

# Workshop on the Research & Evaluation of NEMS/MEMS

September 8 & 9, 2009

Bob Jones Auditorium at the  
Sparkman Center

Redstone Arsenal, AL



## Objective

The objective of this workshop is to identify NEMS/MEMS technologies that may be applied to DoD weapon system platforms. Specific interests for this workshop are in developing state-of-the-art radar devices, and navigation and control devices that can be transitioned to aviation, missile and other DoD weapon system platforms.

The TIP number for this program is F94WREN.

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The steering committee for the Workshop on the Research & Evaluation of NEMS/MEMS is soliciting abstracts in the following areas:

- NEMS/MEMS for Military and Space Applications
- NEMS/MEMS Packaging, Reliability, and Metrology
- NEMS/MEMS Devices and Applications

**Abstracts are due June 1, 2009.**

This workshop is UNCLASSIFIED / ITAR RESTRICTED.

Attendance is limited to US Citizens only. Abstracts must be UNCLASSIFIED. Submissions should target one or more of the topic areas listed. Abstracts should clearly express the objective, scope, and conclusions of the presentation. It should be kept between 250-500 words. Potential presenters should prepare for a twenty minute presentation, with a five minute question/answer time immediately following each presentation. Abstracts will undergo a peer review selection, and all submitters will be notified of the selection results. Please address any administrative questions to [Angie Cornelius](#) .

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## Submission Information

(The following must be included with all abstract submissions.)

- ◇ Title of Author (Dr., Mr., Ms., Mrs., Prof., Rank, etc.)
- ◇ Author Full Name
- ◇ Paper Title
- ◇ Author Company/ Organization
- ◇ Author Phone & Fax
- ◇ Author Email
- ◇ Presenter Name & Organization, if different from author
- ◇ POC Phone & POC Email
- ◇ Co-Author(s) (Include Full Name and Company/ Organization)

## How to Submit Your Abstract

Electronic submission is required by June 1, 2009. All abstracts must include complete submission information as listed above. All abstracts must be UNCLASSIFIED. Please email your abstract & submission information to [Angie Cornelius](#) .



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## Tentative Agenda

### Tuesday, September 8, 2009

- 7:30-8:00 Sign in
- 8:00-8:10 Welcome / Keynote Speaker Introduction
- 8:10-9:10 Keynote Address: N/MEMS – Building the Future from the Inside Out.....**Dr. Dennis Polla**  
*DARPA*
- 9:10-9:20 Break

### Session 1: MEMS for Military and Space Applications - Radar, Seekers, and Communications

Session Chair: Mr. Joel Booth, US Army AMRDEC

- 9:20-9:45 Ruggedized RF MEMS Relays and Phase Shifters.....**Dr. Daniel J. Hyman**  
*XCOM Wireless, Inc.*
- 9:45-10:10 A MEMS Fabrication Approach for Terahertz and Submillimeter-Wave Klystrons.....**Dr. Jonathan Protz**  
*Duke University*
- 10:10-10:35 RF MEMS for Future Military Weapons Systems.....**Mr. Robert Newgard**  
*Rockwell Collins, Inc.*
- 10:35-10:45 Break
- 10:45-11:10 Adhesive Wafer Bonding Using Photo-Definable Polyimide for MEMS Device Integration.....**Mr. Mark G. Temmen**  
*AMRDEC US Army*
- 11:10-11:35 PiezoMEMS at ARL: Applications for Communications, Radar, and mm-Scale Robotics.....**Mr. Jeffrey S. Pulskamp**  
*ARL*
- 11:35-12:05 DISCUSSION SESSION, Facilitator TBD
- 12:05-13:00 LUNCH

### Session 2: MEMS for Military and Space Applications - Inertial

Session Chair: Mr. Gregory Reynolds, US Army AMRDEC

- 13:00-13:25 Bias-Stabilized MEMS IMU Sensor Chip.....**Dr. Dan Cardarelli**  
*MilliSensor Systems & Actuators, Inc*
- 13:25-13:50 Enhancing Navigation-Grade MEMS Inertial Sensors through Force Balancing.....**Mr. Bill Dillard**  
*Archangel*

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- 13:50-14:15 MEMS Inertial Sensors: Existing Applications and Future Needs.....**Mr. Anthony Kourepenis**  
*C.S. Draper Laboratory*
- 14:15-14:25 Break
- 14:25-14:50 Accurate Real Time Inertial Measurement by Application and Processing of Arrays of MEMS Inertial Sensors .....**Mr. Martin Tanenhaus**  
*Tanenhaus and Associates, Inc.*
- 14:50-15:15 MEMS Electro-Optical Accelerometer Development for Navigation and Space Applications.....**Mr. Brad Chisum**  
*Lumedyne Technologies Inc.*
- 15:15-15:40 MEMS Development for DoD Applications.....**Dr. Barry Roberts**  
*Honeywell Defense and Space*
- 15:40-15:50 Break
- 15:50-16:15 Velocity Sensor Assisted Micro Inertial Measurement.....**Dr. Tamal Mukherjee**  
*Carnegie Mellon University*
- 16:15-16:40 Guidance, Navigation and Control Challenges for NEMS/MEMS and Beyond.....**Dr. Vicki C. LeFevre**  
*US Army AMRDEC*
- 16:40-17:10 DISCUSSION SESSION, Facilitator TBD

**Wednesday, September 9, 2009**

- 7:30-8:00 Sign in
- 8:00-8:10 Welcome

**Session 3: MEMS for Military and Space Applications – Early Warning Sensors and Systems**

Session Chair: Ms. Michelle Chaffin, US Army AMRDEC

- 8:05-8:30 Microfabrication of Cylindrical Ion Trap Mass Spectrometer Arrays.....**Dr. John Bumgarner**  
*SRI International*
- 8:30-8:55 Wireless MEMS Strain Sensing Technology for Military Applications.....**Prof. Darrin Young**  
*Case Western Reserve University*
- 8:55-9:20 MEMS Acoustic Wave Chemical Sensors and MEMS Chemical Preconcentrators.....**MAJ LaVern A. Starman**  
*The Air Force Institute of Technology*
- 9:50-10:00 DISCUSSION SESSION, Facilitator TBD

**Session 4: NEMS / MEMS Devices and Applications**

Session Chair: Mr. Brian Grantham, US Army AMRDEC

- 10:00-10:25 A 16-Element, Ka-band, MEMS-based, Linear Phased Array.....**Ms. Janice C. Rock**  
*US Army AMRDEC*
- 10:25-10:50 Cell Transfection, Particle Delivery and Imaging by Micro-Shockwave Device.....**Dr. Keshab Gangopadhyay**  
*University of Missouri*
- 10:50-11:15 Microthruster Application with Novel Nanothermite Composites.....**Mr. Steve Apperson**  
*NEMS / MEMS Works, LLC.*
- 11:15-12:15 LUNCH
- 12:15-12:40 Simulating NEMS / MEMS Manufacturability, Performance, and Reliability.....**Mr. Steven Groothuis**  
*SimuTech Group*
- 12:40-13:05 Correlation of NEMS / MEMS Intellectual Property Development with Commercial Device Applications .....**Dr. Russ**

Alexander			US Army AMRDEC
13:05-13:30 Roman	Thermal Metamaterials Design, Layout, and Modeling.....	Mr. Calvin	The Air Force Institute of Technology
13:30-13:55 Starman	A MEMS Multi-Cantilever Variable Capacitor on Metamaterial.....	MAJ LaVern A.	The Air Force Institute of Technology
13:55-14:05	Break		
14:05-14:30 Lake	MEMS Safe and Arming Device.....	2LT Robert A.	The Air Force Institute of Technology
14:30-14:55 Stackhouse	MEMS Anti-Tamper Device Analysis.....	CAPT Michael J.	The Air Force Institute of Technology
14:55-15:20 Griffin	High Temperature Direct Shear Stress and Pressure Sensors.....	Dr. Benjamin	Interdisciplinary Consulting Corporation
15:20-15:45 Kudiya	Reliability Characterization Testing of Low Cost MEMS Devices.....	Mr. Abdul	US Army AMRDEC
15:45-16:15	DISCUSSION SESSION		
16:15-16:25	Workshop Wrap-Up		

**FOR MORE INFORMATION REGARDING THIS WORKSHOP, PLEASE VISIT OUR WEBSITE AT:**  
<http://smapcenter.uah.edu/SMAP-CENTER/Conferences/RENM09/index.htm>

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## [Registration](#)

To register for this conference, click the link below.

### [NEMS/MEMS Registration](#)

Fill in the information and click submit, or print the form and fax it to Angie Cornelius.

Fax: (256) 876-6421

**Adobe Acrobat Reader is required to view this form.**

This can be downloaded at [Abode.](#)

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## Attendance Requirements

There are no attendance fees for this workshop. The workshop is open to US Government and DoD contractors. Attendance is limited to U.S. CITIZENS ONLY.

ALL ATTENDEES MUST PRESENT PROOF OF CITIZENSHIP AT THE WORKSHOP.

### PROOF OF CITIZENSHIP IS EITHER YOUR:

- PASSPORT; or
- CERTIFIED BIRTH CERTIFICATE AND PHOTO ID; or
- U.S. GOVERNMENT ARSENAL / CAC Card; or
- CERTIFICATE OF NATURALIZATION AND PHOTO ID; or
- \*VISIT REQUEST (FAXED PRIOR TO WORKSHOP) & PHOTO ID.

\*\*THIS WORKSHOP IS UNCLASSIFIED, HOWEVER, A VR CONFIRMS YOUR CITIZENSHIP. A FORM OR OFFICIAL LETTER FAXED FROM YOUR SECURITY OFFICE PRIOR TO WORKSHOP WILL SUFFICE, POC: ANGIE CORNELIUS, FAX: 256-876-6421.

Non-Government personnel planning to attend this workshop must provide a copy of a properly executed DoD Form 2345,

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"Militarily Critical Technical Data Agreement," authorizing their organization access to export controlled material, in addition to the requirements listed above. Those unfamiliar with the procedure of DoD 2345 may contact the Defense Logistics Information Service (DLIS) at 1-800-352-3572 for assistance or visit the following website:

<http://www.dlis.dla.mil/JCP/forms/DD2345Form.pdf>

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### Redstone Arsenal Access:

Individuals who do not have an access to get in the gates at Redstone Arsenal must go through the Visitor Center to obtain a pass. The Visitor Center is located at gate 9 at Research Park Boulevard.

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[Map of Huntsville](#)

### Area Hotels:

**Westin Hotels & Resort:** At the Bridge Street Town Centre  
6800

Governor's West. (256)428-2000

King-159.00+tax      Government Rate-109.00+tax

Double-159.00+tax      Government Rate-109.00+tax

**Best Western:** 6200 Torok Circle (256)837-7412

King-85.00+tax      Government Rate-80.00+tax

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**Country Inn and Suites:** 4880 University Dr (256)837-4070

King-92.65+tax      Government Rate-84.00+tax

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Queen Suite-119.00+tax Government Rate 84.00+tax

**Courtyard by Marriot:** 4804 University Dr (256)837-1400

King-134.00.00+tax Government Rate-84.00+tax

Double-134.00+tax Government Rate 84.00+tax

**Holiday Inn:** 5903 University Dr 256)830-0600

King-102.00+tax Government Rate-94.00+tax

Double-102.00+tax Government Rate 94.00+tax

**Holiday Inn Express:** 3808 University Dr 256)721-1000

Double-85.00+tax Government Rate 84.00+tax

**Marriot Hotel:** 5 Tranquility Base256)830-2222

King and Concierge-179.00+tax

Corporate King and Double-169.00+tax

### Near Gate 1:

**Radisson Hotel:** 6000 Memorial Parkway South (256)882-9400

Single-109.00+tax Government Rate-84.00+tax

Double-109.00+tax Government Rate 84.00+tax

**Hampton Inn:** 501 Boulevard South (256)882-2228

Single-95.00+tax Government Rate-84.00+tax

Double-89.00+tax Government Rate 84.00+tax

### Downtown Huntsville:

**Embassy Suites:** 800 Monroe St (256)539-7373

King-169.00+tax Government Rate-139.00+tax

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Hotel reservations are the responsibility of the conference participant(s). These are only suggested hotels and there are several more to choose from in the area. If you would like to see

more hotels in the area, please visit

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## Administrative Points of Contact:

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Workshop on the Research & Evaluation of NEMS/MEMS	8-9 Sept. 2009	<a href="#">Go to website</a>
12th DoD Electromagnetic Windows Symposium	April 28-May 1 2008	<a href="#">Go to website</a>
Algorithms for Autonomous & Aided Target Recognition Workshop	6-8 June 2007	<a href="#">Go to website</a>
Reconfigurable Systems, Microsystems, and Nanotechnology Workshop	8-9 May 2007	<a href="#">Go to website</a>
Metamaterials and Nonlinear Materials Conference	4-5 April 2007	<a href="#">Go to website</a>
Common Simulation Framework Users Group	Aug. 31-Sept. 1 2005	<a href="#">Go to website</a>
Radio Frequency Module Manufacturing Workshop	23-24 Aug. 2005	<a href="#">Go to website</a>
Collaborative Engineering Environments	2-3 March 2005	<a href="#">Go to website</a>
The Nano and Microsystems Technology and Metrology Workshop	17-18 Nov. 2004	<a href="#">Go to website</a>
The Coupling of Target Resources for Weapon Guidance	6-7 Oct. 2004	<a href="#">Go to website</a>
Tri-Service Symposium on the Advancements in Heatshield Technology	14-17 Sep. 2004	<a href="#">Go to website</a>
Tactical Battlefield Communications for Missiles, Rotorcraft, and Unmanned Vehicles	23 March 2004	<a href="#">Go to website</a>
Nano and Microsystems Technology and Metrology Workshop	4-5 Dec 2002	<a href="#">Go to website</a>
Lean Manufacturing Workshop	20-21 Nov. 2002	<a href="#">Go to website</a>
Life Cycle Systems Engineering Workshop	6-7 Nov. 2002	<a href="#">Go to website</a>
Detection and Classification of Difficult Targets	25-26 Sep. 2002	<a href="#">Go to website</a>
Advances in Laser Technology and Applications	21-22 Aug. 2002	<a href="#">Go to website</a>
DoD Electromagnetic Windows Symposium	13-16 May 2002	<a href="#">Go to website</a>

Advancements in Heat Shield Technology	16-18 April 2002	<a href="#">Go to website</a>
Diminishing Manufacturing Sources and Material Shortages	25-28 March 2002	<a href="#">Go to website</a>
Workshop on Multi/Hyperspectral Technology and Applications	5-7 Feb. 2002	<a href="#">Go to website</a>
Workshop on Microsystems Technology and Applications	11-12 July 2001	<a href="#">Go to website</a>
DMSMS 2001	3 May 2001	<a href="#">Go to website</a>
Precision Guidance of Small Diameter Missiles	25-26 April 2001	<a href="#">Go to website</a>
Optics Manufacturing for Dual-Use	14-15 Feb. 2001	<a href="#">Go to website</a>
Multi/Hyperspectral Sensors, Measurements, , Modeling, and Simulation	7-9 Nov. 2000	<a href="#">Go to website</a>
Advances in Navigation Guidance and Control Technology	1-2 Nov. 2000	<a href="#">Go to website</a>
DMSMS 2000	21-24 Aug. 2000	<a href="#">Go to website</a>
Life Cycle Software Engineering Technology	16 Aug. 2000	<a href="#">Go to website</a>
Beamforming Technology and Applications	26-27 July 2000	<a href="#">Go to website</a>
Nanoscience for High Performance Computing in Embedded Systems and Sensors	17-19 May 2000	<a href="#">Go to website</a>
Defense Sponsored Symposium on Advances in Heatshield Technology	10-11 May 2000	<a href="#">Go to website</a>
Affordability and Cost Reduction for Radar Systems	5-6 April 2000	<a href="#">Go to website</a>
DMSMS 1999 Workshop	14 Oct. 1999	<a href="#">Go to website</a>
Photonics Materials 1999	6, 7 Oct. 1999	<a href="#">Go to website</a>
National Conference on the Advancement of Research	26-29 Sept. 1999	<a href="#">Go to website</a>
Hyperspectral/Multispectral 1999	7-9 Sept. 1999	<a href="#">Go to website</a>
Total Cost of Ownership Reduction Initiatives Workshop	27-28 July 1999	<a href="#">Go to website</a>
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