

ABSTRACT SUBMISSION GUIDELINES

Due: March 1, 2011

All abstracts must be written for public release with intent to present in an U.S. ONLY environment. Abstracts should include a presentation summary consisting of between 800 and 1000 words, describe objectives, anticipated or actual results, conclusions, any key innovative steps and the significance of your work. Short abstracts and abstracts not approved for public release will be de-weighted in the selection process. Note that you must be a citizen of the US to submit an abstract for FOUO U.S. only sessions (June 28-29) and/or a citizen of the US, AUS, CAN or the UK to submit an abstract for the 4-eyes classified sessions (June 30). Abstracts should be submitted electronically no later than March 1.

To submit your abstract go to www.jointnavigation.org and click on the abstract submission icon for JNC on the main page. Complete all boxes on the abstract submission form. Enter or paste abstract text directly into the appropriate box on the online submission form. Abstracts may also be e-mailed to abstracts@ion.org as a Microsoft Word™, WordPerfect™, or text file. Please indicate the abstract title, the most appropriate session(s) for the paper, a list of all authors and affiliations, and the primary contact author's complete mailing address, phone, fax and e-mail.

Abstracts received electronically will be acknowledged electronically. Abstract titles and corresponding contact authors will be posted weekly on the JNC website. If your name does not appear after two weeks, please contact the ION® office at 703-366-2723 or via e-mail at meetings@ion.org.

You will be notified of acceptance after April 1.

Classified Session Abstracts: Abstracts submitted for classified sessions should be written for public release and submitted according to the submission guidelines described above. If your abstract cannot be written for public release, please contact the ION® National Office for instructions. Final presentations are not required for the selected abstracts in the classified sessions.

PRESENTATION REQUIREMENTS

All presentations, unclassified and classified, will only be released to U.S. citizens who were approved to attend the conference by the Joint Navigation Warfare Center. Speakers presenting as part of the classified sessions (June 30) must provide foreign disclosure approval to the Joint Navigation Warfare Center NLT by May 30, 2011. Presenters are reminded that foreign disclosure approval does not authorize release under International Traffic in Arms Regulations (ITAR). Your organization must ensure appropriate ITAR approvals are obtained in accordance with your organizational policy.

Sessions will consist of presentations. An electronic copy of your final FOUO presentation (typically a PowerPoint file) with signed release form must be received by the ION National Office by July 8, 2011. Classified presentations will be due to the JNWC by May 30, 2011. Presenters will receive a speaker's kit with presentation guidelines and additional meeting information. All presenters are required to pay conference registration fees. You must be a citizen of the US to present at the conference June 28-29 or a citizen of the US, AUS, CAN or the UK to present at the conference on June 30.

CONFERENCE INFORMATION

The conference will be hosted in a FOUO U.S. ONLY environment June 28-29 and a 4-Eyes classified (Secret/REL) environment on June 30. **Advance visit requests and approvals are required for all attendees.** June 28-29 participation will be restricted to: U.S. government and U.S. government contractors. June 30 participation for the classified sessions will be restricted to U.S. government, U.S. government contractors and allied personnel from Australia, Canada, and the United Kingdom. All attendees will require approved visit requests. Foreign national attendees must submit a visit request to the Joint Navigation Warfare Center thru their embassy's channels. Foreign national visit request must be received by May 30, 2011.

Additional information and updates regarding the conference may be found at the website address: www.jointnavigation.org

CONFERENCE TUTORIALS (June 27)

- **GPS 101**, Dr. Jacob Campbell, *AFRL*
- **Inertial MEMS for Navigation & Guidance**, T. Roszhart, *Penn State*
- **Navigating Without GPS**, LtCol Micheal Veth, *AFIT*
- **Urban Indoor Navigation**, Dr. R. James Duckworth, *Worcester Polytechnic Institute*
- **Precise Time and Frequency Applications**, Dr. Joe White, *US Naval Research Lab*
- **The History of Navigation**, Marvin May, *Penn State (invited)*
- **Fundamental Reference Systems**, Dr. Dennis McCarthy or Dr. Brain Luzum, *USNO*

ADVANCE REGISTRATION & HOTEL INFORMATION

Register Online! Go to www.jointnavigation.org and follow the JNC Meeting links to guide you through the registration process (available 2011).

Full Registration includes all technical sessions, access to the exhibit hall, conference refreshments and events, and a CD-ROM of the FOUO presentations. Individual registration benefits are non-transferable.

Member registrations received and paid by May 30, \$680; after May 30, \$770.
Non-member registrations received and paid by May 30, \$750; \$840 after May 30.
Single day registration is \$350 (sessions only, does not include events or proceedings).

Hotel Reservations: Make your government rate hotel reservations at the Crowne Plaza Colorado Springs, phone: 800-981-4012, by May 30 and identify yourself as JSDE/ION Joint Navigation Conference participant.

More than 20 companies showcased their products and services at the JNC's 2010 conference. For exhibit or sponsorship information, contact Ken Esthus, ION® National Office, 8551 Rixlew Lane, Ste. 360, Manassas, VA 20109. Phone: +1-703-366-2723, Fax: +1-703-366-2724, e-mail: kesthus@ion.org, or visit us at www.jointnavigation.org!

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JNC GUIDANCE, NAVIGATION & CONTROL
2011 JOINT NAVIGATION CONFERENCE
June 27-30, 2011
Crowne Plaza Hotel
Colorado Springs, CO

CALL FOR ABSTRACTS
DUE: March 1, 2011

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JNC GUIDANCE, NAVIGATION & CONTROL
2011 JOINT NAVIGATION CONFERENCE



"Military Navigation Technology: The Foundation for Military Ops"

June 27-30, 2011

Crowne Plaza Hotel
Colorado Springs, Colorado

Co-Sponsored by
Joint Services Data Exchange (JSDE)
& **The Institute of Navigation (ION)**



more details at
www.jointnavigation.org

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2011 JOINT NAVIGATION CONFERENCE — Military Navigation Technology: The Foundation for Military Ops

CHAIR

Paul Olson, *U.S. Army CERDEC*

VICE CHAIR

Bill Bollwerk, *U.S. Naval Observatory*

FOUO U.S. ONLY TRACK CHAIRS

TRACK A: Greg Graham, *U.S. Army AMRDEC, Redstone Arsenal*

TRACK B: John Del Colliano, *U.S. Army CERDEC*

TRACK C: Jan Anszperger, *C.S. Draper Laboratory*

4-EYES CLASSIFIED SESSIONS (Secret/REL)

West Kasper, *Joint Navigation Warfare Center*

4-EYES CLASSIFIED PANEL DISCUSSION (Secret/REL)

Dr. Mikel Miller, *AFRL Munitions Directorate* & Jim Doherty, *Institute for Defense Analysis*

The Joint Services Data Exchange (JSDE) and The Institute of Navigation (ION) will co-host the 2011 Joint Navigation Conference (JNC 2011) for the Department of Defense and Department of Homeland Security at the Crowne Plaza Hotel in Colorado Springs, Colorado from June 27-30, 2011. The theme for this year's conference will be:

“Military Navigation Technology: The Foundation for Military Ops”

The 2011 JNC will be the largest U.S. military navigation conference of the year with joint service and government participation. The event will focus on technical advances in positioning, navigation and timing (PNT) with emphasis on joint development, test and support of affordable PNT systems, logistics, and integration. From an operational perspective, the conference will also focus on advances in battlefield applications of GPS, critical strengths or weaknesses of fielded navigation devices, warfighter PNT requirements & solutions, and navigation warfare.

FOUO U.S. ONLY JNC conference attendance (June 28-29) will be controlled by the Joint Navigation Warfare Center and will be restricted to U.S. citizens only. The classified sessions will have 4-Eyes access (June 30) for citizens of U.S., Australia, Canada and the United Kingdom. All participants must establish a need to know and be approved by the Joint Navigation Warfare Center security office.

SESSION TOPICS

Warfighter Requirements & Solutions

Warfighter requirements, needs, and possible solutions involving operational PNT. In addition, presentations on logistic concerns (applied maintenance concepts; spares/replacement availability; interchangeability within host platforms; interoperability with form, fit, and function of host platforms), and International restrictions/concerns, as well as requirements for future technologies. In addition, PNT for Pointing and Stabilization; Tri-Service Programs & Commonality Considerations; User Comments and feedback; NDI/COTS; Homeland Security; and other critical issues such as Target Location Errors.

Chairs: Ray Swider, *OSD* & Bill Bollwerk, *USNO*

Multi-Sensor Solutions for Guidance, Navigation, and Control

This session provides information about navigation sensor developments, new or emerging navigations sensors, and advantages to navigation from additional information available from existing sensors. Further this topic covers techniques for integrating multiple sensors into a single navigation system, advantages to performance for sensor coupling, or developments of multiple sensors in guidance, navigation, and/or control applications.

Chairs: Dr. Navin Mathur, *NVESD* & Dr. Jacob Campbell, *AFRL Sensors Directorate*

Navigating in Challenged Environments (e.g. Urban, Indoor and Sub-Surface Navigation)

This session addresses navigation solutions in difficult environments. Systems and solutions to challenges to navigation systems due to low Size, Weight, And Power (SWAP) requirements such as in UAVs, UUVs, UGVs, Autonomous UGVs (i.e. robots), missiles, dismounted Soldiers, etc. are all of interest. Other environment challenges of interest are navigating in GPS denied conditions, high multipath locations, underground/cavernous environments, poor terrain (mountainous/canyons), or urban/indoor environments.

Chairs: Dr. Jalal Mapar, *DHS* & Terry Roszhart, *Applied Research Laboratory, Pennsylvania State University*

Collaborative Navigation Techniques

As access to networks continues to improve and expand, a great deal of information can be passed or made available that enhances the performance and capabilities of the warfighter in their missions. This topic addresses techniques for exploiting network connectivity to assist and improve navigation and navigation related solutions. This includes efforts for supplying accurate up-to-date information to navigation processors, sharing of data for relative navigation solutions within a defined group, determining situational awareness for the warfighter, and providing pertinent navigation related information for missions such as search and rescue, targeting, joint operations, and other applications requiring complex coordination. Of interest are efforts and technologies that support the ability for navigation systems to share information amongst a number of other users, synergistically improving group's overall performance. This topic also includes the use of network connected devices for navigation such as Smart phones, navigation apps, GPS based personal navigation systems with on-line maps, etc.

Chairs: Dr. David Taylor, *ENSCO* & Dr. Stan Sokolowski, *QED Systems (invited)*

Land Applications

Concepts, requirements, performance and operational experience with the use of military navigation systems for land vehicle automation and guidance, and issues associated with precision control.

Chairs: Eric F. Edwards, *U.S. Army AMRDEC* & Dr. Mikel Miller, *AFRL Munitions Directorate*

Alternate Navigation Technologies: I and II

This session will focus on alternative navigation technologies to traditional GPS/INS solutions. Presentations that describe navigation sensors and techniques using vision based/camera measurements, RF-based signals (other than GPS), signals of opportunity (SOOP), laser-aided, celestial, bathymetric, gravimetric, nature-inspired navigation, or other novel techniques that seek to provide navigation in environments where GPS is not available are highly desirable

Session I: Vision Aided & RF Signals Based Solutions (non-GPS)

Chairs: Dr. Jeff Dickman, *Northrop Grumman (invited)* & Don Venable, *AFRL Sensors Directorate*

Session II: Naturally Occurring Measurement Sources (gravity, magnetic fields, lightning, etc.)

Chairs: Jim Doherty, *Institute for Defense Analysis* & Dave Lyon, *ARL*

Marine Applications

Military navigation systems operation in a marine environment, including waterway navigation, harbor entrance/approach (HEA), port entry and docking, ocean and harbor control of vessels, and precision berthing operations. Abstract addressing military marine applications, including vessel tracking systems, mine recovery and exploration.

Chairs: CAPT Ashley Evans, *Navigation Branch, USN* & Dave Brown, *Navigation Branch*

Space & Satellite Applications

Applications of PNT systems on spaceborne platforms such as satellites, the space station, launch vehicles and interplanetary missions. Use of navigation sensors to aid primary objectives of orbit determination, attitude determination, and navigation, and application objectives such as gravity determination, and mapping from space. Advances in space-based user equipment.

Chairs: LtCol Mike Manor, *USAF 250PS (invited)* & Ed Powers, *USNO*

Aviation Applications

The use of navigation systems for military aviation, including future PNT requirements for aviation, integration into multi-mode systems and flight testing of PNT applications. Aircraft based processing, including integrity monitoring (RAIM/FDE) and GNSS/INS integration to support aviation requirements. Integration of satellite navigation technology into military aircraft design, air traffic management and airport surface navigation and guidance.

Chairs: CDR John Kennard, *Joint Navigation Warfare Center, USN* & LTC James Bamburg, *Aviation Mission Equipment, U.S. Army*

NEW! Micro Navigation Applications

Concepts, requirements, performance and operational experiences utilizing navigation systems that are Size Weight and Power (SWaP) limited, to include, but not limited to, systems that are man-portable, sensor systems and unmanned micro vehicles.

Chairs: Al Hasselbring, *Honeywell Aerospace* & Dr. Vicki LeFevre, *Navigation & Control Technology Weapons Development & Integration Directorate, AMRDEC*

Robust Navigation Systems/Solutions

This topic discusses techniques for assuring navigation in all operating environments/conditions. Of interest are methods for monitoring navigation performance, improved signal processing to permit GPS solutions below normal signal thresholds, robust surface navigation techniques, or integration techniques leveraging performance characteristics for navigating in a variety of locations and conditions.

Chairs: Dr. Stefanie Tompkins, *DARPA* & Dr. Bernard Schnaufer, *Rockwell Collins*

NEW! Missile Applications

This session will cover the use of navigation technologies for missile system applications, including inertial sensors, Inertial Measurement Units (IMU), Inertial Navigation Systems (INS), Global Positioning System (GPS), and integrated GPS/INS systems. Topics will include innovative design concepts, challenging performance and environmental requirements, laboratory and flight test results, compensation methods, alignment/initialization techniques, and size constraints/miniaturation as well as other issues related to the integration of navigation technologies in current and emerging missile systems.

Chairs: Steve Stockbridge, *AFRL Munitions Directorate* & Christopher E. Roberts, *Weapons Development & Integration Directorate, AMRDEC*

NEW! GPS Modernization

New military capabilities and performance, including integrity and accuracy improvement concepts. Modernized space segment, and control segment. New GPS. Research and development status. Impact on future applications.

Chairs: Maj. Christopher Williams, *USAF GPS Wing (invited)* & Gary Rafferty, *Braxton Technologies*

NEW! GPS Constellation Performance

The GPS constellation provides precision navigation to millions of civilian and military users daily. The constellation's health, availability, accuracy, and overall performance are the focus of the 2nd Space Operations Squadron with support from the GPS Wing. Independent test organizations provide additional insights into how GPS performs to meet unique user needs. This session focuses on the GPS constellation, technologies used to manage the constellation, and looks at future requirements and technologies needed to maintain current and future user needs.

Chairs: Capt. John Taylor, *USAF 250PS* & Chaz Bowman, *LinQuest Corporation*

Military GPS/Antenna Technologies and Interference Mitigation

Antenna designs for GNSS with emphasis on size, gain control, multiple frequency coverage, multipath mitigation, and RF interference suppression. Combined effects of interference on military receivers, interference mitigation techniques and limits of performance.

Chairs: Dr. Inder Gupta, *The Ohio State University* & Jeffry Ross, *The MITRE Corporation*

Military GPS Receivers and Military GPS Receiver Technology

Military GPS receiver designs and algorithms. Future concepts including hardware, algorithms and techniques related to rapid acquisition, improved code and/or carrier tracking performance, high accuracy position solutions, reduced computational loads. In addition, flexible receiver architectures for GNSS receivers; receiver implementations using programmable processors or re-configurable Field Programmable Gate Arrays (FPGAs). Unique approaches to military GPS software receivers. Unique advantages of software receivers. Implementation of new approaches. Demonstration of novel advantages of unique approaches to software receivers.

Chairs: Eddy Emile, *USAF GPS Wing* & Dr. Alex Cerutti, *The MITRE Corporation*

Military GPS Use and Experiences

GPS applications in military transport vehicles; unique applications for GPS in the military infrastructure, the combat environment, and non-combat applications; GPS as a force enhancer; GPS experience in exercises; GPS use by Allied Forces; GPS use in combat operations; GPS integration into other military applications, etc.

Chairs: Michael Harms, *RTLogic* & Greg Kohls, *647th Squadron, WPAFB*

GPS in Military Applications/Navigation Warfare

Integration of GPS into new and existing military systems. M-code signal development and testing. Precision weapon delivery and military applications in land, sea, air, and space using GPS. Development of new military GPS and auxiliary sensor hardware. Includes interference and jamming aspects of GNSS from an unclassified perspective.

Chair: Bob Greenlee, *Joint Navigation Warfare Center, USSTRATCOM*

Modeling & Simulation

Novel and interesting uses of software GNSS and INS models and simulations to prove military concepts, advance algorithms and the state of the art in navigation. Software-defined GNSS simulator applications and technology. The use of hardware-in-the-loop simulators for navigation research, development and evaluation.

Chairs: Denice Jacobs, *AFRL Sensors Directorate* & Sharon Donald, *C.S. Draper Laboratory*

Classified Session Sponsored by: The Joint Navigation Warfare Center (classified 4-Eyes)

Navwar threat; test and evaluation including testing activities and results including design of GNSS signal simulators and other test assets; modeling and simulation; and PNT operations and applications (military GNSS, military differential avionics implementations such as JPALS and military GNSS-INS integrations) including allied (AUS, CAN & UK partners) PNT initiatives. All classified presentations must be approved for 4-Eyes release.

Chair: West Kasper, *Joint Navigation Warfare Center*

Cross-Talk Panel (classified 4- Eyes)

The Joint Navigation Conference each year conducts “Cross Talk” - an interactive discussion between the audience and a panel of war fighters who have had recent operational experience. The purpose of Cross Talk is to inform the navigation development community on how to better formulate military navigation systems. Cross Talk's panel members will make an opening statement that addresses the nature of their specialty or how current navigation systems are meeting the needs of their missions; be prepared to be “wowed” by film and photographs of their experiences. After the opening statements, questions will be taken from the audience.

Moderators: Dr. Mikel Miller, *AFRL Munitions Directorate* & Jim Doherty, *Institute for Defense Analysis*

Note: We are soliciting panel member participation from all services. We are looking for war fighters who have had operational experience in the last year; Electronic Warfare specialists are of particular interests. All those who can contribute to the panel are requested to contact Jim Doherty, Phone: (215) 682-4006, E-mail: jdohertry@ida.org

Hotel accommodations and conference registration will be provided at no cost to Cross Talk panel members.

www.jointnavigation.org