

High Efficiency Energy Conversion, Energy Management, and Low Power Systems for Aerospace/Military Electronics Workshop

September 14-15, 2010

Rocket Auditorium

Redstone Arsenal, AL



Objective

The objective for the *High Efficiency Energy Conversion, Energy Management, and Low Power Systems for Aerospace/Military Electronics Workshop* is to examine energy efficiency from a systems point-of-view, and study potential techniques to increase overall battery to actuator energy efficiency.

This workshop is proudly hosted by **Aviation and Missile Research Development and Engineering Center**.

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The steering committee for the *High Efficiency Energy Conversion, Energy Management, and Low Power Systems for Aerospace/Military Electronics Workshop* is requesting abstracts in the following and related areas:

(1) High Efficiency Power Conversion:

- (1.1) Energy conversion techniques with greater than 95 % energy conversion efficiency.
- (1.2) Energy conversion techniques with greater than 90 % energy conversion efficiency over a power supply load range of 20 % to 90 %.
- (1.3) Low energy standby and shutdown power supply modes.
- (1.4) Adaptive switching power supplies which monitor power source and load characteristics.
- (1.5) High efficiency magnetics, inductors, and transformers.
- (1.6) High efficiency switched capacitor power supplies.
- (1.7) Real-time battery system characterization.
- (1.8) Real-time load characterization (linear, nonlinear, inductive, capacitive, etc.)
- (1.9) Characteristics of high performance, wide temperature range (-40°C to + 85°C) batteries.
- (1.10) Ultra and Super Capacitors for energy storage and peak load handling.

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(2) Energy Management Techniques:

- (2.1) Adaptive clock frequency and adaptive voltage control for electronics (microprocessors, FPGAs, and integrated circuits)
- (2.2) Techniques to reduce the number of computations required for algorithms (for example a coding technique to reduce the number of operations required for a Kalman filter)
- (2.3) Adaptive Algorithms to trade accuracy/performance for energy consumption.
- (2.4) Energy Management and CPU Process scheduling.
- (2.5) Active Power Factor Correction.
- (2.6) Energy Regeneration and Energy Harvesting.

(3) Low Power Systems for Data and Signal Processing:

- (3.1) Parallel Processing Techniques.
- (3.2) Asynchronous Digital Logic.
- (3.3) Graphics Processor Unit (GPU)/Physics Accelerator for System Dynamics/Signal Processing.
- (3.4) Low Power FPGA Techniques.
- (3.5) Low Energy Data Transmission Techniques.
- (3.6) Ultra Low Power Health Monitoring Systems.
- (3.7) Ultra Low Power Electronics: Microprocessors, DSPs, Network Interface, and Integrated Circuits.

Please submit 250-500 word abstracts by Friday, 30 July 2010.

Security: This workshop is UNCLASSIFIED / ITAR RESTRICTED / EXPORT CONTROLLED.

Attendees must be US Citizens, and must either be a DoD contractor, military, or DoD civilian employee. Attendees from industry and academia must also provide their organization's Militarily Critical Technical Data Agreement (Form DD2345) certification number. Please refer to the Defense Logistics Agency "DD Form 2345, Militarily Critical Technical Data Agreement, May 2008," at <http://www.dlis.dla.mil/JCP/forms/DD2345Form.pdf>

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)
- ◇ For government funded work, please include the name, phone number, and email address for the contracting officer or contracting officer technical representative.

Government funded work must include a public release (unclassified/non-export controlled) or limited release (ITAR/Export Controlled) statement from the government contracting officer or appropriate official. Non-government sponsored work must include a statement for non-export controlled 'approved for unlimited release,' or ITAR / Export Controlled 'limited release' as appropriate. Please do not submit any proprietary material. Copyrighted works must provide a release statement for publication as workshop proceedings.

How to Submit Your Abstract

Electronic submission is required by Friday, 30 July 2010. Please submit all files as Portable Document Format (PDF), Word 2003/2007 or Powerpoint 2003/2007 files. All abstracts must include complete submission information as listed above. All abstracts must be UNCLASSIFIED / Nonproprietary. Please email your abstract & submission information to [Angie Cornelius](#) .

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Tentative Agenda

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Tuesday, September 14, 2010

8:00

- Sign In

8:30

8:30

- Welcome/Keynote Speaker Introduction

8:45

8:45

- **Keynote Address: RDECOM Power and Energy Technology Focus Team Perspective**

9:15

9:15

- **Invited Speaker: Power Distribution in Missile Systems**

9:45

9:45

- BREAK

9:55

Dr. Brian Morgan
US Army Research Lab

Dr. Ed Shaffer
US Army Research Lab

Mr. Bill McMahan
US Army AMRDEC

Session 1 Thermal Design Issues Driving Low Power

Session Chairman: Roger Berry, US Army AMRDEC

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9:55 -	Integrated Thermal Management Solutions in Composite Missile Skins	Mr. Keith Roberts <i>US Army AMRDEC</i>
10:20 -	Active and Passive Cooling of Solid State Electronics Using Dielectric Fluids	Dr. James E. Smith <i>University of Alabama in Huntsville</i>
10:45 -	Solid Oxide Fuel Cells	Mr. Jon Rice <i>Adaptive Materials, Inc</i>
11:10 -	Military Power Systems	Mr. Boris Jacobson <i>Raytheon</i>
11:20 -	Power Subsystems	Mr. Brian Branthover <i>Northrop Grunman Corp.</i>
11:30 -	ROUND TABLE DISCUSSION	
11:45 -	LUNCH	
1:00		

Session 2 **High Efficiency / Low Energy Systems**

Session Chairman: Dr. Robert McMillian, US Army SMDC ARSTRAT

1:00 -	Invited Speaker: Ferroic Microsystems	Dr. Jack Judy <i>DARPA</i>
1:30 -	Designs in High Efficiency Low Current Switching Power Supplies	Mr. Ross Bird <i>Qortek, Inc.</i>
1:55 -	99% Efficiency Power Converter with Variable Input and Output Capability	Mr. John Bush <i>Ridgetop Group, Inc.</i>
2:20 -	MM-Scale Power Converters for Autonomous Microsystems	Dr. Brian Morgan <i>US Army Research Lab</i>
2:45 -	BREAK	
3:00 -	3-Phase AC/DC Boost Converter Power Factor Control using Traditional and	Dr. Yuri Shtessel <i>University of</i>

3:25	Second Order Sliding Mode Techniques	<i>Alabama in Huntsville</i>
3:25	Output Voltage Tracking Control of Parallel Boost Power Converters via Adaptive Second Order Sliding Modes	Mr. Joe Patterson <i>US Army AMRDEC</i>
3:50		
3:50	Versatile Power Modulation System for High Power Microwave Sources	Mr. Richard Thomas <i>US Army Research Lab</i>
4:15		
4:15	Energy-Aware Thread Size Selection for Many-Core Processors	Mr. Patrick A. La Fratta <i>US Army AMRDEC</i>
4:40		
4:40	ROUND TABLE DISCUSSION / DAY 1	
5:00	WRAP-UP	

Wednesday, September 15, 2010

Session 3 Long-Term Low Power Systems

Session Chairman: Mr. Mark Temmen, US Army AMRDEC

8:00		
-	Sign In	
8:30		
8:30	Welcome	Dr. Patrick Jungwirth <i>US Army AMRDEC</i>
8:35		
8:35	Invited Speaker: Missile Health Monitoring Units	Mr. Pat Bradford <i>US Army AMRDEC</i>
9:05		
9:05	Development of Lithium Primary Back-Up Battery with a 20-year Calendar Life.	Dr. Igor V. Barsukov <i>American Energy Technologies Co.</i>
9:30		
9:30	Performance Characteristics of Solid? State Batteries	Dr. William L. Rauch <i>Johnson Research & Development</i>
9:55		
9:55	BREAK	
10:10		
10:10	Development of a Low-Power Wireless-Networked Radioactive Materials Sensor Array	Mr. Marc Litz <i>Army Research Laboratory</i>
10:35		Dr. Peter

10:35 -	Micropower Betavoltaic Hybrid Sources	Cabauy <i>City Labs, Inc.</i>
11:00 -	Advances in Betavoltaic Batteries for Ultra Low Power Wireless Sensors	Mr. Jonathan W. Greene <i>Widetronix, Inc.</i>
11:25 -	Energy Harvesting from Low Frequency and Arbitrary Vibrations	Dr. Becky Lorenz Peterson <i>University of Michigan</i>
11:50 -	ROUND TABLE DISCUSSION / WORKSHOP WRAP-UP	
12:10		

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Registration

Registration form for High Efficiency Energy Conversion, Energy Management,
and Low Power Systems for Aerospace/Military Electronics

~MUST BE SUBMITTED NO LATER THAN SEPTEMBER 6, 2010~

If you have any questions regarding this conference, please contact Angie Cornelius at angie.cornelius@us.army.mil

The workshop qualifies as two days of TIP credit. The TIP course number is: F104ENEW.

* Required

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

ALL ATTENDEES MUST PRESENT PROOF OF CITIZENSHIP AT THE WORKSHOP.

PROOF OF CITIZENSHIP IS EITHER YOUR:

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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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- Defense Advanced Research Projects Agency
- US Army Space and Missile Defense Command Army Forces Strategic Command (SMDC ARSTRAT)
- US Army Research Lab

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Administrative Points of Contact:

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