

SCANFAX

November 2002

Volume 54, Issue 9



IEEE

Chicago Section Website:
www.ewh.ieee.org/r4/chicago

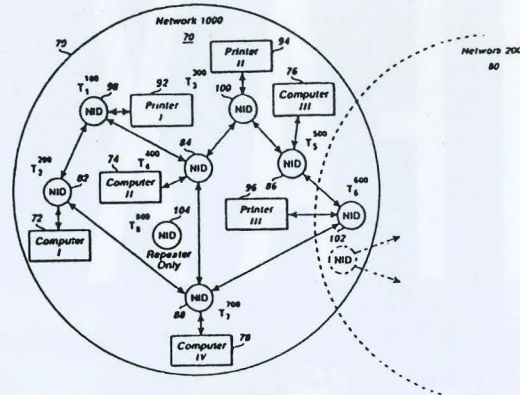
A publication of the
Institute of Electrical & Electronics Engineers
— Chicago Section —

DO YOU READ ME?

*The importance of
signal processing
to advances in cell
phone technology*



U.S. POSTAGE PAID
NON-PROFIT ORG
Permit No. 53
Columbus, Wisconsin



Masters of the Intellectual Property Maze®

Attorneys experienced in virtually every scientific and engineering discipline and concentrating in all facets of intellectual property law including

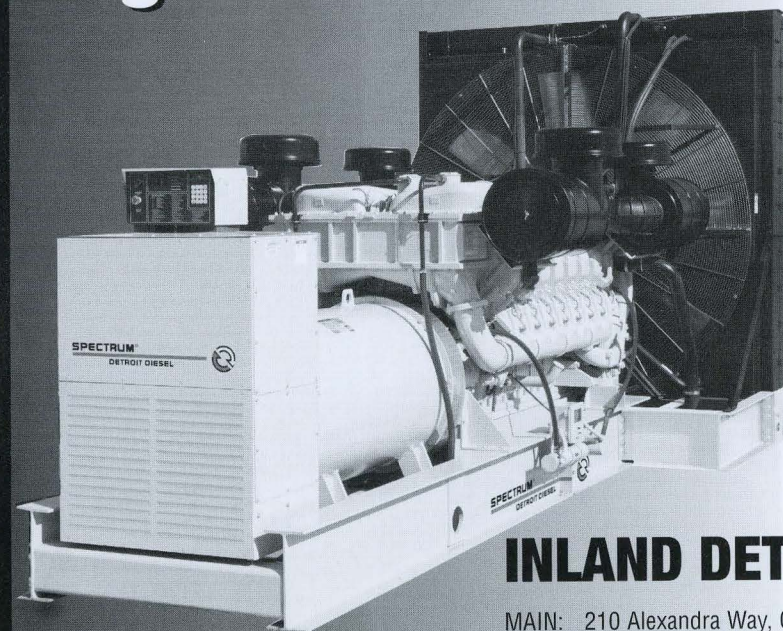
litigation, licensing, **WELSH & KATZ, LTD.** negotiation, client counseling and corporate identification programs, as well as protecting rights through trade secrets, patents, trademarks and copyrights worldwide.

120 S. Riverside Plaza • 22nd Floor • Chicago, Illinois 60606 • Telephone 312-655-1500 • Fax 312-655-1501
IEEE MEMBER CONTACTS: A. SIDNEY KATZ AND JAMES A. SCHEER

www.welshkatz.com

Washington Office: Crystal Plaza One • Suite 206 • 2001 Jefferson Davis Highway • Arlington, Virginia 22202-3603 • Tel: 703-415-4777

Right Choice for Power Generation



- Modern four-stroke cycle industrial engines
- Meet all U.S. EPA off-road emission standards
- Electronically-controlled engines feature unsurpassed fuel economy
- Low and medium voltages available to 15kV
- Permanent magnet excitation provides instantaneous response with the overcurrent capability to trip downstream circuit breakers
- Cooling options include unit-mounted radiators, remote radiator setup, or city water cooling

Every Spectrum system is backed by the industry's most extensive sales and service support network.

INLAND DETROIT DIESEL-ALLISON

MAIN: 210 Alexandra Way, Carol Stream, IL 60188 • 800-236-9559 FAX 630-871-8997
2601 E. 15th Ave., Gary IN 46402 • 800-616-8371 FAX 219-883-0441
13015 W. Custer Ave., Butler, WI 53007-0916 • 800-236-6667 FAX 262-781-0357
600 Industrial Park Dr., Iron Mountain, MI 49801 • 800-562-9250 FAX 906-774-6003
Inland Website: www.Inland-DDA.com

DETROIT DIESEL
SPECTRUM



Chicago Section:
www.ewh.ieee.org/r4/chicago

A publication of the
Institute of Electrical & Electronics Engineers
— Chicago Section —

Chairman

Patrick Hennelly
Phone 847-398-4510
Fax 847-398-0597
E-mail phennelly@ieee.org

Editor

Gerry Ryan
Phone 708-445-7537
Fax 708-445-7538
E-mail: gerryr_idcs@ameritech.net

Published for IEEE by
Slack Attack Communications

Publisher

Barbara Slack

Advertising Sales

Beth Vander Grinten
Phone: 608-222-7630
E-mail: bethv@slackattack.com

Printed By

Town & Country Printers
Columbus, WI

SCANFAX (ISSN #0018-1297) is a monthly publication (except July and August) of the Chicago Section Institute of Electrical and Electronics Engineers, Business Office, c/o Western Society of Engineers, 28 East Jackson, Suite 1320, Chicago, IL 60604, (800) 898-4333 or (312) 253-4333. It is published by **Slack Attack Communications**, 5113 Monona Drive, Madison, WI 53716, (608) 222-7630. Printing is by **Town & Country Printers**, Columbus, WI 53925. For advertising information, contact Slack Attack Communications.

Subscriptions included in IEEE membership dues; non-member subscriptions: \$25 per year.

Address corrections should be sent to: IEEE Membership, 440 Hoes Lane, Piscataway, NJ 08854-1331 or by phone (800) 678-4333.

Meeting notices should be sent to graphics@slackattack.com

©Copyright 2002 by the Chicago Section Institute of Electrical and Electronics Engineers. Permission to reprint must be secured in advance of publication and credit given to author and SCANFAX.

SCANFAX

November 2002
Volume 54, Issue 9

Feature

Do You Read Me?

The Importance of Signal Processing to Advances in Cell Phone Technology

Upcoming Events

- Chicago Chapter of the IEEE Power Engineering Society**
Adaptive VAR Compensation
Wednesday, November 13, 2002
- ED/CAS/SSC (Electron Devices/Circuits and Systems/Solid State Circuits)**
Bluetooth: Technology & Applications
Wednesday, November 20, 2002
- IEEE EMC Society Chicago Chapter**
Mars Express Antenna Calibration Project
Wednesday, November 20, 2002
- IEEE IAS/IES Dinner Presentation**
Active Harmonic Control
Wednesday, November 20, 2002
- IEEE Chicago/Rockford IEEE Consultants' Network**
What Makes an Entrepreneur?
Monday, November 25, 2002

Departments

- Employment Opportunities**
- Advertiser Index**
- Professional and Business Directory**

CHICAGO SECTION EXECUTIVE COMMITTEE MEETING

Tuesday, November 5, 6:30 p.m.

DeVry DuPage, Room TBA, 1221 N. Swift Rd., Addison, IL
No Registration Needed

ATTENTION

NEW BUSINESS OFFICE LOCATION:

The Institute of Electrical and Electronics Engineers Business Office has moved.
The new address and phone number are as follows:

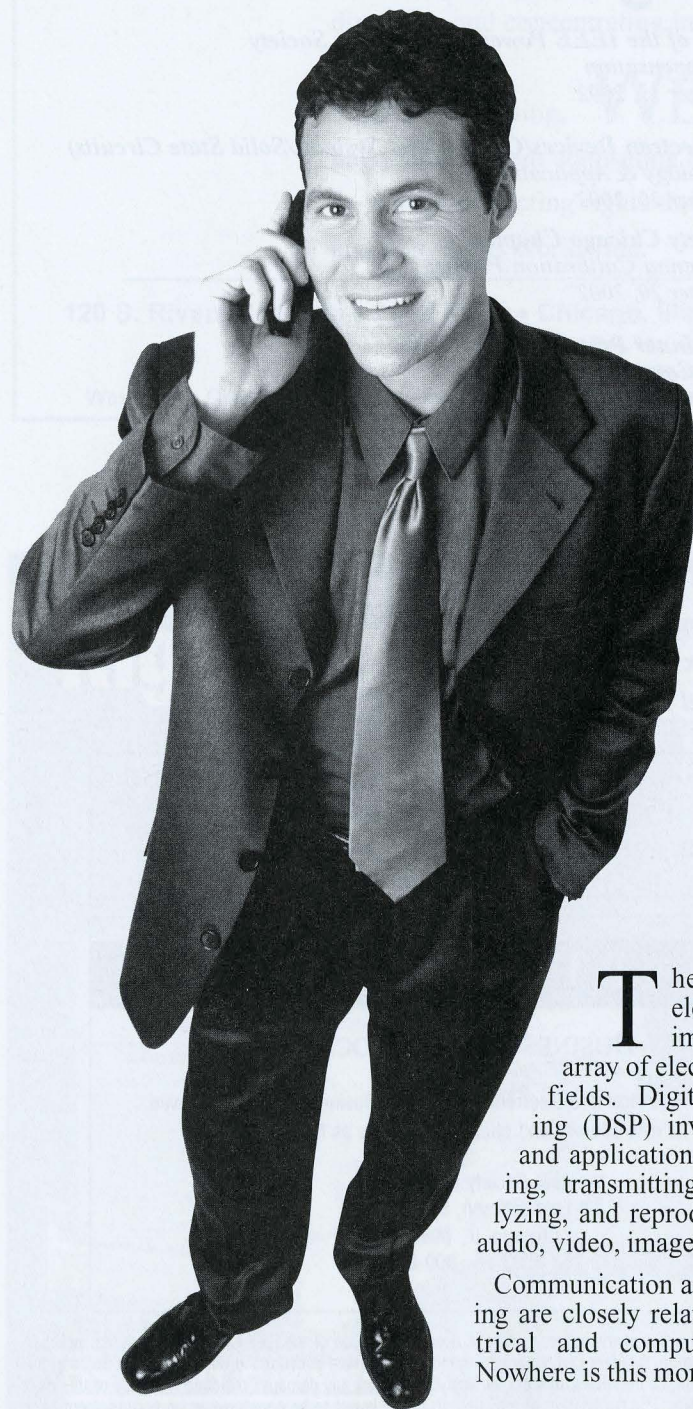
Western Society of Engineers
28 East Jackson, Suite 1320
Chicago, IL 60604
312-253-4333 — 800-898-4333

Statements or opinions expressed herein are those of the author's and not necessarily those of the IEEE Chicago Section, its members, officers, or staff, or the editors of this publication. Readers using any information or materials described in this publication do so at their own risk. In no event will IEEE Chicago Section, its members, officers, or staff be liable for any damages resulting from use of this material and hereby expressly disclaim such liability. The publication of any advertisement is not to be construed as an endorsement of the product or service offered unless the advertisement specifically states that there is such an endorsement or approval by the organization.

Do you read me?

The importance of signal processing to advances in cell phone technology

By Paul Zukowski



The processing of electronic signals is important to a wide array of electrical engineering fields. Digital signal processing (DSP) involves the theory and application of filtering, coding, transmitting, detecting, analyzing, and reproducing signals for audio, video, image and other signals.

Communication and signal processing are closely related fields in electrical and computer engineering. Nowhere is this more apparent than in

wireless telephone technology, where increasing demand for services to be delivered via the wireless spectrum presents great challenges.

Electrical communication began in 1838 when Samuel B.F. Morse sent a message over a 10-mile telegraph line. Today our communication systems transfer information at rates more than one billion times faster than Morse's first telegraph message. We can have telephone conversations from our automobiles to anywhere in the world. These conversations travel over radio links, cop-

per wires, optical fibers and satellite links. Economic growth has come to depend on the ability to exchange and transfer information.

Currently the next generation (3G) wireless communication systems need to support access to multimedia data available on the Internet. To deliver universal wireless access to multimedia data requires data rates and quality of service much better than those available in current wireless systems. Not only that, but in 3G devices, one or more DSPs supplement the main processor and handle the number crunching required by user applications and air interfaces. While these DSPs provide flexibility because they can be reprogrammed, they are also power hungry and may lack the processing power necessary for 3G and beyond.

Ideally, an application specific integrated circuit (ASIC) would be designed for each 3G phone. ASICs use far less power than DSPs to extend battery life, and ASIC processing power is greater than a DSP. There are also certain functions that a DSP lacks the capability to perform.

However, the typical development time for an ASIC is two years, and the

concern is that this will retard the adoption of 3G technology and beyond. Especially in the areas of MPEG-4 video and audio. MPEG-4 processing requires major algorithms such as motion estimation, discrete cosign transform (DCT), and Huffman encoding — all of which demand extremely high levels of processing power.

One way the industry could keep pace with increasing demand and evolving standards is to move from a mixed hardware/software DSP/ASIC design to a pure software development model. A new class of integrated circuit called the adaptive computing machine (ACM) could provide a solution. The architecture of an ACM chip is not rigid like that of a DSP or ASIC. It is designed to map software algorithms directly onto dynamic hardware resources. This makes it particularly flexible because it is both programmable and adaptable. It only takes nanoseconds to adapt on-the-fly to handle ever-evolving interface standards, communication protocols, algorithms, modulation types, and data formats.

In a recent article in Electronic News, Bob Plunkett of Quicksilver Technology

Inc., San Jose, wrote, "New technologies such as the ACM are critical to the future success of wireless/mobile communications OEMs. The software-based adaptive computing designs eliminate the need for expensive hardware changes. This alone has dramatic benefits, allowing the developer to enter the design cycle at any point to create changes or variations with software. Changes or updates can also be made even after the product is shipped or while in use."

He envisions the use of high-level language (HLL) software tools to allow software implementers to program the ACM. This could reduce the two-year ASIC implementation period to six months and greatly reduce development costs. Adaptive computing would also allow manufacturers a cost-effective way to change features, functions, and services to their existing handset users through software changes.

Adapting newer, more advanced IC technologies will be the key for original equipment manufacturers to survive the new universe of signal processing demands that 3G and beyond wireless traffic presents. ■

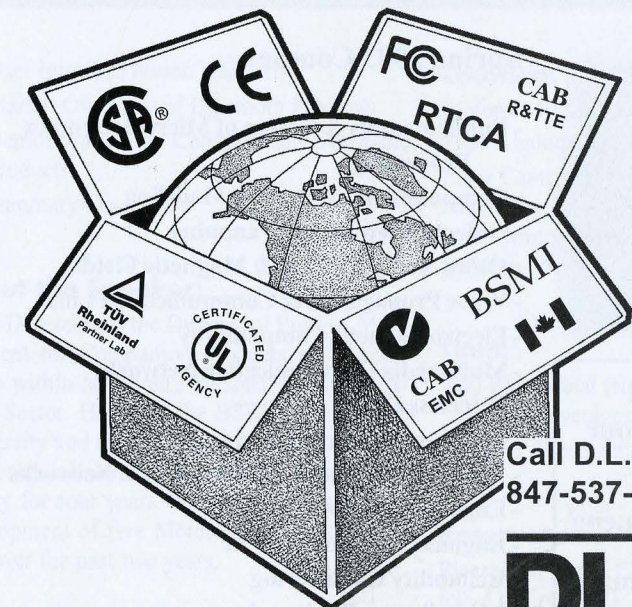
MOVING?

Notify IEEE via the web.

IEEE headquarters provides the following web page to let you change your IEEE mailing address and/or IEEE e-mail address directly: <http://www.ieee.org/membership/coa.html>. You will need your IEEE Account Number, Password, and Membership Number for initiating such a change securely. The instructions for changing your IEEE mailing address include the methods for using the mail, e-mail, or the telephone. Note: Please modify your IEEE mailing address only for a permanent address change. Otherwise, the "normal lead time" for preparing a correct address label for your IEEE publications may cause you to lose this valuable information.

Global EMC & Safety Compliance

All in one neat package
to meet your specific requirements.
No need to visit multiple agencies.



Call D.L.S. today at
847-537-6400 ext. 404



Wheeling, IL www.dlsemc.com

EVENING MEETING

Chicago Chapter of the IEEE Power Engineering Society **Adaptive VAR Compensation** Wednesday, November 13, 2002

Mike Jones, S&C Electric Company

About the Topic:

This presentation will review several methods presently used to achieve power factor correction and voltage flicker control, with a specific focus on the use of thyristor switching of capacitors to achieve these results.

The need for voltage sag correction, voltage flicker mitigation, and power factor correction arise from industrial applications which share a similar load profile — a rapidly varying demand for active and reactive power. Solutions to this problem can range from simple to complex, depending on the impact the dynamic load is having on either adjacent loads or on the upstream electrical system.

Thyristor-switched capacitors are distribution-class static VAR compensators utilizing power-electronic switching to provide variable amounts of reactive compensation on a cycle-by-cycle basis. These compensators continuously monitor load conditions and match the output

to the requirement of the load, providing real-time VAR compensation. Typical applications for this device include voltage-support, voltage-flicker, and power-factor correction for dynamically varying industrial loads, such as welding operations and large motor drives. In some cases, industrial customers install these devices to mitigate the effects of their variable loads on other customers on the feeder. In other cases, utilities use these devices to improve voltage regulation, to utilize their capacity more efficiently, or to reduce distribution transformer loading and system losses.

Applications for thyristor switched capacitors include such industries as resistance welding operations, petrochemical pumping, mining operations, wood processing operations, paper conversion, steel rolling mills, metal-forming and stamping operations, and even linear-induction-motor-driven rides in amusement parks.

About the Speaker:

Mike Jones is Application Director for the Power Quality Products Division of S&C Electric Company. He holds a BSEE and MBA from the University of Virginia. Prior to S&C he worked at divisions of Emerson Electric and ITT.

Location:

Western Suburban Location To Be Determined
- Please visit <http://peschicago.org> for more details.

Time:

5:30 PM Social
6:30 PM Dinner
7:30 PM Presentation
8:30 PM Adjourn

Reservations:

Dinner tickets can be purchased at the door. Please call the IEEE Business Office at (800) 898-IEEE to make your reservation. For more information, please visit the Chicago Chapter IEEE PES web site: <http://peschicago.org>

UIC University of Illinois
at Chicago

MEng

The Master of Engineering Degree Program is offered worldwide on the Internet. The MEng is a flexible program based entirely on coursework, without a research component and tailored to the educational needs of professional engineers. Prospective students are able to design their own curricula.



Spring 2003 Courses

- Fundamentals & Design of Microelectronics Processing
- Computational Molecular Modeling
- Object-Oriented Programming
- Quasi-Static Electric & Magnetic Fields
- Wave Propagation & Communication Links
- Electromagnetic Compatibility
- Multimedia Communication Networks
- Wireless Data
- Electromagnetic Scattering
- Advanced Wireless Communication Networks
- Engineering Law
- Engineering Management
- Reliability Engineering
- Air Pollution Engineering

For additional
information visit our
website:
www.uic.edu/eng/meng
or contact us by email:
meng@uic.edu

SCANFAX

Plan Now for 2003

Keep SCANFAX in your marketing plan for the upcoming year!

The Market Served — SCANFAX magazine is the official publication of the Institute of Electrical and Electronics Engineers (IEEE) Chicago Section. Those in the Chicago area who are influential in the electrical, electronics, and computer industry receive SCANFAX each month (except July and August). It provides a forum for manufacturers, consultants, sales representatives, universities, and colleges to exchange ideas and information.

Readership — Approximately 7,000 professionals are members of IEEE Chicago Section. These members represent more than 200 companies in the Chicago Area. You can reach this targeted audience with your advertisement in SCANFAX.



Weldy/Lamont & Associates

Manufacturers Representative
Engineered Products and Services

AC distribution equipment 600V thru 35KV (50 or 60Hz)

- Transformers
- Distribution switchgear
- Busway
- Automatic transfer switches (mechanical and static)
- Metering

DC power systems

- Switching Controlled Ferro, Mag-amp and SCR rectifiers
- DC to AC inverters
- Free standing rack systems
- Batteries

Uninterruptible Power Supplies and Frequency converters

- Rotary and static type

Weldy/Lamont Assoc., Inc. / 1008 East Northwest Hwy, Mount Prospect, IL 60056 / 847-398-4510

EVENING MEETING

ED/CAS/SSC (Electron Devices/Circuits and Systems/Solid State Circuits) **Bluetooth: Technology & Applications** Wednesday, November 20, 2002

Steve Deutscher, Motorola

About the Topic:

This presentation will explore the short-range wireless technology known as Bluetooth. The discussion will focus on market applications of Bluetooth technology with emphasis on usage models as applied to both audio and data functionality. Issues related to ease of use, profile support, and market acceptance will also be discussed. Live demonstrations of commercially available products spanning the personal audio, wireless data, and in-vehicle space will also be given during the presentation. The presentation will cover:

- Brief History of Bluetooth Technology
- Technical Overview of Bluetooth (hardware and software components)
- Bluetooth SIG Involvement with interoperability and standardization
- Bluetooth Profile Definition and Discussion
- Usage Model Discussion

- User Interface Issues/Tradeoffs
- Market Overview of Bluetooth Products
- Demonstration of Commercially Available Products
- Summary Discussion

About the Speaker:

Steve Deutscher is the Director of Product Management for Companion Products and Accessories within Motorola's Personal Communications Sector. He holds the BSEE from Purdue University and an MBA from Indiana University. Steve has been involved with Bluetooth technology for four years. His team has completed development of five Motorola Bluetooth products over the past two years.

Location:

Motorola Schaumburg Campus
1301 Algonquin Road
Enter Campus using Gate A, westmost gate off Algonquin Road, west of Meacham. Door 13 is under Motorola sign on west face of six story building. Preregistration is required.

Time:

7:00 PM Social (free sandwiches, snacks, and beverages)
7:30 PM Presentation

Reservations:

Please call the IEEE Message Center at (800) 898-4333 or (312) 253-4333 by 1PM Monday, November 18th. For information, call Norm Phoenix at (847)523-1078.

EVENING MEETING

IEEE EMC Society Chicago Chapter Mars Express Antenna Calibration Project Wednesday, November 20, 2002

Mike Howard, Liberty Labs

About the Topic:

Liberty Labs, Inc. was selected by the University of Iowa to perform the calibration of a dipole antenna used on an upcoming satellite mission to the planet Mars, called the Mars Express. The Mars Express uses the antenna to detect water beneath the permafrost of the surface of Mars. The 130-foot-long antenna transmits a pulsed signal from 1.5 to 5.5 MHz. It uses an on-board super computer to perform real-time analysis of the data retrieved from the dipole. The Mars Express is scheduled to be launched atop a Russian Soyuz Rocket by June 2003. The University of Iowa was selected to design the transmitter/receiver and the antenna, while Liberty Labs, Inc was selected to perform the antenna

calibration. The presentation features a slide show and video showing the calibration of this satellite system and antenna. A helicopter was used to suspend a satellite mock-up 500 feet below the helicopter while 10,000 feet above the test site and five miles down range.

About the Speaker:

Mike Howard founded Liberty Labs, Inc. as an antenna calibration service company in 1992. Liberty Labs now operates the world's largest antenna test range sized 50 x 80 meters. This range was used for the calibration of the Mars Explorer antenna.

Location:

Elite Electronic Engineering, Inc.
1516 Centre Circle
Downers Grove, IL

Time:

6:30 PM Social
7:00 PM Meeting Start

Reservations:

Steve Laya (Elite)
Phone: 630-495-9770

Employment Opportunities

Nationwide engineering firm is expanding its Chicago office. We are seeking both entry level and experienced **ELECTRICAL ENGINEERS** to assist us in our growth. Must have BSEE and excellent communication skills. PE or EI would be a plus.

Experienced Electrical Engineer position requires background in 480-volt power distribution for motors, equipment, and lighting systems integral to water, wastewater, commercial, and transportation projects. Experience in SCADA controls and instrumentation systems is helpful.

We offer an attractive salary, professional growth potential, immediate ESOP eligibility, no-interest computer loans, and other outstanding benefits.

If you are interested in working with a dynamic, professional team, send your resume to:

Consoer Townsend Envirodyne Engineers, Inc.

303 E. Wacker Drive, Ste. 600 Chicago, IL 60601
Attn: Human Resources, Dept. S.A.
Or fax to: (312) 938-1109

EOE

M/F/D/V

CHIEF ELECTRICAL ENGINEER/DEPARTMENT MANAGER

Candidate will be responsible for electrical engineering and design of commercial, educational, institutional and industrial projects from design inception through construction. The selected candidate will be starting an electrical department. Duties shall include supervising all electrical design projects, scheduling the resources of the electrical department, assisting in business development/business plan implementation, assisting in preparation and management of budgets, and be responsible for project design, contract document review and final review of the department's deliverables.

Qualified candidates will have at least 10 years of experience in electrical power system design, fire alarm system, and other special systems along with the ability to lead and supervise technical people. Candidate must have a BSEE, licensed PE in the State of Illinois or the ability to obtain a license in IL, and 10 years or more of experience.

We offer competitive salary, insurance program, SEP-IRA plan, and a great place to work.

Send resumes to:

Brian Berg & Associates, Ltd.
Attention Brian Berg Jr.,
801 W. Wise Rd.
Schaumburg, IL 60193

EVENING MEETING

IEEE - IAS/IES Dinner Presentation Active Harmonic Control Wednesday, November 20, 2002

Charles J. Nochumson, P.E.

About the Topic:

Harmonic currents created by various solid state devices travel from the load throughout the electrical distribution system. The amount of harmonic voltage and current that a system will tolerate is dependent upon both the loads on that system and the source(s). The continuing proliferation of nonlinear power electronic loads guarantees the need for ways to address the effects of these damaging harmonic disturbances. This presentation will review the source, causes and effects of created harmonics and review the basics of passive and active harmonic mitigation with emphasis on active mitigation control.

About the Speaker:

Education: University of Illinois in 1965 with BSEE, MBA from Northwestern University 1970

Charles J. Nochumson is an Application Engineer for Cutler-Hammer and was previously an Application Engineer with Westinghouse Electric Corporation in their Distribution and Control Business Unit for 29 years. Mr. Nochumson

is co-author of an IEEE paper on "Transfer Considerations in Standby Generator Application," author of a *TAPPI* and IEEE paper on "Application of New Technologies in Power Circuit Breakers with Higher Interrupting Capacity and Short Time Ratings." He has also been published in *Electrical Distributor* and *Plant Engineering* magazines. Mr. Nochumson is a Professional Engineer and Senior Member of IEEE.

Time:

5:30 PM Social
6:00 PM Dinner
7:00 PM Presentation

Location:

Costa's (Greektown)
340 S Halsted St.
Chicago, IL
Costa's is located in Greektown on the corner of Van Buren and Halsted. For detailed directions and a map, see www.iaschicago.com

Reservations:

Please call the IEEE Business Office at (800) 898-IEEE or (312) 253-4333 with your reservation. Please note any special meal requests at the time of the reservation. You can also make your reservations on line at www.iaschicago.com

Cost:

Your cost includes the presentation and a four-course dinner with a choice of the main entry - roast lamb, chicken, or fish. (vegetarian or special dietary meals available upon request). Cost is \$25 IEEE Member and \$30 non-member. Valet parking is included with your meal.

Information:

For P.E. licenses that require continuing education for renewal, attendance at IEEE Technical Meetings is acceptable as one Professional Development Hour (PDH) per meeting.

EVENING MEETING

IEEE Chicago/Rockford IEEE Consultants' Network What Makes an Entrepreneur? Monday, November 25, 2002

About the Topic:

In addition to networking and sharing leads and referrals, there is usually a guest speaker. On November 25, instead of a speaker, we plan to have an open discussion on "What Makes An Entrepreneur?" based on the article by Dave Lundy in the September 8, 2002 edition of the *Chicago Sun-Times*. From lawyer to CEO, entrepreneur to professor, video-game designer to *Rolling Stones* web developer, Howard Tullman has worn many hats over his 35-year career. Although he found success as a class-action lawyer, Tullman saw richer opportunities in the exploding world of high-tech. With venture capital in hand, Tullman built and took public a database-driven company for the insurance industry. It was the first of many entrepreneurial ventures that he founded, advised, or led. Tullman believes the biggest mistakes entrepreneurs make are "falling in love with their products," worrying too much about valuation and trying to be both the "accelerator" and "brake" for their companies." Members and non-members are invited to both the meeting and the optional dinner. (Reservations are NOT required).

ucts," worrying too much about valuation and trying to be both the "accelerator" and "brake" for their companies." Members and non-members are invited to both the meeting and the optional dinner. (Reservations are NOT required).

Meeting Location:

Palatine Public Library
700 North Court
Palatine, IL

Dinner Location:

Bakers Square
270 E. Northwest Highway and North Court,
just south of the library

Time:

6:15 PM Optional Group Dinner at
Bakers Square (order off menu -
reservations are not required)
7:30 PM Open Discussion-Meeting
9:00 PM Adjourn

Information:

Information about the network can be obtained by e-mail: g.l.blank@ieee.org or visit our web site at <http://www.drblank.com/coaction.htm>
See you on NOVEMBER 25, and bring consultants and those who aspire to be consultants for a pleasant and informative evening of networking.

Meetings are usually held on the last Monday of odd-numbered months.

PROFESSIONAL AND BUSINESS DIRECTORY

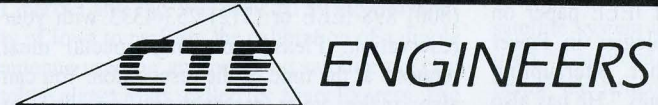
Automatic Switch Company

ASCO

CHICAGO DISTRICT SALES OFFICE
747 Church Road, Suite 3E
Elmhurst, IL 60126

TEL: (630) 832-5900
FAX: (630) 832-7988

Transportation Engineering • Water Resources Engineering



CONSOER TOWNSEND ENVIRODYNE ENGINEERS, INC.
303 East Wacker Drive, Suite 600, Chicago, Illinois 60601
(312) 938-0300 www.cte-eng.com

ELECTRONIC INSTRUMENT ASSOCIATES

Chicago 630-924-1600 • Milwaukee 262-677-1600
Manufacturer's Representative info@electronicinstrument.com

Electromagnetic Compatibility Test Equipment

Power Amplifiers, Transient Generation Equipment, Shielded Rooms,
Anechoic Chambers, EMC Antennas, Turntables, Field Probes, etc.

Electrical Parameter Measurement Instrumentation

AC & DC Current, Voltage, Watt, VAR Transducers, Sensors, Signal
Conditioning, Energy Monitoring Instruments, Demand / Submetering

EffectiveEdu.com



Effective solutions for your distance learning needs.

Phone: (630) 858-6161, ext. 12

anu@goinfo.com
www.effectiveedu.com



Gus Berthold Electric Co.
1900 W. Carroll Ave., Chicago, IL 60612

Switchboards Ph: (312) 243-5767
Panelboards Fax: (312) 243-5811
Motor Controls sales@bertholdelectric.com



LEE BUTTER & ASSOCIATES
ELECTRICAL MANUFACTURERS REPRESENTATIVES

1125 W. LUNT AVE. (800) 323-1802
ELK GROVE, IL 60007 FAX (847) 437-7609
847/437-7600 lee_butter@msn.com

LEHMAN COMPANY

Electrical Manufacturers Representative

PHONE: 630-942-1900 FAX: 630-942-1955



Automation and Controls

www.panatrol.com
info@panatrol.com

7481 S. Sayre Ave. • Bedford Park, Illinois
Phone: (708) 496-3080 • Fax: (708) 496-2770

- PLC and Computer Programming
- Electrical Design and Drawings
- Engineered Factory Automation
- Custom Control Panels
- Motor Controls

U/L Listed
CSA Certified

RFcomps.com

**RF & Microwave
Components Distributor**

P.O. Box 1822
Highland Park, Illinois 60035-7822
847-926-9060
847-926-9061
www.RFcomps.com
Visit www.RFcomps.com for a broad selection of RF & Microwave components.

T&D Products, Inc.

Manufacturers Representatives - Transmission & Distribution Electrical Equipment

650 East Diehl Road, Suite 107 Phone: (630) 245-9130
Naperville, IL 60563 Fax: (630) 245-9135
Web: www.tdproducts.com email: info@tdproducts.com

ABB Inc., Atkinson Industries, Cyberex, Hamby Young, IPC Resistors,
MTI Technologies, Shallbetter, Tierney Electrical

Transformers, Switchgear, Breakers, Relays, Capacitors, Harmonic
Filters, Electrical Buildings, Power Resistors, Synchronizing
Switchgear, Non-Seg Bus, Iso Phase Bus, Batteries, UPS Systems,
Chargers, Substation Design and Supply.



Register Now For Spring!
<http://online.engr.uiuc.edu>

Programs in CS, ECE, & ME via the Internet.
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Support these fine
businesses that
support SCANFAX.

ADVERTISER INDEX

DLS Electronic Systems, Inc.5

Elite Electronic EngineeringIBC

Elmhurst College.....BC

Inland Detroit Diesel - Allison.....IFC

Weldy/Lamont & Associates7

Welsh & Katz Ltd.....IFC

**Little Price
Big Reward.**

Call today to reserve
your advertising space.

608-222-7630
Beth Vander Grinten
Slack Attack Communications
bethv@slackattack.com

Elite Speed.

TEST LABORATORY

When getting a product to market hinges on compliance approval, speed means everything. Approval is often measured in months. With Elite Electronic Engineering on your side, it can be measured in days. From dedicated experts who accelerate the process to comprehensive single-site testing chambers, we make the process smoother, easier and quicker.

To put your products — and your company — on the fast track, contact Elite today.

- EMC testing, regulatory and design consulting, and certification under one roof.
- FCC Telecommunication Certification Body (TCB) services and CE Mark Approvals (CAB) for RF transmitters and telecom equipment.
- Emissions measurements are performed in a single chamber. No need to run a preliminary scan and then move the test item to an Open Air Test Site (OATS).
- Test engineers and certification experts assist throughout the process, identifying requirements, eliminating delays, and assisting with time-consuming troubleshooting.
- Elite experts are trained, qualified, and up to date on the latest compliance requirements.
- Pre-test design evaluation by EMC and safety experts saves test time and expense.

Elite Electronic Engineering Inc.

1516 CENTRE CIRCLE, DOWNERS GROVE, IL 60515
1-800-ELITE-11 [1-800-354-8311]
www.elitetest.com

AzLA Accredited
NVLAP Accredited
ANSI Accredited
DESC Approved
NARTE Certified Engineers

FC Canada CE

In graduate study at Elmhurst, you'll

learn more.

Master of Science in Computer Network Systems

Our master's program in computer network systems provides professionals with state-of-the-art technical knowledge and a lot more. You will learn the ins and outs of WANs, LANs, Visual BASIC, distributed databases, VB script, Active Server Pages, and client server systems. You also will sharpen your communication skills, develop your management competencies, and explore the ethical issues of a fast-moving profession.

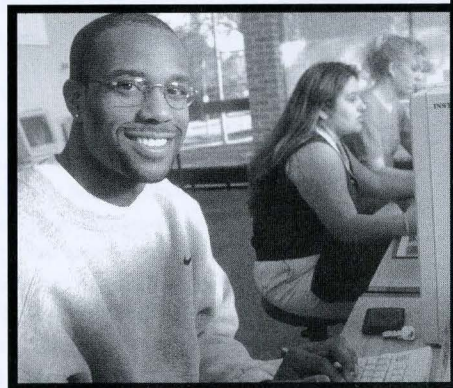
Elmhurst takes a distinctive approach to graduate study. We keep classes small, so each student works closely with our talented faculty. What's more, because you go through the entire program in cohorts, you will gain team-building experience and build a key professional support network.

All classes are scheduled part-time, in the evening. Challenging, innovative, intensely practical: at Elmhurst, you will get more than a master's.



Elmhurst College

More than a master's...



For information or to arrange a campus interview, call us at (630) 617-3030, or e-mail us at gradadm@elmhurst.edu. The College is located at 190 Prospect Avenue, Elmhurst, Illinois 60126.