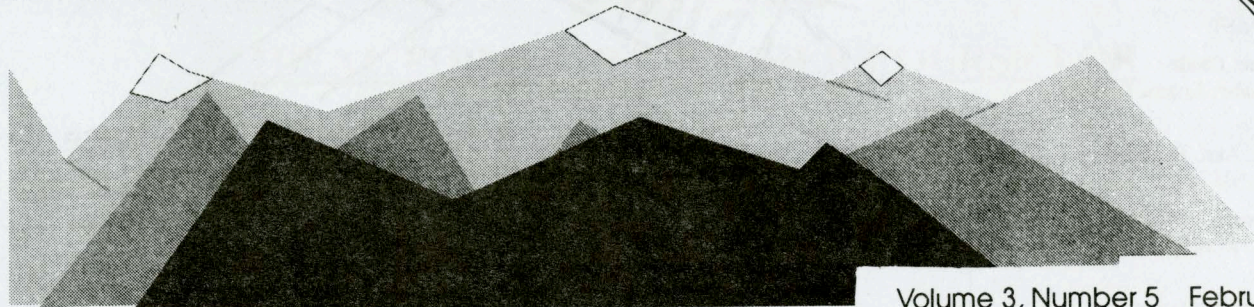


# RockIEEE Overlook



Volume 3, Number 5 February 1998

## Meetings

### Reliability Society

Thursday, February 19, 1998  
6:30 p.m.

Department of Commerce (NIST)  
Building Room, room 0113  
325 Broadway  
Boulder, CO

(there will be signs on the door of  
building 2 to direct us).

#### Speaker

Fred Fickett, Group Leader of  
Materials Reliability Divisions

*"NIST Research in Electronic  
Packaging"*

Program includes a tour of their  
facilities.

Contact Kirk Gray, 666-7692 for  
more information.

### Lasers & Electro-Optics

LEOS Meetings are generally held  
on the third Thursday of the month  
at NIST, 325 Broadway, Boulder, CO.  
Refreshments are served at 7:00 p.m.,  
with the speaker starting at 7:30 p.m.

### Joint Antenna & Propagation/Microwave Theory & Technology, Geoscience & Remote Sensing

Thursday, February 19, 1998 4:00 - 5:00 p.m.  
NIST, Room 1107 325 Broadway, Boulder, CO

#### Speaker

Dr. Lawrence P. Dunleavy

Dept. of Electrical Engineering, Visiting Scientist, NIST 813.06  
(Microwave & Wireless Program) University of South Florida, Tampa, FL

*"A Versatile Test and Simulation Bench for Characterization and Modeling of  
Wireless Circuits and Systems"*

A 3 GHz test bench is combined with a modern circuit and system computer-aided-design tool set to comprise a versatile measurement and simulation environment. The environment, developed for a powerful new teaching laboratory at the University of South Florida, is exemplified through a 915 MHz receiver case study. This talk will give brief overview of the test/simulation bench, the new wireless curriculum it was developed for, and examples of how the bench can be used for cost effective wireless component and sub-system characterizations.

Contact Richard Geyer at 497-5852 if you have any questions.

engineering  
dynamics

Acoustic, Seismic, Vibration,  
Temperature, Humidity and Altitude  
Testing to ANSI, IEEE, ISO, MIL and  
other applicable Standards

3925 south kalamath street ♦ englewood, co 80110  
303.761.4367 ♦ fax 303.761.4379

e-mail: engdyn@dnvr.uswest.net ♦ www.engdynamics.com

RockIEEE Overlook  
Official Publication of the  
IEEE Denver Section  
P.O. Box 4626, Englewood, CO 80155-4626  
Published Jan. - May, Sept. - Nov.



## RAWCON'98

### General Chair

Roger B. Marks, NIST

### Technical Program Chair

Michael S. Heutmaker, Lucent Technologies

### Finance

Richard A. Sparks, Anro Engineering

Gerome R. Reeve, NIST

### Local Arrangements

John G. McInay, The MITRE Corporation

### Exhibition

Michael Fennelly, ATN Microwave

### Publications

Gary Breed, Applied Microwave & Wireless

### Registration

George Jankovic, RF Globalnet Website

### At-Large

Peter W. Staecker, M/A-COM, Inc.

John W. Meredith, Hewlett-Packard Co.

### Technical Program Committee

Mr. Robert J. Achatz

Institute for Telecommunication Sciences  
Boulder, CO

Dr. Masami Akaike

Science University of Tokyo, Japan

Dr. Lutfi Albasha

University of Leeds, UK

Dr. Seng-Woon Chen

QUALCOMM, Inc., San Diego, CA

Dr. Roger Dalke

Institute for Telecommunication Science  
Boulder, CO

Dr. Kari-Pekka Estola

Nokia Research Center, Helsinki, Finland

Mr. Bernard Geller

Sarnoff Corp., Princeton, NJ

Dr. David Hill

NIST, Boulder, CO

Mr. Charles Hodges

Flextronics International, San Jose, CA

Dr. Hossein Izadpanah

Hughes Research Laboratories, Malibu, CA

Dr. Luc Martens

University of Gent, Belgium

Dr. Masahiro Muraguchi

NTT Wireless Systems Laboratory  
Kanagawa, Japan

Dr. Modest Oprysko

IBM T.J. Watson Research Center

Yorktown Heights, NY

Dr. Chong-Il Park

Kyocera America, San Diego, CA

Dr. Peter Petre

Hughes Research Laboratories, Malibu, CA

Dr. James Schaffner

Hughes Research Laboratories, Malibu, CA

Mr. Andreas Schmidbauer

Technical University of Munich, Germany

Dr. Mohammad Shakouri

Hewlett-Packard Company, Cupertino, CA

Dr. David Smithgall

Lucent Technologies, Princeton, NJ

Mr. Joseph Staudinger

Motorola Inc., Tempe, AZ

Dr. Gene Tkachenko

Alpha Industries, Woburn, MA

Dr. Vijai Tripathi

Oregon State University, Corvallis, OR

Dr. Mark Wickert

University of Colorado, Colorado Springs, CO



## CALL FOR PAPERS

The 1998 IEEE Radio and Wireless Conference (RAWCON'98) is new, but you may recognize many of the sponsors, organizers, and participants who helped make last year's Wireless Communications Conference a great success, with 50 outstanding presentations and 254 attendees from 14 nations. RAWCON'98 expects to continue that success by again focusing on the technology driving the advancement of commercial wireless communications, from systems to components to propagation. We will pay special attention to radio and radio-frequency issues.

RAWCON'98 sponsors:

- IEEE Microwave Theory and Techniques Society
- IEEE Communications Society
- IEEE Pikes Peak Section
- National Institute of Standards and Technology
- Institute for Telecommunications Sciences

RAWCON'98 offers authors an outstanding venue with a sophisticated audience of your customers, suppliers, and competitors. Our IEEE Conference Proceedings ensures wide distribution of your archival publication. We will offer significant registration discounts to speakers and will provide speakers with valuable publicity through listings and hyperlinks on our highly-visible World Wide Web site at <http://rawcon.org>.

We seek original, practical technical presentations in these wireless technologies:

- *System Architecture*, including third generation wireless systems, LMDS, wireless LANs, wireless local loop, PCS, cellular, paging, etc.
- *System Performance*, including base stations, mobiles, signal processing, digital modulation, linearization, etc.
- *Antennas and Propagation*, including antenna design, propagation modeling, electromagnetic compatibility, interference, etc.
- *Active Devices*, including linearity, modeling, characterization, RFICs, MMICs, etc.
- *Passive Components*, including integrated passives, filters, packaging technology, package design, etc.

Also, the Program Committee is particularly interested in papers on the following focus topics:

- *Wireless data systems*
- *Software radio architectures*
- *Infrastructure equipment design for wireless communications*
- *Active device technologies for wireless communications*
- *Applications of advanced antennas to mobile communications*

Authors are asked to submit five copies of a two-page summary (including figures) to the Technical Program Chair (TPC) by March 1, 1998. The summary must contain complete contact information (including email) for the corresponding author. Please contact the TPC for information about electronic submission of the summary, if desired. Direct submissions to Dr. Michael S. Heutmaker, Lucent Technologies, P.O. Box 900, Princeton, NJ 08542 (for non-postal shipment: Rte. 569 Carter Rd., Hopewell, NJ 08525); email: [heutmaker@lucent.com](mailto:heutmaker@lucent.com); tel: +1-609-639-3116; fax: +1-609-639-3197.

Submissions will be evaluated for originality, significance of the work, technical soundness, and interest to a broad audience. Authors will be notified of acceptance by April 24, 1998. Final accepted papers (3-5 pages in length) must be received by the TPC in camera-ready form by June 12, 1998 to be included in the published Proceedings.

<http://rawcon.org>

## POWER ENGINEERING WORKSHOPS

### IDEAL FOR P.E. REFRESHER COURSE FOR

### ELECTRICAL ENGINEERS

- Power Circuits - March 7
- Engineering Economics - March 14
- Transformers & Machines - March 21
- Symmetrical Components - March 28
- Power Systems Analysis - April 4
- National Electrical Code - April 11

**INSTRUCTORS:** Professor P.K. Sen, P.E., John P. Nelson, P.E. and John Ake, P.E.

**Location:** Marriott Denver Tech Center

**Dates:** Saturdays March 7, 14, 21 and 28th, April 4, 11, 1998

**Time:** 8:30 am - 12:30 pm

**Cost:** \$100/per class or \$ 500/for all 6 classes if paid prior to 2/2/98

\$125/per class or \$600/for all 6 classes if paid after 2/2/98

For college students or more than 2 attendees from one company, please call for special rate

✓ Notes and handouts will be provided

✓ Refreshments

✓ Extensive problems will be solved

✓ 4 Professional Development Hours (PDH's) per class

**Continuing Education Units: Upon Request**

**Questions:** Rosa Johnson @ NEI Electric Power Engineering, Inc.

(303)431-7895 Fax: (303) 431-1836

☐ Power Circuits, March 7

☐ Transformers & Machines, March 21

☐ Power Systems Analysis, April 4

☐ Engineering Economics, March 14

☐ Symmetrical Components, March 28

☐ National Electrical Code, April 11

**Name:** \_\_\_\_\_ **Company:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Phone:** ( ) \_\_\_\_\_ **Fax:** ( ) \_\_\_\_\_

**E-Mail** \_\_\_\_\_ **Date:** \_\_\_\_\_

**MAIL TO:** Short Course Series c/o NEI, PO Box 1265, Arvada, CO 80001

**Make checks payable to: "NEI WORKSHOPS"**



**Power Circuits:** This short course is an excellent review of electric power circuits and covers single phase and three phase circuits: voltage and current calculations; phasor diagrams; power, reactive power, apparent power and power factor; power triangle; power factor improvement and voltage drop calculations.

**Engineering Economics:** Knowledge of the "time value of money" and its application to engineering projects is important to all practicing engineers. This short course provides a discussion on simple, compound and continuously compounding interest rates; present worth values of single payments; present worth values of a series of payments; annual costs; salvage values; future costs; straight line depreciation; cost comparisons of alternative projects; and special topics as time permits.

**Power Transformers and Rotating Machines (Induction, Synchronous and DC):** This short course presents the basics of power transformers, motors and generators. The course will cover voltage-current relationship; equivalent circuits and modeling; performance evaluation; losses and efficiency; and application oriented problems.

**Symmetrical Components:** The understanding and use of symmetrical components is a valuable tool for the practicing engineer. The positive, negative and zero sequence components are first defined and illustrated; sequence networks are defined and illustrated using multiple one line diagrams and different fault conditions; power system protection is defined; ANSI device numbers are shown; and simple protection schemes are developed for feeder, bus, transformers and generators.

**Power System Analysis:** This short course combines the basics of the previous four courses and the tools are used to analyze commercial, industrial and utility power systems. The course covers per-unit calculations; equivalent circuits, modeling of power systems and impedance diagrams; fault calculations; percentage voltage drop and voltage regulation calculations; short transmission line, impedance calculations; and motor starting voltage drop calculations.

**National Electrical Code:** Knowledge of the National Electrical Code (NFPA 70) is essential for the practicing engineer. This short course provides an overview of the NEC and its proper use it. In particular, grounding, wiring, overcurrent protection, transformers, motors, hazardous locations, emergency systems and standby systems will be discussed along with other areas of interests of the attendees.

#### Instructors:

**Professor P.K. Sen, P.E., PhD, Sr. Member IEEE** - Professor of Electrical Engineering, University of Colorado at Denver. Professor Sen has over 30 years of power engineering teaching and industry experience with emphasis on electric machinery and power system applications and design.

**John P. Nelson, P.E., MSEE, Fellow IEEE** - President of NEI Electric Power Engineering, Inc. Mr. Nelson has 28 years of power engineering experience with emphasis on utility and industrial power system projects involving generation, transmission, distribution and utilization of electricity.

**John Ake, P.E., BSEE, Member IEEE** - Electrical Consultant. Mr. Ake has over 40 years of power engineering experience with emphasis on utility, commercial and industrial power systems; system grounding; forensic engineering; and NEC interpretations.

## Three Notable Milestones for Job Listing System

from IEEE - USA FRONTLINE Report

### Entry level Job Listings Launched

We unveiled a new Entry Level Job Listing Service in August. With the increased demand for new graduates in the workplace and to better assist our student members, we developed a separate file specifically for entry level postings. Another new feature on the entry level page are links to companies that are actively recruiting new and recent graduates - so now employers can choose between listing either specific positions in the JLS or providing summarized information and a hot link to their own Web sites. Check out [www.ieee.org/usab/EMPLOYMENT/info.ieeeusa.jobs.entry.txt](http://www.ieee.org/usab/EMPLOYMENT/info.ieeeusa.jobs.entry.txt).

### IEEE-USA's Job Listings Favorite Among Engineers

The JLS is the most popular job listing service for electrical engineers

according to the respondents to EE-Times' Salary and Opinion Survey (see Sept. 1 edition). Of the respondents who got new jobs over the past year, more found jobs on the Net than at job fairs - and more of them (40%) used IEEE-USA's service than any other. Dan Benigni, Chairman of USAB, recognized the Employment Assistance Committee for their efforts and the success of the JLS with a special citation at the USAB awards ceremony during the PACE conference.

### JLS Capabilities to Expand Soon with Searchable Database

The JLS will shortly initiate a new JLS with capability to search listings on-line. This is a long-needed upgrade to the current system and should be available this fall. The old system of

regional files grew out of the original implementation of email auto-response files and, although easily accessible (the JLS remains one of the most frequently visited Web site at IEEE), it is awkward to use. Look for the new, searchable JLS at [www.ieee.org/jobs.html](http://www.ieee.org/jobs.html).

<b>Raytheon Engineers &amp; Constructors</b>	
<i>Serving Colorado and the World</i>	
<ul style="list-style-type: none"> <li>■ Power</li> <li>■ Mining &amp; Metals</li> <li>■ Petroleum &amp; Petrochemicals</li> <li>■ Aerospace &amp; Defense</li> <li>■ Biotechnology</li> </ul>	<ul style="list-style-type: none"> <li>■ Pharmaceuticals</li> <li>■ Hazardous Waste Management</li> <li>■ Food &amp; Consumer Products</li> <li>■ Airports/Infrastructure</li> <li>■ Environmental</li> </ul>
P.O. Box 5888 Denver, CO 80217	(303) 843-2000 FAX: (303) 843-2208

## Do Your Electronics Technicians Need More Training?

Send your electronics technicians to Arapahoe Community College. You'll find their training program to be affordable, efficient and effective. The three-year, associate degree, evening program is paced to accommodate a full-time work schedule. Well-equipped labs and faculty with years of experience in industry assure that graduates will possess the knowledge and skills necessary to become a productive team member. Technicians are trained to build, test, trouble-shoot and repair circuits and systems.

ACC can also partner with you in training your electronic technicians through our certified industrial apprenticeship training program in electronics technology. Apprentices receive their classroom training through the College and gain hands-on training in an on-the-job work setting at your location.

If you'd like more information about the electronics training options at Arapahoe Community College, call 797-5799.

EOE

## POLYCOM

*Engineering with a Passion for Excellence*

### Turnkey Electronic Product Development

POLYCOM brings to its new Denver office over a decade of experience serving its San Diego clientele in the **Communications & Video** industries:

Eastman Kodak Company	General Instr. Communications Div.
Harris Corporation	Pacific Communication Sciences Inc.
Comstream Corporation	Primary Access Corporation
Fisk Communications, Inc.	Horizons Technologies, Inc.
NASA, DigiVision, Inc.	Lawrence Livermore Nat. Labs.

- 100% success rate
- Faster time to market
- Fixed Fee Guaranteed Schedule
- Innovation in Digital & Analog-RF Technologies

### POLYCOM DEVELOPMENT CORPORATION

<p>info@intellcam.com</p> <p><b>Denver Office:</b> 16095 Ridge Tee Drive Morrison, CO 80465-2140 Voice (303) 697-1577, Fax (303) 697-4050</p>	<p><b>San Diego Office:</b> 6046 Cornerstone Court West, Suite 150 San Diego, CA 92121-4733 Voice (619) 452-1700, Fax (619) 452-1219</p>
---	--



# The Institute of Electrical and Electronics Engineers - Denver Section

<http://www.engr.du.edu/ieee/densec.html>

Chair	Chair-elect	Sr. Vice Chair	Vice Chair Member Services	Vice Chair Student Activities	Secretary	Treasurer
Ron DeLyser University of Denver Dept. of Elec. Eng. University Park Denver, CO 80208-0177 (303) 871-2034 (303) 871-4450 Fax rdelyser@du.edu		Kevin Wright NEI Elec. Power Eng. P.O. Box 1265 Arvada, CO 80001 (303) 431-7895 (303) 431-1836 Fax w.k.wright@ieee.org	Cliff Alston Lockheed-Martin 1307 E. Belleview Denver, CO 80121 (303) 971-9020 (303) 977-1907 Fax c.j.alston@ieee.org	Jim West Lockheed-Martin 7329 S. Tamarac Ct. Englewood, CO 80112 (303) 971-7074 (303) 977-1907 Fax westj@aol.com	Lisa Brookman Public Service 550 15th St., Ste. 600 Denver, CO 80202 (303) 571-7575 (303) 571-7866 Fax lbroom@msp.pscsco.com	Trevor Pfaff Peak Power Eng. P.O. Box 340 Golden, CO 80402 (303) 279-7607 (303) 279-7597 Fax tre4p@aol.com

779-5267

Senior Past Chair / Programs - Bob Struthers, (303) 843-2235, r.struthers@ieee.org  
 Junior Past Chair - Dave Richmond, (303) 843-2465, d.richmond@ieee.org  
 Society Chapters - John Tsucalas, (303) 798-5769, j.c.tsucalas@ieee.org  
 Educational Activities - Francis Long, (303) 753-4677, flong@du.edu  
 Pre-College Student Activities -  
 Student Fund - Edward Pitchkolan, (303) 966-3707  
 Student Branch Activities - John Synhorst, (303) 556-2504, synhorsj@mscd.edu  
 Professional Activities (PACE) - Christy Yearous, (303) 924-6658,  
 yearous@usi.ibm.com  
 Professional/Industry Liaison - Jeff Wilson, (303) 388-6322  
 Audit -  
 Finance - Jeff Wilson, (303) 388-6322, pcoden@interramp.com

Membership - Fareed Hasan, (303) 843-2347, shasan@ccgate.ueci.com  
 Nominations - Dave Richmond, (303) 843-2465, d.richmond@ieee.org  
 Conference Activities - John Nelson, (303) 431-7895, nei19@ios.orci.com  
 Awards & Bylaws - Bob Struthers, (303) 843-2235, r.struthers@ieee.org  
 Long Range Planning -  
 Publicity - Diane Cloud, (303) 571-7011, ta111@msp.pscsco.com  
 Publications - Pete Koloditch, (303) 843-2976, Fax (303) 843-3622,  
 p.koloditch@ieee.org  
 Publisher - Anita Wanberg, Phone/Fax: (303) 220-8042, awanberg@aol.com  
 Black Hills Subsection - Dr. James W. Cote, Jr., (605) 394-5196, jcote@silver.sdsmt.edu  
 Centennial Subsection -

## Chapter Officers

Magnetics - Dr. Peter Hopkins, (303) 604-5401, hopkins@qntm.com  
 Joint Vehicular Technology/Communications -  
 Joint Power Engineering/Industry Applications - Trevor Pfaff, (303) 279-7607,  
 tre4p@aol.com  
 Reliability - Kirk Gray, (303) 666-7692, kirkgray@privatei.com  
 Laser & Electro-Optics - Andrew Aust, (303) 497-3942, aust@boulder.nist.gov  
 Engineering in Medicine & Biology - Norbert Kaula, (303) 315-8973

Joint Computer/Information Theory -  
 Electromagnetic Compatibility-Barry Wallen, (303) 692-6600, bwallen@intellistor.com  
 Joint Antenna & Propagation/Microwave Theory & Techniques/Geoscience &  
 Remote Sensing - Richard Geyer, (303) 497-5852, geyer@boulder.nist.gov  
 Aerospace & Electronic Systems - John Tsucalas, (303) 798-5769, j.c.tsucalas@ieee.org  
 Components, Packaging, Mfg. Tech- Mike Erni, (303) 678-2437,  
 mike\_erni@maxtor.com

**Please notify IEEE headquarters of any changes to your address and/or phone number by calling  
 1-800-678-IEEE (4333). We can not change this information in the Denver Area.**

The Institute of Electrical and Electronics Engineers



Denver Section  
 P.O. Box 4626  
 Englewood, CO 80155-4626

Non Profit Org.  
 U.S. Postage  
**PAID**  
 Denver CO  
 Permit No. 1993

DAVID RICHMOND  
 2921 S SIDNEY CT  
 DENVER CO 80231-6023