



**AUVSI's Unmanned Systems North America 2007**  
**August 7 – 9, 2007**  
**Washington Convention Center, Washington DC, USA**

**Tuesday, August 7, 2007**

9:00 a.m. – 12:00 noon  
Opening Plenary Session  
**Chief Donald L. Shinnamon, Sr.**, Chief of Public Safety, Holly Hills Florida, and Aviation Committee Chair, International Association of Chiefs of Police (IACP)  
**Tan Peng Yam**, Deputy Chief Executive (Technology), Defence Science & Technology Agency, Singapore  
**Lt. Gen. Donald J. Hoffman**, Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition  
**Dr. Delores M. Etter**, Assistant Secretary of the U.S. Navy for Research, Development and Acquisition

**Wednesday, August 8, 2007**

8:00 a.m. – 4:00 p.m. Poster Sessions  
9:30 – 10:30 a.m. Technical Sessions  
Wednesday Plenary Session  
**COL John Burke**, USA, Director, Unmanned Systems Integration, HQDA  
**RADM Timothy McGee**, Commander, Naval Meteorology and Oceanography Command  
**MG Gary L. Harrell**, Deputy Commanding General, United States Army Special Operations Command  
**Major General Michael Kostelnik**, USAF (Ret.), Department of Homeland Security, Assistant Commissioner, Office of CBP Air and Marine  
*Four concurrent tracks as follows: (1) Command & Control I, (2) Command & Control II, (3) Design I, and 4) Operations I*  
4:00 – 5:30 p.m. Technical Sessions  
*Four concurrent tracks as follows: (1) Command & Control III, (2) Command & Control IV, (3) Operations II, and (4) Payloads & Missions I*

**Thursday, August 9, 2007**

8:00 a.m. – 4:00 p.m. Poster Sessions

9:30 – 11:30 a.m. Technical Sessions

*Four concurrent tracks as follows: (1) General I, (2) (3) Lethal/UCAS, and (4) Test & Evaluation I*

1:00 – 3:00 p.m. Technical Sessions

*Four concurrent tracks as follows: (1) Command & Control V, (2) Design II, (3) Payloads & Missions II, and (4) Test & Evaluation II*

**Wednesday, August 8**

**8:00 – 4:00 p.m. - Poster Sessions**

**UAV Formation Maintenance in Linear and Curvilinear Trajectories**

Tariq Abdelrahman and Spiros Courellis, PhD, California State University, Fullerton

**A Descriptive Methodology for Customer Centric Unmanned Aerial Vehicle (UAV) Motion Imagery Metadata**

Sean Baity and Joey Raynes, AAI Corporation

**TacVue™ – Making High-Resolution SAR Imagery Feasible and Affordable from Tactical UAS**

Randy Bernard, Jeff Bishop and Steve Carlson, Rockwell Collins

**Protector Unmanned Surface Vehicle**

David Boudreau, BAE Systems

**How to Select and Qualify a Parachute Recovery System for Your UAS**

Manley C. Butler and Roberto Montenez, Butler Unmanned Parachute Systems, LLC

**Application of a Modular Framework for Mission Management and Control of Air, Land, & Maritime UxVs**

Geoffrey Butler, Jason Colbourne, Nigel Cox, Rex Helton, Robert Settle and Andrew Tonge, BAE Systems

**Design and Integration of Small Coaxial Unmanned Aerial Vehicle**

Young-Seop Byun, Jun-Beom Song, Byoung-Eon Lee, Jeong-Kim and Beom-Soo Kang, Department of Aerospace Engineering at Pusan National University

**Formation Control Based on Relative Position Using the 802.15.4 (ZigBee) Protocol**

John Clemmensen, Dr. Al Wicks and Dr. Andrew Kurdila, Virginia Tech

**Mixing Manned and Unmanned Aircraft in a Forward Arming Refueling Point**

William Clemons, John H. Northrop & Associates

**The Breakfast Club – Micro Air Vehicle (MAV) Innovative Transformational Design**

CIC Joseph Conrad, Pete Gac, Barrett Meysembourg, Kendall Forrester, Kyle Morales and Ryan Freaney, United States Air Force Academy

**Parameter Identification for Look-Ahead Vehicle Maneuverability**

Dustin Edwards and David Bevely, Auburn University

**Autonomy Development in the AMN (Autonomous Maritime Navigation) Program**

Les Elkins, Spatial Integrated Systems, Inc.

**Sea Trial Test of RIB-Type Unmanned Surface Vessel for Ensuring Seaworthiness of Electronic Equipment**

Dr. Tae Hyun Fang, Hyeon Kyu Yoon, Dong-Jin Yeo and Chang-Min Lee, Korea Ocean Research and Development Institute

**Ship Recognition Using Optical Imagery for Harbor Surveillance**

Dr. Patricia Feineigle, Dr. Daniel D. Morris and Dr. Franklin D. Snyder, General Dynamics Robotic Systems

**Playbook Control of Multiple Heterogeneous Weaponized UAVs**

Susan Flaherty, US Army AFDD; Harry B. Funk, Smart Information Flow Technologies, Inc.; Terry Turpin, Turpin Technologies; R. Jay Shively, US Army AFDD

**Development of the GDRS Anti-Submarine Warfare USV EDM System for the USN and LCS**

Brad Beeson, General Dynamics Robotic Systems

**Adaptive Delegation Interfaces (ADI) for Improved Situation Awareness and Reduction of Workload in C**

Dr. Amos Freedy and Gershon Weltman, Perceptronics Solutions Inc.; Raja Parasuraman and Ewart deVisser, George Mason University; Nicole Coeymen, RDECOM-STTC

**Design and Test of a Sonobuoy Precision Aerial Delivery (SPAD) UAV System**

Nathan Gravelle, Jerome Fanucci and Steve Schoenholtz, KaZaK Composites Inc.; David Maass, Flightware; Jason Payne, NAVAIR

**Utilization of JAUS to Bridge Software and Hardware Barriers for an Autonomous Mobility Application**

Dr. Michael Hannan, Applied Research Associates; Grant Gothing, Virginia Tech

**Adaptation of the Remote Multi-Mission Vehicle (RMMV) for Additional Unmanned Missions**

John Brandes, Eric Holmes, Brad Hines, Dan McLeod and Marc Heller, Lockheed Martin-MS2

**Design of a Hybrid PEM Fuel Cell Powered UAV Using a Sodium Borohydride Hydrogen Carrier**

Charles Chiang and Christopher Herwerth, MFDCLab California State University, Los Angeles

**System Architecture for Autonomous Mine Detection Using Small Unmanned Ground Vehicles**

Dr. Brian Huff, The University of Texas at Arlington; Veera Jawahar Vibeeshanan, UTA Industrial Engineering; Arthur Reyes, UTA Computer Science and Engineering; Atilla Dogan and Kamesh Subbarao, UTA Mechanical & Aerospace Engineering

**Recent Status of the Smart UAS Program**

Dr. Cheolho Lim, Jai Moo Kim and Ohsung Ahn, Korea Aerospace Research Institute

**Long Endurance Solid Oxide Fuel Cell Power Systems for Small UAVs**

Timothy LaBreche, Nathan Ernst and Brad Clawson, Adaptive Materials Inc.

**Wednesday, August 8**

**9:30 - 11:30 a.m. - Technical Sessions**

Four concurrent tracks as follows: (1) Command & Control I, (2) Command & Control II, (3) Design I, and 4) Operations I

**Command & Control I**

9:30 – 11:30

**Video-Data-Optimization and Dissemination of Predator B Media to Mobile Web Applications**

Chad Partridge, Sensing System; Maj. Kevin Kniskern, US Air Force – UAV Battlelab

- 10:00 – 10:30 a.m. **Advancements in Next Generation Unmanned Control Systems**  
Mark Bigham, Raytheon Company
- 10:30 – 11:00 a.m. **Air Assault Expeditionary Force (AAEF) Campaign of Experimentation**  
Edwin F. Davis, US Army Infantry Center, Soldier Battle Lab/TRADOC, ARCIC
- 11:00 – 11:30 a.m. **A Multi-Objective Control Strategy for the Persistent Littoral Undersea Surveillance Network (PLUSNet)**  
Jonathan Williams, Jeffrey Weinschenk and Kwang Lee, Pennsylvania State University Applied Research Laboratory

#### Command & Control II

- 9:30 – 10:00 a.m. **Multi-purpose Autonomous Teaming Control of Heterogeneous (MATCH) Robots**  
Brett Breslow, Matthew Wellner and Adam Salamon, Lockheed Martin Advanced Technology Laboratories; Corrinna Lathan, Jack Vice and Bryan Hays, AnthroTronix, Inc.
- 10:00 – 10:30 a.m. **Advances in Autonomous Obstacle Avoidance for an Unmanned Surface Vehicle**  
Jacoby Larson, Michael Bruch, Jason Lum and John Ebken, SSC San Diego; Robert Webster, SAIC
- 10:30 – 11:00 a.m. **Optimal Path Planning and Control of Tactical Unmanned Aerial Vehicles in Urban Environments**  
Capt Kevin Bollino (USAF) and LT L. Ryan Lewis (USN), Naval Postgraduate School program
- 11:00 – 11:30 a.m. **MQ-8B Fire Scout: A Program Overview, Update on Recent Flight Test Activity and Future Program Plans**  
Michael Fuqua, Northrop Grumman

#### Design I

- 9:30 – 10:00 a.m. **Transformational Gust Resistant Wing Design**  
Adam Danielson, Guy Baldwin, Phil Becker, Chris Collins and Seth Erickson, USAFA; Lt Col Andy Szmerekovsky, USAF
- 10:00 – 10:30 a.m. **DARPA Urban Challenge Autonomous Navigation Developments and Test Results**  
Dr. Charlie Reinholtz and Dr. Al Wicks, Virginia Tech; Andrew Bacha and Michael Fleming, TORC Technologies
- 10:30 – 11:00 a.m. **DEPTHX Autonomous 3D Mapping Vehicle – Program Summary**  
Dr. William Stone, Stone Aerospace
- 11:00 – 11:30 a.m. **A Vision for Open Architecture Standards for Future Unmanned Aerial Systems**  
Paul Geier, Kenneth Spencer and Earl Wyatt, Booz Allen Hamilton

#### Operations I

- 9:30 – 10:00 a.m. **Multi-Fuel Internal Combustion Engine Design to Improve UAV Reliability and Performance**  
Russ Hunter, CSC; Keith Voigts, Wiseman Engine Technologies
- 10:00 – 10:30 a.m. **Focused Flying for Naval UASs**  
CAPT Paul Morgan, PMA-263
- 10:30 – 11:00 a.m. **An Operator's Requirements for Detect, Sense, and Avoid**  
Lt Col Andy Thurling, David Morrow and Capt Eric Rucker, 452d FLTS, Edwards AFB

11:00 – 11:30 a.m.

**Small Form Factor Safety Critical Operator Control Unit for Gladiator UGV**  
Mark Snyder, Quantum3D; Ricky Houghton, Carnegie Mellon University

**Wednesday, August 8**

**Technical Sessions - 4:00 - 5:30 p.m.**

Four concurrent tracks as follows: (1) General I, (2) (3) Lethal/UCAS, and (4) Test & Evaluation I

**General I**

4:00 – 4:30 p.m.

**Development of Small Rotating Cylinder Valve 4-stroke Engines for UAV Applications**  
Dr. Brian Mason, RCV Engines Ltd.

4:30 – 5:00 p.m.

**The FCS Small Unmanned Ground Vehicle (SUGV) Development Successfully Demonstrates Performance, Utility, and Endurance with Pre Prototypes in an FCS Experiment I.I**  
Robert Bell, iRobot; John Possel, FCS LSI & SAIC; Keith Anderson, US Army

5:00 – 5:30 p.m.

**Northrop Grumman's Family of Unmanned Systems**  
Rick Ludwig, Northrop Grumman

**General II**

4:00 – 4:30 p.m.

**Software Fault Tolerance is a Major Autonomy Concern**  
Michael O'Heeron, Alion Science and Technology

4:30 – 5:00 p.m.

**US Army Family of UASs**  
Col Donald Hazelwood, UAS Project Office

5:00 – 5:30 p.m.

**High Fidelity Training Systems for the Predator Community**  
Jeffrey Goldfinger, L-3 Communications/Link Simulation & Training Lethal/UCAS

**Lethal/UCAS**

4:00 – 4:30 p.m.

**Navy Unmanned Combat Air System (Navy UCAS)**  
CAPT Tony Albano, Navy OPNAV N88

4:30 – 5:00 p.m.

**Application of an Armed UAS for Close Air Support**  
John Sundberg, EDO-CAS

5:00 – 5:30 p.m.

**Smart Wide Area Weapons For UAVs**  
Richard Sterchele, Lou Cataldo, Catherine Bright and Freeda Ostis, Textron Defense Systems

**Test & Evaluation II**

4:00 – 4:30 p.m.

**Automated Aerial Refueling Station Keeping Flight Test**  
Lt Jamie Schnapp, Jacob Hinchman, Ba Nguyen and Capt William McClelland, Air Force Research Laboratory

4:30 – 5:00 p.m.

**Serpentine Robot Performance Testing**

Kristina R. Jantzen, System Planning Corporation (SPC); Dr. Ed Van Reuth, DARPA

5:00 – 5:30 p.m.

**The Israeli Unmanned Ground Vehicle**

Dr. Arie Perry, Yaakov Mashiah and Meir Shabtai, Israel Aerospace Industries (IAI) - Lahav Division

**Thursday, August 9**

**8:00 a.m. – 4:00 p.m. - Poster Sessions**

**Investigation of Potential Benefits of UAVs for Agricultural Observations**

Gabriel Ladd and Abhijit Nagchaudhuri, University of Maryland Eastern Shore; Geoff Bland and Ted Miles, NASA Wallops Flight Facility

**Enhanced Stability Controllers for UGVs**

Kenneth Lambert and Dr. David Bevely, Auburn University

**Multi-Vehicle Mission Planning**

Dr. Michael Leen, OR Concepts Applied

**Integration and Flight of a University-Designed UAV Payload in an Industry-Designed Airframe**

Matthew Lendway, Samuel Trandem, Brian L. Berseth, Richard R. Schultz and William H. Semke, University of North Dakota School of Engineering and Mines

**H-I-L Testbed for The Evaluation of Unmanned Vehicle Hybrid Power System Architectures and Control**

Jeffrey McLaughlin and Dr. Pritpal Singh, Villanova University; Dr. Chris Dafis, John Metzger and Brian Brady, Naval Surface Warfare Center Carderock Division

**Heterogeneous Unmanned Vehicle Collaborative Control Demonstration**

John Sauter, NewVectors; John Moody, Augusta Systems

**Tri-Service UAV RDT&E — Accessible Flight Test Resources Yield Successes for UAV/Payload Projects**

Bill Mueller, EG&G/Lear Siegler; Joe Holt, US Army CERDEC Flight Activity; Tom Szallai, Naval Air Engineering Center Lakehurst; Bill Maiorano, Lear Siegler Services, Inc.

**Unmanned System Risk Management in the Risk-Aware Mixed-Initiative Dynamic Replanning (RMDR) System**

Dr. Lance Page, Margaret Nervegna and Dino DiBiasco, Draper Laboratory

**Team Planning for Unmanned Vehicles in the Risk-Aware Mixed-Initiative Dynamic Replanning (RMDR) System**

John Wilde, Dino DiBiasco and Margaret Nervegna, Draper Laboratory

**Global Hawk Block 20 Testing Through First Flight**

William Norton, 452d FLTS, Edwards AFB

**Reconfigurable Mission System: A Proof-of-Concept**

Felix Pageau and Martin Morissette, Ecole de Technologie Supérieure; Manuel Darveau, Miranda Technologies Inc.

**Automatically Deployed Communication Relays**

Narek Pezeshkian and Aaron Burmeister, SPAWAR Systems Center, San Diego

**Unmanned Air System (UAS) Carriage and Release Systems**

Stefano Lassini, Smiths Aerospace; Rick Rezabek, Black Ram Engineering (BRE)

**Facilitating Multiple UAV Control with Integrated Netcentric Information Feeds**

Dr. William Marshak, Jeff Collier, Dominic Bartek, John Miles, Nick LaDue and John Hudson, SYTRONICS, Inc.

**Integrating Instant Messaging Information as a Network-Centric Data Source**

Jeff Collier, John Hudson and Dr. William Marshak, SYTRONICS, Inc.

**Risk Reduction and Mitigation Strategies for Unmanned Aircraft Systems**

David Wilcox, Melissa Hildebrandt, Michael Ciemian, and Terry Michael, AAI Corporation

**Generalized Field D\* Algorithm for Path Planning Using Graphs**

Leonid Sapronov and Alberto Lacaze, Robotic Research LLC

**Towing MAV Systems**

Cadets Gregory Schroeder, Daniel Moseby, Scott Skibitsky, John Cordova, Matthew Duncan and Lt Col Andrew Szmerekovsky, United States Air Force Academy

**Vision Based Sensing for Autonomous In-flight Refueling**

Douglas Scott and Michael Toal, Octec Ltd.

**Testing High Fidelity Mapping for Near-Earth UAVs**

Keith Sevcik and Paul Oh, Drexel University

**An SVD-Based Method of Obstacle Detection and Efficient Evasive Maneuvering for UAVs**

Azhar Sufi, Sarnoff Corporation

**Real-time Decentralized Air Space Management for UAVs with Partial Information**

Dr. Regis Vincent and Osher Yadgar, SRI International

**LEAPP (Long Endurance Autonomous Powered Paraglider) UAV**

Daniel Preston, Atair Aerospace, Inc.

**Thursday, August 9**

**Technical Sessions - 9:30 - 11:30 a.m.**

Four concurrent tracks as follows: (1) Command & Control III, (2) Command & Control IV, (3) Operations II, and (4) Payloads & Missions I

**Command & Control III**

9:30 – 10:00 a.m. **The North West Shelf Unmanned Aerial System Trial – The General Atomics Mariner Demonstration**

Dr. Duncan Craig, Defence Science and Technology Organisation

10:00 – 10:30 a.m. **PANCAS Autonomous Collision Avoidance Technology Demonstration Status**

Duane Cline and Thomas Milkie, Scientific Applications and Research Associates, Inc.

10:30 – 11:00 **The Crusher System for Autonomous Navigation**

a.m. Dr. Anthony Stentz, John Bares, Thomas Pilarski and David Stager, Carnegie Mellon NREC  
11:00 – 11:30 **Human Interface and Autonomy Technologies for Multiple Unmanned Air, Sea, and Undersea Vehicles**  
a.m. Marc Steinberg, Office of Naval Research

#### Command & Control IV

9:30 – 10:00 a.m. **A Demonstration of Autonomous Mission Management and Ground Based Autorouting**  
Jason Colbourne, BAE Systems  
10:00 – 10:30 **Weaponized Unmanned Air System Command & Control**  
a.m. Andrew Tree and Scott B. Millett, NAVAIR  
10:30 – 11:00 **Development of Intelligent Navigation System for USV (Unmanned Surface Vehicle)**  
a.m. Dr. Changmin Lee, Hanjin Lee, Dosig Gong, Kunhang Yun, Hyun-Taek Choi, MOERI/KORDI  
11:00 – 11:30 **Air Force Predator Mishap Trends and Implications for Training**  
a.m. Dr. Robert Nullmeyer, Air Force Research Laboratory; Robert Leonik, CAE USA

#### Operations II

9:30 – 10:00 a.m. **Space Weather Effects on GPS Navigation for Unmanned Systems**  
2d Lt Kenneth Lebay, 452d FLTS, Edwards AFB  
10:00 – 10:30 **Flexible AUV Vision Framework**  
a.m. Martin Morissette, Felix Pageau and Jean-Francois Im, École de technologie supérieure  
10:30 – 11:00 **UAV Autonomous Airborne Refueling: The AARD Success Story**  
a.m. Joseph Hansen and Nassib Nabba, PhD, Sierra Nevada Corporation  
11:00 – 11:30 **UAS Use for Ecological Research and Natural-Resource Monitoring**  
a.m. Adam Watts, University of Florida; Ahmed Mohamed, Geomatics Program, University of Florida; Peter Ifju and W. Scott Bowman, Mech & Aero Engineering, University of Florida; Larry Taylor, US Army Corps of Engineers; Franklin Percival, US Geological Survey/Univ. of FL

#### Payloads & Missions I

9:30 – 10:00 a.m. **Expanded Unmanned System Interoperability via Mission Planning**  
Michael Hanchuck, DP Associates  
10:00 – 10:30 **A Dual-Flight Mode MAV for Situational Awareness and Search-and-Rescue in Near-Earth Environments**  
a.m. William Green and Paul Y. Oh, Drexel University  
10:30 – 11:00 **High Performance SAR Sensors for MALE UAVs: New Development or Modified COTS?**  
a.m. David Stevens, MDA Corporation and Jim Blumling, Telephonics Corporation  
11:00 – 11:30 **VTUAV – Current and Future Payloads and Missions**  
a.m. Dave Maier, PMA-263

**Thursday, August 9**  
**Technical Sessions - 1:00 - 3:00 p.m.**

Four concurrent tracks as follows: (1) Command & Control V, (2) Design II, (3) Payloads & Missions II, and (4) Test & Evaluation II

**Command & Control V**

- 1:00 – 1:30 p.m.     **LiDAR for Enhanced Situational Awareness of Rotary UAV**  
Bill Gutelius and Jeff Tripp, Optech Incorporated
- 1:30 – 2:00 p.m.     **Encounter Model to Support Elevation Field of Regard Requirements Analysis**  
Dennis Coulter, Modern Technology Solutions, Inc.
- 2:00 – 2:30 p.m.     **Air Force Research Laboratory Sense and Avoid (SAA)**  
Dr. John McCalmont, AFRL/SNJT
- 2:30 – 3:00 p.m.     **Multi-Vehicle Mission Planning**  
Dr. Michael Leen, OR Concepts Applied

**Design II**

- 1:00 – 1:30 p.m.     **SAMARAI Nano Air Vehicle – A Revolution in Flight**  
Steve Jameson and Brian Satterfield, Lockheed Martin Advanced Technology Laboratories; Ned Allen, Lockheed Martin Aeronautics Advanced Development Programs
- 1:30 – 2:00 p.m.     **Battery Systems for Maritime AUVs**  
Dr. Arden Johnson, Electrochem Commercial Power
- 2:00 – 2:30 p.m.     **UV Sentry: A System of System Approach to High Value Asset Defense Using Unmanned Vehicles**  
Michael Fetsch, Sara Wallace and John Kark, NSWCCD; Chris Mailey, SSCSD
- 2:30 – 3:00 p.m.     **Inflatable Wings as a UAV Design Alternative**  
Dr. Jamey Jacob, Oklahoma State University; Suzanne Smith, University of Kentucky; Dave Cadogan and Steve Scarborough, ILC Dover, Inc.

**Payloads & Missions II**

- 1:00 – 1:30 p.m.     **Prospects for a Civil UAS Market in the United States**  
Basil Papadales, Moiré Incorporated
- 1:30 – 2:00 p.m.     **Technology Review for Highly Miniaturized SAR Sensor Systems**  
Dr. Michael Edrich, EADS Deutschland GmbH
- 2:00 – 2:30 p.m.     **Latest Missions and Capabilities of the Predator UAS Series**  
Scott Nyberg, General Atomics Aeronautical Systems, Inc.
- 2:30 – 3:00 p.m.     **Flight Inserted Detection Expendable for Reconnaissance Offboard Sensing Capability**  
Alvin Cross, Naval Research Laboratory; Jim Guthrie, DTRA

## Test & Evaluation II

- 1:00 – 1:30 p.m. **Detect Sense and Avoid Capability within a Terrain Awareness Warning System**  
Tom Anderson and Ed Smetana, PMA-209 Collision Avoidance Systems; Paul Sossong, Michael Johnson and Dennis Bostich, PMA-209/DCS Corporation
- 1:30 – 2:00 p.m. **GHMD – Lessons Learned – Testing and Evaluating Operations**  
Dave Seagle, PMA-263
- 2:00 – 2:30 p.m. **OSD Sense-and-Avoid Flight Demonstration**  
Pete Lewis, SRA International; Dyke Weatherington, OSD(AT&L)
- 2:30 – 3:00 p.m. **An Experiment to Assess Detection and Avoidance of Moving Obstacles from a UGV**  
Dr. Barry Bodt and Elias Rigas, U.S. Army Research Laboratory