboratory of Geo-Information Engineering, China; Y. Chen, Chinese Academy of Surveying and Mapping, China; J. Wang, Tongji University, China

Dr. Jess W. Curtis,
Air Force Research Laboratory

Session B5: Collaborative Navigation Topics
Room: Kona Moku B

9:05   1.   The Future Satellite Navigation Systems: M.M. Romay Merino, M.D. Laínez Samper, GMV, Spain

9:35   2.   Data Exchange in Swarms of Mobile Vehicles for Positioning, Control and Navigation: J. Schattenberg, H. Harms, T. Lang, S. Batzdorfer, M. Becker, U. Bestmann, Technische Universität Braunschweig, Germany

10:05   3.   Decentralized Cooperative Positioning for Vehicle-to-Vehicle (V2V) Application using GPS Carrier Phase Integrated with UWB Range: D. Wang, K. O'Keefe, M. Petovello, University of Calgary, Canada

Break 10:35 a.m. – 10:55 a.m.

11:00   4.   Cooperative Positioning using GPS, Low-cost INS and Dedicated Short Range Communications: A. Kealy, A.H. Rabia, The University of Melbourne, Australia; N. Alam, The University of New South Wales, Australia; C. Toth, D. Brzezinska, Ohio State University; V. Gikas, C. Danezis, Athens University, Greece; G. Retscher, Vienna University of Technology, Austria

Mr. Shoji Yoshikawa,
Mitsubishi Electric Corporation, Japan

11:30   5. Collaborative Navigation in an Urban Canyon: L. Grymek, O. Osechas, U. Khan, Tufts University

12:00   6. Collaborative Navigation of UAV and UGV Using Vision and LIDAR Sensors: J.H. Kim, I. Bae, C.H. Quan, S.H. Lee, P.W. Son, J.H. Rhee, S. Kim, J. Seo, Yonsei University, Republic of Korea

Alternates

1. Precise Bearing Determination for Collaborative Formation Flight Using Terahertz Signals: J.S. Parker, J. Rife, Tufts University

2. Submeter Accuracy 3D Indoor Positioning Algorithm by Matching Feature Points of 2D Smartphone Photo: D. Yun, Korea Communications Commission, Republic of Korea / Exchange Researcher at Bell Laboratories, Alcatel-Lucent, USA; P. Mirowski, Bell Laboratories, Alcatel-Lucent, USA; T. Lee, Korea Institute of Science and Technology, Republic of Korea; C. Kee, Seoul National University, Republic of Korea

3. Trajectory Shaping for Cooperative Navigation with Inter-Agent Range Measurements: A.J. Rutkowski, M.J. Eilders, B.K. Taylor, K.M. Brink, AFRL/RW; C.N. Taylor, AFRL/RY

Session C5: Air Vehicle Navigation and Surveillance
Room: Kona Moku C

9:05   1. Application of Beacon Navigation and Angle-Only Artillery Surveying Methods for INS Aiding on Aerial Platforms in GNSS Denied Environments: D.R. Levent Guner, Aselsan Inc., Turkey; M.K. Ozgoren, B.E. Platin, Middle East Technical University, Turkey

9:35   2. Guidance, Navigation, and Separation Assurance for Local-Area UAV Networks: Putting the Pieces Together: S. Pullen, Stanford University, USA; J. Lee, Korea Advanced Institute of Science and Technology, Republic of Korea

10:05   3. Enabling Efficient Approach Procedures for Unmanned Aircraft (UA): D. Geister, R. Geister, German Aerospace Center, Germany

Break 10:35 a.m. – 10:55 a.m.

11:00   4. Measurement-based ADS-B System for Detection of Off-nominal Intruder Operations: P. Duan, M. Uijt de Haag, Ohio University

11:30   5. Development of a Navigation Solution for an Image Aided Automatic Landing System: C. Eitner, F. Holzapfel, Technical University Munich, Germany

12:00   6. Integrating Electro-Optical Grid Reference System (EOGRS) and Other Sensors of Opportunity into GPS-Based Precision Applications: G. Johnson, J. Waid, S. Dogra, S. Toussaint, CTSi

Alternates

1. A Low Cost, Highly Capable Navigation Flight Test Approach Through Industry and University Collaboration: S. Sorber, Lockheed Martin; D. Bruckner, Ohio University

2. Cockpit Visualization of Curved Approaches Based on GBAS: R. Geister, T. Kapol, German Aerospace Centre, Institute of Flight Guidance, Germany

3. Protected Sense and Avoid System for Multiple GNSS Constellations: V. Contarino, R. Cubed Inc., USA; I. Borshchova, Memorial University of Newfoundland, Canada; P. Molchanov, AMPAC Inc., USA; S.O. Young, Memorial University of Newfoundland, Canada

Mr. Neeraj Pujara,
Air Force Research Laboratory

Mr. Boyd Loh Hon Leong,
Defense Research and Technology, Singapore Ministry of Defense, Singapore

Prof. Jiyun Lee,
*Korea Advanced
Institute of Science and
Technology, South Korea*

Session A6: Aviation Applications of GNSS
Room: Kona Moku A

1:35   1.   **GPS Orbit and Clock Error Distributions, 2005 to 2012:** C. Cohenour, F. van Graas, Ohio University

2:05   2.   **Null Space Ephemeris Monitor for GBAS:** J. Jing, S. Khanafseh, S. Langel, F-C. Chan, B. Pervan, Illinois Institute of Technology

2:35   3.   **Flight Test Evaluation of INS-Aided GPS Tracking Performance under Equatorial Ionospheric Plasma Bubbles:** T. Tsujii, T. Fujiwara, T. Kubota, Japan Aerospace Exploration Agency (JAXA), Japan

Break 3:05 p.m. – 3:25 p.m.

3:30   4.   **Performance of Civil Aviation Receivers During Maximum Solar Activity Events:** L. Deambrogio, C. Macabiau, Ecole Nationale de l'Aviation Civile (ENAC), Toulouse, France; W. Vigneau, M3SYSTEMS, France; J-J. Valette, Collecte Localisation Satellites (CLS), France; M. Mabilleau, Egis Avia, France; E. Robert, EUROCONTROL, Belgium

4:00   5.   **New Generation SBAS Systems and Monitoring Tools for Aeronautical Applications:** M.M. Romay Merino, M.D. Laínez Samper, A. Madrazo Fernández, A.J. Gavín Alarcón, GMV, Spain

4:30   6.   **SBAS Signal in Space Performance Improvement through Code Phase Resolution Error Correction:** S.D. Ericson, Zeta Associates Incorporated

Alternates

1.   **New Non-Least-Squares Estimator Design to Minimize the Integrity Risk Using RAIM:** M. Joerger, F-C. Chan, S. Langel, B. Pervan, Illinois Institute of Technology

2.   **Sensitivity Analysis of the Airborne CCD Monitor for GAST-D:** Y. Yun, J. Cho, M-B. Heo, Korea Aerospace Research Institute, Republic of Korea

3.   **Investigation of Effects of Ionospheric Plasma Bubble on GBAS Availability and its Mitigation by GPS/INS Integration:** T. Fujiwara, T. Tsujii, T. Kubota, Japan Aerospace Exploration Agency, Japan

Dr. Juan Blanch,
Stanford University

Session B6: Inertial Navigation Technology and Applications
Room: Kona Moku B

1:35   1.   **Precision Navigation and Timing Enabled by Microtechnology: Are We There Yet?:** A. Shkel, DARPA

2:05   2.   **A CMOS Based Current-to-Frequency Converter Design for Current Output Analog Accelerometers:** O.L. Nuzumlali, M. Eren, Aselsan Inc., Turkey; H. Kulah, Middle East Technical University, Turkey

2:35   3.   **INS Aided GPS Integer Ambiguity Resolution and Real Time Vehicle Attitude Determination:** T. Li, G. Yuan, D.D. Wang, L. Zhang, Harbin Engineering University, China

Break 3:05 p.m. – 3:25 p.m.

3:30   4.   **A Novel Federated Prefilter Design for Ultra-Tightly Coupled GPS/INS Integration:** D-J. Jwo, National Taiwan Ocean University, Taiwan; C-F. Yang, Chung-Shan Institute of Science and Technology, Taiwan

4:00   5.   **Low-cost Inertial-aided Cycle-slip Detection for Single-frequency Receiver of Land Vehicle:** Y. Kim, J. Song, B. Park, C. Kee, Seoul National University, Republic of Korea

4:30   6.   **The SLAM Algorithm Based on PNN in the Application for Autonomous Underwater Vehicle:** G. Yuan, D. Wang, T. Li, L. Zhang, Harbin Engineering University, China

Alternates

1.   **An Adaptive Algorithm of Rotation Vector Estimation Suitable for the High-speed Circumgyrating Carrier:** Y. Tian, J. Sun, J. Li, J. Li, Y. Yan, Institute of Microelectronics of Chinese Academy of Sciences, China

2.   **Nuclear Magnetic Resonance Gyroscope:** M. Larsen, M. Bulatowicz, Northrop Grumman

Mr. Wayne Soehren,
Honeywell, Inc.

Prof. Gannan Yuan,
*Harbin Engineering
University, China*

3. **Parameter Identification of Ship Vertical Motions using Light Ray Optimization Algorithm:** G-N. Yuan, L-N. Zhang, D-D. Wang, T. Li, Harbin Engineering University, China

4. **Risk Assessment Techniques for Small-sized Sea Floater by Comparing Dynamic Motions Measured by MEMS-based Sensor with Probability-based Criteria:** J-B. Yim, Mokpo National Maritime University, South Korea

Session C6: Challenging Navigation Topics
Room: Kona Moku C

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

Prof. Mark Petovello, *University of Calgary, Canada*

1:35   1. **Tracking of Direct and Reflected GNSS Signals in Hubble Servicing Mission 4:** B. W. Ashman, J. L. Garrison, Purdue University

2:05   2. **Optimal Parameters for the Combination of Coherent and Non-coherent Acquisition of Weak GNSS Signals:** R. Yang, K.V. Ling, E.K. Poh, Nan Yang Technology University, Singapore

2:35   3. **Implementation of Software GPS Receiver Algorithm for GEO Satellites:** C. Kim, G. Kim, D. Han, C. Kee, Seoul National University, South Korea

Break 3:05 p.m. – 3:25 p.m.

3:30   4. **Instantaneous GPS/BeiDou/Galileo Attitude Determination: A Single-Frequency Robustness Analysis under Constrained Environments:** N. Nadarajah, Curtin University, Australia; P.J.G. Teunissen, Curtin University, Australia and Delft University of Technology, The Netherlands

4:00   5. **A Decentralized Scheme to Generate High Resolution Ionospheric Map in Real-Time:** K.H. Choi, H.S. Kim, J.Y. Lee, J.H. Lim, H.K. Lee, Korea Aerospace University, Republic of Korea

4:30   6. **International Collaborative Navigation Research:** E. Vinande, AFRL/RYWN; N. Pujara, AFRL/RYW; J. Morton, Miami University; F. van Graas, Ohio University

Alternates

1. **Development of Software Based GPS L1 IF Signal Simulator for GEO Satellite Environments:** G. Kim, D. Han, C. Kim, C. Kee, Seoul National University, Republic of Korea

2. **A Software-Defined Real-Time GNSS Signal Quality Monitoring Receiver using GPU (Graphic Processing Unit):** S-H. Im, Korea Aerospace Research Institute, Republic of Korea; J-H. Im, G-I. Jee, Konkuk University, Republic of Korea; E. Lee, M-B. Heo, Korea Aerospace Research Institute, Republic of Korea

3. **Design Considerations of Direct RF Sampling Front End for GNSS Test Receiver in Strong Signal Conditions:** H. Zhang, Beihang University, China; Y. Liu, Beijing Institute of Tracking and Telecommunication Technology, China; Z. Zhang, Beihang University, China

4. **A Simple Model to Mitigate Higher Order Effects on GNSS Positioning Using Triple Frequency:** J. Taramona, Corpac S.A, Peru; J. Galera Monico, H. Marques, Sao Paulo State University, Brazil; E. Rodrigues de Paula, INPE, Brazil

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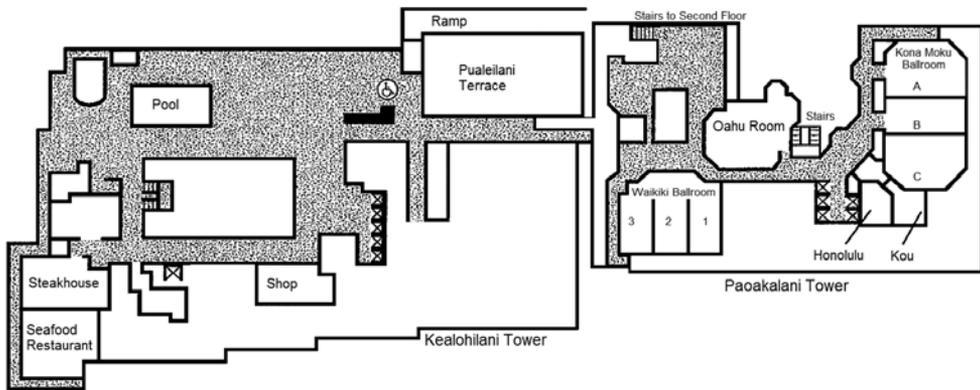
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