



2015 IEEE International Conference on Wireless for Space and Extreme Environments

FAIRWINDS Alumni Center, University of Central Florida

Orlando, FL, USA – December 14th-16th, 2015

In cooperation with NASA, ESA, CSA

Government and Industry panels – Tour of NASA Kennedy Space Center on December 16th, 2015

Scope

Spaceflight involves critical sensing and communication in extreme environments such as planetary surfaces, space vehicles, and space habitats. The many challenges faced in space sensing and communication are extremely diverse and overlap significantly with those found in many terrestrial examples of extreme environments such as extreme hot or cold locations, extreme high- or low-pressure environments, critical control loops in aircraft and nuclear power plants, high-speed rotating equipment, oil/gas pipelines and platforms, etc. All of these environments pose significant challenges for radio-frequency or optical wireless sensing and communication and will require the application of a broad range of state of the art technologies in order to generate reliable and cost effective solutions. Although the specific challenges vary significantly from environment to environment, many of the solutions offered by sensing, communication, and statistical signal processing technologies can be applied in multiple environments, and researchers focusing on space applications can benefit greatly from understanding the problems encountered and solutions applied in alternative environments.

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KEYNOTE SPEAKERS



*Ali Hajimiri (Caltech):
"Space based solar power: is there a path from science fiction to reality?"*



*Christopher Valenta (Georgia Tech Research Institute):
"Harvesting wireless power: current capabilities and future directions"*



*Steve Horan (NASA, Langley):
"NASA Wireless Mission Support Concepts"*



*Jason Soloff (NASA, Johnson Space Center):
"Disruption Tolerant Networking: An Architecture for Challenged Communications"*



*Jay Dryer (NASA HQ ARMD):
"NASA Aeronautics Strategic Direction and Aeronautical Research Programs"*



*Jeppie Compton (NASA, EPSCOR):
"NASA Experimental Program to Stimulate Competitive Research (EPSCoR)"*



*Mohsen Kavehrad (Penn State University):
"Optical Wireless, Theory and Applications"*



*Jack Fox (NASA, Kennedy Space Center):
"The NASA and LVX System Partnership for Development of Light Communications Technologies"*

**Dec 15th, 4:20-5:00pm WiSEE 2015 Panel Discussion On
“Wireless and Less Wires-Connectors-Penetrations”
Questions for the panel:**

1. What is the **greatest need** in this area for in your organization/industry?
2. What has been the **greatest impediment(s)** in this area for your org/industry?
3. What are the **technology & application trends** in this area in your org/industry?



Moderator
George Studor, NASA
Eng & Safety Center

Panelists:



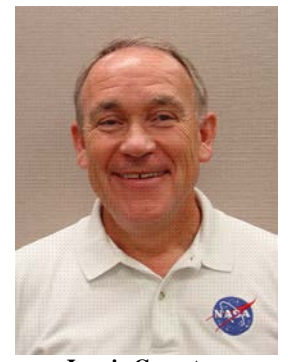
Jay Dryer, NASA HQ
Director, Advanced Air
Vehicles Program



Andrew Bill, Airbus
Landing Gear R&D
Systems Specialist



David Redman, Director
Aeronautical Vehicle
Systems Institute(AVSI)



Jeppie Compton,
NASA/KSC Director,
National EPSCOR Program



Steven Horan,
NASA/LaRC PT for Game-
Changing Development



James Larkin, AR
Aerojet Rocketdyne
DPHM lead



Tim McIntyre, DOE/ORNL
Energy & Environmental
Sensors Program



Kim Simpson, NASA/JPL
Future Habitat Systems
Engineering



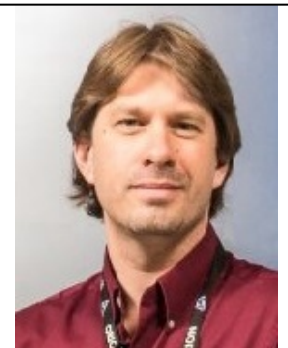
Brian Hall,
NASA/Wallops
Orbital Projects Manager



Robert Dillman,
NASA/LaRC
Hypersonic Inflatable



Leo Fabinski,
NASA/MSFC
MSFC Engineering
Advanced Concepts Office



Rich Evans, NASA/GRC
Space Power Facility (SPF)
Instrumentation Manager

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Mohammed Taj-Eldin, Kansas State University, USA
Nikolai Joseph, George Washington University, United States
Obadiah Kegege, NASA GSFC, USA
Omid Taghizadeh Motlagh, RWTH Aachen University, Germany
Patrice Pelissou, AIRBUS D&S, France
Paul Jaffe, U.S. Naval Research Laboratory, USA
Paul Mitchell, Univ of York, UK
Philippe Dallemagne, CSEM, Switzerland
Pier Giorgio Arpesi, Selex ES, Italy
Pietro Savazzi, University of Pavia, Italy
Richard Barton, NASA, USA
Robert Youngquist, NASA KSC, USA
Scott Burleigh, JPL/CalTech, NASA, United States
Seyed Zekavat, Michigan Tech Univ, USA
Stefano Caizzzone, German Aerospace Center (DLR), Germany
Susanna Spinsante, Universita' Politecnica delle Marche, Italy
Victor Tomashevich, University of Passau, Germany
Vikaram Singh, IntelCom Lab, India
Werner Schiffer, Rolls-Royce, United Kingdom

IEEE INTERNATIONAL CONFERENCE 2015

ON WIRELESS FOR SPACE AND EXTREME ENVIRONMENTS

Conference Program Overview

DAY 1	14/12/2015		
Monday	08:15 AM <i>Ballroom</i>	Don Malocha, UCF Opening Remarks	
	08:30AM <i>Ballroom</i>	Plenary 1: Ali Hajimiri, CalTech	"Space based solar power: Is there a path from science fiction to reality?"
	09:15 AM <i>Ballroom</i>	Plenary 2: Chris Valenta, GTRI	"Harvesting Wireless Power: Current Capabilities and Future Directions"
	10:00 AM	<i>AM break in the lobby / poster session</i>	
		Room A	Room B
	10:30 AM	WiSEE - S1	STINT - S1
			Room C
			SSP - S1
	12:00 PM	<i>Networking lunch</i>	
	01:30 PM	WiSEE - S2	STINT - S2
			SSP - S2
	03:00 PM	<i>PM break in the lobby / poster session</i>	
	03:30 PM	WiSEE - S3	STINT - S3
			SSP - S3
	05:00 PM	<i>Day 1 ends</i>	
	06:00 PM	<i>Banquet in the patio – Speaker – Dr. Don Malocha, UCF “Wireless Challenges and UCF Solutions”</i>	
DAY 2	15/12/2015		
Tuesday	08:15 AM <i>Ballroom</i>	Bob Youngquist NASA KSC	Announcements
	08:30AM <i>Ballroom</i>	Plenary 3: Steve Horan NASA LaRC	"NASA Wireless Mission Support Concepts"
	09:15 AM <i>Ballroom</i>	Plenary 4: Jason Soloff NASA JSC	"Disruption Tolerant Networking: An Architecture for Challenged Communications"
	10:00 AM	<i>AM break in the lobby / poster session</i>	
		Room A	Room B
	10:30 AM	WiSEE - S4	PWS - S1
			Room C
			SSP - S4
	12:00 PM	<i>Networking lunch</i>	
	01:30 PM	WiSEE - S5	PWS - S2
			SSP - S5
	03:00 PM	<i>PM break in the lobby / poster session</i>	
	03:30 PM <i>Ballroom</i>	Plenary 5: Jay Dryer NASA HQ ARMD	"NASA Aeronautics Strategic Direction and Aeronautical Research Programs"
	04:00 PM <i>Ballroom</i>	Plenary 6: Jeppie Compton NASA EPSCOR	"NASA Experimental Program to Stimulate Competitive Research (EPSCoR)"
	04:15 PM <i>Ballroom</i>	User Government-Industry Panel - Q & A	R&D and Funding Opportunities - Q & A
	05:00 PM	One-on-One Sessions with Users/Stakeholders	All WiSEE is invited (Sign-up for your 10 minute time slot at the registration desk)
	06:00 PM	<i>Networking reception</i>	
DAY 3	16/12/2015		
Wednesday	08:00 AM <i>Ballroom</i>	Plenary 7: Mohsen Kavehrad, Penn State University	"Optical Wireless, Theory and Applications"
	08:45 AM <i>Ballroom</i>	Plenary 8: Jack Fox NASA KSC	"The NASA and LVX System Partnership for Development of Light Communications Technologies"
	09:30 AM	<i>AM break in the lobby / poster session</i>	
		Room A	Room B
	10:00 AM	PWS-S3A	PWS-S3B
			Room C
			PWS-S3C
	12:00 PM <i>Ballroom</i>	Best Paper Award and Closing Ceremony / Bagged Lunch	
	12:30 - 03:00 PM	One-on-One Sessions with User/Stakeholders	All WiSEE is invited (Sign-up ahead of time at registration desk - 15 min sessions)
Post-Conference Options (Registered attendees will receive an email with instructions to sign up):			
a) Visit NASA KSC Visitors Center - travel on your own, discounted group rate;			
b) Tour UCF SAW Laboratory - limited number can be accommodated.			

WiSEE 2015 Program – Room A

Monday DAY 1: 12/14/2015

WiSEE - S1: Chair: Gholamreza Alirezaei, Room A

10:30 - 11:00 AM	Gholamreza Alirezaei	Lifetime and Power Consumption Analysis of Sensor Networks
11:00 - 11:30 AM	Ignacio Arruego	Practical application of the Optical Wireless communication technology (OWLS) in extreme environments
11:30 - 12:00 AM	Patrice Pelissou	Building blocks for an intra-spacecraft wireless communication

WiSEE - S2: Chair: Ali Abedi, Room A

01:30 - 02:00 PM	Casey Clark	Wireless Leak Detection Using Airborne Ultrasonics and a Fast-Bayesian Tree Search Algorithm with Technology Demonstration on the ISS
02:00 - 02:30 PM	Sayan Roy	An Integrated Remote Monitoring System for Impact Responses of Aerospace Structures
02:30 - 03:00 PM	Frank Pinto	Software Defined Radio Implementation of DS-CDMA in Inter-Satellite Communications for Small Satellites

WiSEE - S3: Chair: Dirk Thurnes, Room A

03:30 - 04:00 PM	Pascale Minet	Adaptive wireless sensor networks for aircraft
04:00 - 04:30 PM	Rui Caldeira	Methods and Tools for Assessment of Wireless Networks in Extreme Environments
04:30 - 05:00 PM	Murat Gürsu	A Wireless Technology Assessment for Reliable Communication in Aircraft

Tuesday DAY 2: 12/15/2015

WiSEE - S4: Chair: Don Malocha, Room A

10:30 - 11:00 AM	Omid Motlagh	Power Allocation for Distributed Passive Radar Systems with Occasional Node Failure
11:00 - 11:30 AM	Vikaram Singh	Metamaterial based Wireless charging system for Wireless Sensor Network with an effective charging algorithm
11:30 - 12:00 AM	James Humphries	Standalone SAW Sensor Interrogator Using an Embedded Computer and Software Defined Radio

WiSEE - S5: Chair: Reza Zekavat, Room A

01:30 - 02:00 PM	Pietro Savazzi	Carrier Synchronization in Distributed MIMO Satellite Links
02:00 - 02:30 PM	Amir Torabi	Millimeter Wave Directional Channel Modeling
02:30 - 03:00 PM	Maximilian Scardelletti	Wireless Capacitive Pressure Sensor with Directional RF Chip Antenna for High Temperature Environments

STINT 2015 Program – Room B

Monday DAY 1: 12/14/2015

STINT - S1		Introduction and Keynote
10:30 - 11:00 AM	Ed Birrane	Workshop Introduction and Opening Remarks
11:00 - 12:00 AM	Ed Birrane	Special Topic: Security and Management of DTNs
STINT-S2		Oral Presentations
01:30 - 01:50PM	Marius Feldmann	Towards Ground Station Contact Discovery in Ring Road Networks
01:50 - 02:10 PM	Juan Fraire	Preliminary Results of an Evolutionary Approach Towards Contact Plan Design for Satellite DTNs
02:10 - 02:30 PM	Jeremy Pierce- Mayer	DTN-O-Tron: A System for the User-Guided Semi-Autonomous Generation and Distribution of CGR Contact Plans
02:30 - 02:50 PM		Quality of Service Enforcing Centrally Optimized Routing for Delay Tolerant Networks
STINT-S3		Technical Demonstrations
03:30 - 04:00 PM	Juan Fraire	DTN Simulator for Satellite Constellations
04:00 - 04:30 PM	Jeremy Pierce- Mayer	DTN-O-TRON Demonstration
04:30 - 05:00 PM	Leigh Torgerson	Network Monitoring and Control for Space Missions
05:00 - 05:15 PM		Wrap-up

SSP 2015 Program – Room C

Monday DAY 1: 12/14/2015

SSP - S1		Technology Panel
10:30 - 11:00 AM	John Mankins	SPS-ALPHA: A Hyper-modular Approach to the Technology of Space Solar Power
11:00 - 11:30 AM	Bong Wie	Orbit and Attitude Control Issues for Very Large Space Solar Power Satellites
11:30 - 12:00 PM	Nobuyuki Kaya	Recent Advances in Retro-directive Antenna for the Microwave Power Transmission for SSP
SSP-S2		Paper and Abstract
01:30 - 01:50PM	Paul Jaffe	Update on Over-the-Horizon Wireless Power Transmission as a Precursor for Space Solar Power
01:50 - 02:10 PM	Mingyu Lu	Employing Phase-Conjugation Antenna Array to Beam Microwave Power from Satellite to Earth
02:10 - 02:30 PM	Mohsen Jamalabdollahi, Reza Zekavat	Time and Frequency Synchronization for Space-based Solar Power Satellites Network via weighted OFDMA
02:30 - 02:50 PM	Paul Jaffe	Modular Space Solar Power Pathfinder Mission in Low Earth Orbit
SSP-S3		Paper and Abstract
03:30 - 03:50 PM	Gary Barnhard	Unbundling Space Power Systems to foster Space-to-Space Power Beaming Applications
03:50 - 04:10 PM	Trevor Brown	An Industry-Government Partnership for Space Solar Power
04:10 - 04:30 PM	Joshua Gigantino	Single Number Life Cycle Assessment of Space Solar Power
04:30 - 04:50 PM	Paul Jaffe	Review of Sandwich Conversion Modules for Space Solar Power
04:50 - 05:10 PM	Lewis Fraas	Self Pointing Mirrors for Solar Power from Space

DAY 2: 12/15/2015

SSP-S4		Vehicle and Launch Panel
10:30 - 10:50 AM	Dallas Bienhoff	An Overview on RLV Development Programs
10:50 - 11:10 AM	John Olds	A Review of Current and Future Launch Options for SSP
11:10 - 11:30 AM	Edgar Zapata	Emerging US Space Launch – Trends and SSP
11:30 - 11:50 AM	Keith Hensen	Solar Power Satellite Transportation Economy
11:50 - 12:10 AM	George Sowers	Transportation Architecture for Cislunar space
12:10 - 12:30 AM	Bienhoff, Olds, Zapata, Hensen, Sowers	Panel Discussion
SSP-S4		Economy Panel
01:30 - 01:50 PM	Darel Preble	Overview of Space Solar Power's antecedent Technical, Environmental, Economic and Energy Crunch
01:50 - 02:10 PM	John Mankins	Realizing Economically and Programmatically Viable Space Solar Power
02:10 - 02:30 PM	Gail Tverberg	Energy Economics Outlook for Space Solar
02:30 - 03:00 PM		

PWS 2015 Program - Room B

Tuesday Dec 15			
8:00-9:45 AM Plenary Speakers			
08:15-08:30	Announcements	Bob Youngquist	NASA/KSC
08:30-09:15	NASA Wireless Mission Support Concepts	Steve Horan	NASA/LaRC
09:15-10:00M	Disruption Tolerant Networking: An Architecture for Challenged Communications - DTN deployment kit demonstration during the break	Jason Soloff Adam Schlesinger	NASA/JSC NASA/JSC
10:00-10:30 AM Break			
10:30-12:00 PWS-S1			
10:30-11:00	Passive Wireless Sensor Technologies & Needs - a Library of Info and Overview of SAW technology (UCF) and Demonstration	George Studor Arthur Weeks	NASA/NESC UCF
11:00-11:30	On low cost ubiquitous sensor networks: DOE needs and application areas	Tim McIntyre	DOE/ORNL
11:30-12:00	Inflatable Reentry Vehicles and Instrumentation Needs	Robert Dillman	NASA/LaRC
12:00-1:30PM Networking Lunch in the Patio			
1:30-3:00 PWS-S2			
1:30-2:00	Aircraft Wireless Tire Pressure Sensing and Harsh Environmental Constraints	Bill Andrew	Airbus
2:00-2:30	Wireless Avionics Intra-Aircraft Communications(WAIC) for Commercial Aircraft	Dave Redman	AVSI
2:30-3:00	Partnership Opportunities with AFRC for Wireless Systems Flight Testing	Richard Hang	NASA/AFRC
3:00-3:30 PM Break			
3:30-4:20 Plenary Speakers			
3:30-4:00	NASA Aeronautics Strategic Direction and Aeronautical Research Programs	Jay Dryer	NASA/ARMD
4:00-4:20	NASA Experimental Program to Stimulate Competitive Research (EPSCoR)	Jeppie Compton	NASA/KSC
4:20-5:00	User Government-Industry Panel - Q & A - All WiSEE is invited A set of questions will be prepared ahead of time plus from the audience real-time	George Studor Moderator	
5:10-6:00 PM	One-on-One Sessions with User/Stakeholders - all WiSEE is Invited Developers Sign-up at registration desk to meet privately with User/Stakeholders	10min time slots	
Wednesday Dec 16			
08:00-09:30 AM Plenary Speakers			
08:00-08:45	Optical Wireless, Theory and Applications	Mohsen Kavehrad	Penn State U
08:45-09:30	NASA and LVX System Partnership for Development of Light Comm Technologies	Jack Fox	NASA/KSC
09:30-10:00 AM Break			
10:00-12:00 PWS-3A: Wireless Through-wall Comm & Power – Room A			
10:00-10:30	Cryogenic Applications for Wireless Power and Data using Magnetics	Garrick Merrill	NASA/MSFC
10:30-11:00	Ultrasonic Communication for High-Data Rate Through-Metal Applications	Cem Sahin	Drexel
11:00-11:30	Acoustic Data and Power Transmission through and Along Solid Structures	Kyle Wilt	RPI
11:30-12:00	Robust UWB Communication in Large Ship Interiors	Farid Dowla	LLNL
10:00-12:00 PWS-3B: Passive Wireless SAW and RFID Sensors – Room B			
10:00-10:30	A Spacecraft Backbone - Plug 'n' Play Concepts for a Deep Space Habitat	Kimberly Simpson	NASA/JPL
10:30-11:00	Software Defined Radio Approach for Passive, Wireless RFID Sensors	James"Trip" Humphries	UCF
11:00-11:30	Passive RFID Sensing for Harsh Environments - LLNL-Dirac Platform	Faranak Nekoogar	LLNL
11:30-12:00	Improving Performance of Passive RFID-based Part-DNA for Rotor-head Maintenance Application	Maciej Zawodniok	Missouri S&T
10:00-12:00 PWS-3C: NASA Potential Users for Wireless – Room C			
10:00-10:30	The NASA Sounding Rocket Program and Technology Needs	Brian Hall	NASA/WFF
10:30-11:00	Aerojet Rocketdyne Propulsion System PWST Needs/Challenges	James Larkin	Aerojet Rocketdyne
11:00-11:30	4 High Value Wireless Applications at Marshall Spaceflight Center with their Challenges	Leo Fabinski	NASA/MSFC
11:30-12:00	Instrumentation Overview of Space Environment Test Facilities at Plumbrook	Rich Evans	NASA/Plumbrook
12:00-12:15 PM Best Paper Award and Closing Ceremony			
12:15 - 1:00PM Pick me-up lunch			
12:30 - 3:00PM	One-on-One Sessions with User/Stakeholders- all WiSEE is Invited Developers Sign-up at registration desk to meet privately with User/Stakeholders	15 minute time slots	

WSS 2015 Program - Lobby

Joint WiSEE and WSS Poster Session - Chair: Ali Abedi, Room: Lobby

Presenter	Poster Title
Hendra Kesuma	Bit-Error-Rate Measurement of Infrared Physical Channel using reflection via Multi Layer Insulation inside in Ariane 5 Vehicle Equipment Bay for Wireless Sensor Network communication
Tsubasa Matsushita	Simulation and Experiments of Ultra-wideband Radio Propagation within Closed Boxes for Replacing Wired Interface Buses in Spacecrafts
Jean-Marc Collignon	RFID and RF harvesting Wireless Sensor Network platform for launcher application
Maryam Rahmani	Frequency Hopping in Cognitive Radio Networks: A survey
Anam Mazhar	Innovative Conceptualization of Fly-By-Sensors(FBS) flight control systems using Zigbee Wireless Sensors Networks
Muhammad Mamoon Mazhar	Conceptualization of Software Defined Network layers over Internet of Things for Future Innovative Applications
Francesco Amato	5.8 GHz Energy Harvesting of Space Based Solar Power Using Inkjet Printed Circuits on a Transparent Substrate
Kenneth Bundy	Collection and Analysis of Leak Spectral Signatures for Application to the ISS
Shang Gao	A wireless piezoelectric sensor network for distributed structural health monitoring