

SCANFAX

December 2002

Volume 54, Issue 10



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

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

FUZZY CONTROL HELPS TACKLE THE UNCERTAINTY OF COMPLEX SY



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



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

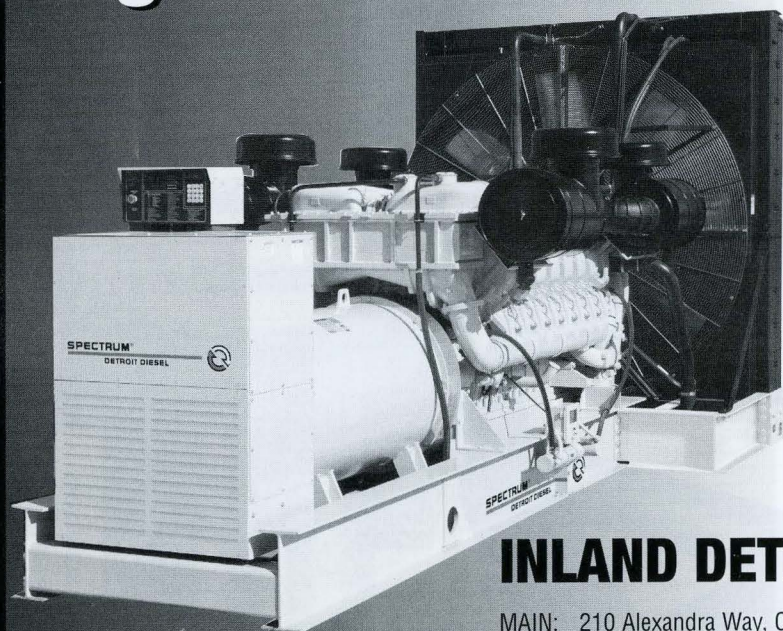
- Switching Controlled Ferro, Mag-amp and SCR rectifiers
- DC to AC inverters
- Free standing rack systems
- Batteries

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

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-Q916 • 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@ieeec.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

December 2002
Volume 54, Issue 10

Feature

- 4 *Fuzzy Control Helps Tackle the Uncertainty of Complex System*

Upcoming Events

- 6 *Chicago Chapter of the IEEE Power Engineering Society
Power Quality: Active Harmonic Filters
Wednesday, December 11, 2002*
- 7 *IEEE EMC Society Chicago Chapter
2003 Meeting Dates*
- 8 *IEEE - IAS/IES Announcement
2003 Meeting Dates*

Departments

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

CHICAGO SECTION EXECUTIVE COMMITTEE MEETING

Tuesday, December 10, 6:30 p.m.

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

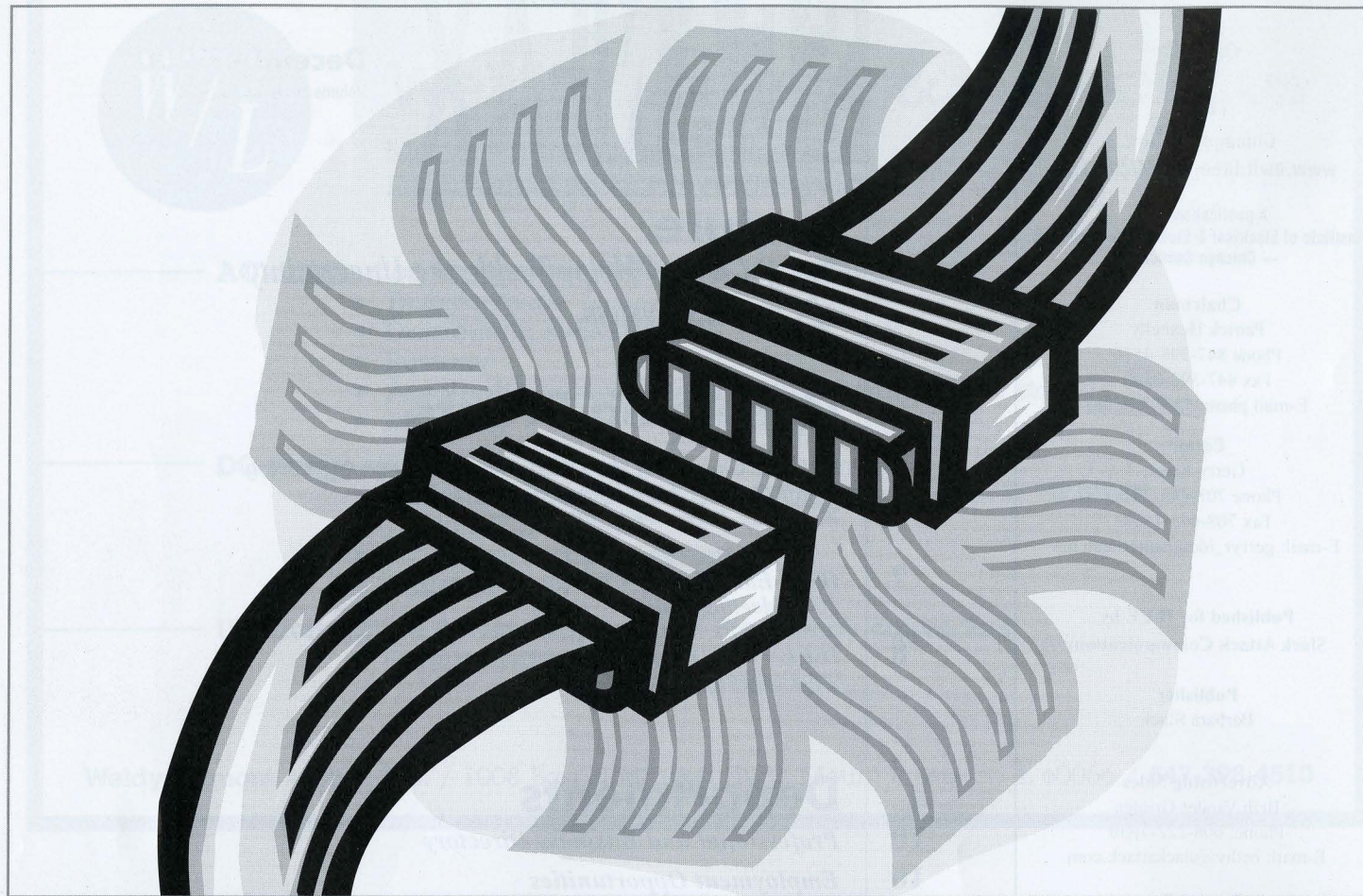
ATTENTION

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.



FUZZY CONTROL HELPS TACKLE THE UNCERTAINTY OF COMPLEX SYSTEM

BY PAUL ZUKOWSKI

A funny thing happens when you try to make everything into an on/off, either/or decision to match the logic of digital computers — it turns out we don't really think that way, and a lot of systems don't work that way either. The neural networks of a living brain go on inferences and input from multiple sources, balancing it all in a fuzzy sort of way based on experience. Managing loads on a large power grid or helping an automatic camera know what to focus on also involves fuzzy decision-making.

The ground rules of logic we inherited from the ancient Greeks were clear: things either had certain properties or they didn't. Logic was two-valued — either true or false. There was no room for half-truths.

But modern scientific theories deal in shades of certainty, starting with Charles Darwin in 1895 and his notion that differential probability of reproduction that determines which animals multiply and which die out, and extending through quantum mechanics in this century that says we can't actually

locate an electron exactly but only cite a probability of finding it at a particular location.

In the 1960s at Berkeley, the control theorist Dr. Lotfi Zadeh proposed and named fuzzy logic, a system that allows categories of truth like entirely true, fairly true, can't say if true nor not, mostly not true, and not true at all. It took some time for the idea to be accepted, but in the end, the proof was that fuzzy logic worked. First it was used to successfully automate cement manufacturing

plants, and today fuzzy logic controllers are in common use in everything from washing machines to automobile transmissions to spell checkers on word processing applications and handwriting recognition on hand-held computers.

A check of recent articles reveals fuzzy logic turning up in:

♦ A musical search engine for the Internet being developed by a consortium of universities where only a few notes need to be hummed and then the program generates statistical tables comparing it against an archive of sounds using fuzzy logic techniques to check for closeness.

♦ A "non-obvious relationship awareness" tool initially developed to help gambling casinos detect unwanted visitors or crooked employees is now being put to work analyzing links and connections in the flow of data intercepted by counter-terrorism agencies. The system's creators said it uses "fuzzy logic algorithms to make associations that are normally difficult for humans to detect" things like false names, or hidden links between people.

♦ Retailers are now able to identify suspicious or abnormal transactions through a data mining solution that uses fuzzy logic to

learn the characteristics of each store and each cashier in order to produce a database of theft or error related correlations.

♦ Scientists based at Newcastle University in England used neural networks which use fuzzy logic and can be trained by learning from mistakes to recognize patterns in breast cancer tissue samples that would predict if the cancer was likely to spread and achieved 90% accuracy.

Fuzzy expert systems were an early and common use of fuzzy logic in several wide-ranging fields including, linear and nonlinear control, pattern recognition, financial systems, operation research, and data analysis. A fuzzy expert system uses a collection of fuzzy membership functions and rules, instead of Boolean logic, to reason about data.

Fuzzy sets and logic make up a formal mathematical theory for the representation of uncertainty, and as we all come to learn, uncertainty is inherent in the management of real systems.

It is vital to recognize that fuzzy logic is not a logic which is itself fuzzy, but a logic of fuzziness. In other words, the laws of fuzziness are not vague, any more than the laws of probability are random.

And speaking of probability, one should not confuse it with fuzzy logic. They are related, but not synonymous. A minimum requirement of probabilities is that they must add together to one, or the integral of their density curves must be one. But this is not required of the "membership grades" used in fuzzy logic calculations. The distinction between fuzzy logic and probability theory has to do with the difference between the notions of probability and a degree of membership. Membership grades can be determined with probability densities in mind, but there are other methods that have nothing to do with frequencies or probabilities. On the other hand, all probability distributions are fuzzy sets.

As the topics at the 2002 IEEE International Fuzzy Systems Conference show, fuzzy logic applications continue to grow, from fuzzy control and robotics to fuzzy computing with words, fuzzy human interfaces, fuzzy system architectures, and fuzzy-neuro-evolutionary hybrids.

It seems logical in the classical sense that whatever area of engineering one works in today, there is a good chance fuzzy logic is already playing a role, or will play one soon. ■

Patten 

♦ ♦ ♦ ♦ ♦ ♦ ♦
**SALES
PARTS
RENTAL
SERVICE**

5 LOCATIONS
GRAYSLAKE • OGLESBY
ROCKFORD • HAMMOND, IN
& OUR HEADQUARTERS:

615 W. LAKE STREET
ELMHURST, IL 60126
630.530.2200
www.pattenpower.com

Your Complete Source for POWER!

Diesel & Gas Powered Generator Sets
Complete System Responsibility

- ♦ Automatic Transfer Switches
- ♦ Paralelling Switchgear
- ♦ Trailerized Rental Units
- ♦ Sound Attenuated Enclosures
- ♦ Fuel Tanks
- ♦ Distribution Equipment
- ♦ 24-Hour Emergency Service

Emergency/Standby
Load Management

Cogeneration
Peak Shaving

LUNCH MEETING

Chicago Chapter of the IEEE Power Engineering Society Power Quality: Active Harmonic Filters Wednesday, December 11, 2002

Application Engineer - TBD, Square D Company / Schneider Electric

About the Topic:

This presentation will review and discuss:

- Sources of Harmonic Problems
- The Impact Harmonics can have on the Electrical System
- Various Approaches for Harmonic Mitigation
- Comparing Active Harmonic Filtering with more Traditional Approaches

Attendees should bring their "harmonic-problem" stories with them.

About the Speaker:

The speaker will be an application engineer from Square D's Power Quality headquarters for North America.

Square D has been in the Power Quality business for decades, starting with power factor correction fixed capacitors, and including electronic sag protectors, automatic power factor correction for harmonic rich environments and medium voltage capacitors.

Location:

Chicago Bar Association
321 South Plymouth Court
(Near Jackson & Dearborn)
Chicago, IL

Time:

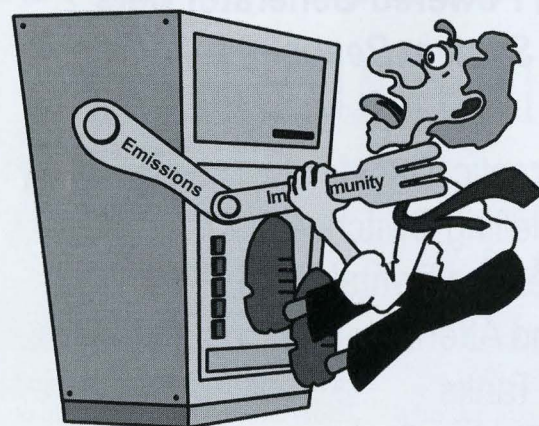
11:30 AM Social
12:00 PM Lunch (optional)
12:15 PM Presentation
1:00 PM Adjourn

Reservations:

Lunch tickets can be purchased in the lobby bookstore (\$11.00). 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>

Introduction to Electromagnetic Compatibility Design Practices* - January 30-31 Design Techniques for Controlling Radiated Emissions* - February 3-4



**Is getting your product to pass its
EMC test
sometimes frustrating?**

Learn the inside information on EMC and how to design for it from the initial stage through final production.

Donald L. Sweeney, with 15 years experience teaching EMC design classes and 30 years experience in the EMC & Electrical Engineering fields, will be offering two courses at the Hilton in Northbrook, IL Jan. 30-31 & Feb. 3-4, 2003.

For students to apply what they have learned from the classes to their specific products, they are encouraged to bring a product, or a schematic, to a free personal consultation offered by the instructor or his associate on February 1 or 5. Classes will also be offered in May, July and October.

For more information or to receive a brochure,
call D.L.S. at 847-537-6400 or www.dlsemc.com.

*These are the same classes formerly offered by Don through the University of Wisconsin.



PUBLICITY CHAIRMAN'S MESSAGE

IEEE EMC Society Chicago Chapter 2003 Meeting Dates

Steve Laya - Publicity Chairman, Elite Electronic Engineering

Here is a list of IEEE EMC Society meetings that we have scheduled for the first half of 2003. We will have more complete meeting announcements at a later date.

February 11 - Tuesday Measuring EMI Above 1Ghz, Mike Windler, U.L.

March 19 - Wednesday Life above 100Mhz, Bud Hoeft

April 22 - Tuesday Reverberation Chambers, Garth D'Abreau, ETS/Lindgren

May 20 - Tuesday Annual EMC MiniSymposium

PRESS RELEASE

Donald L. Sweeney, of D.L.S. Electronic Systems, Inc., will again be offering his two classes:

**"Introduction to Electromagnetic Compatibility Design Practices" and
"Design Techniques for Controlling Radiated Emissions"**

Jan. 30-31 & Feb. 3-4 and May 1-2 & 5-6, 2003 at the Hilton in Northbrook, IL.



The curriculum, developed by Mr. Sweeney and his associates over the past 15 years, includes recent updates with respect to the fast changing electronics industry. Classes start with fundamentals of electromagnetic compatibility (EMC/EMI) and then focus on the methodology of how to minimize EMC problems, starting with the design process through final testing and approval. The courses are based on two textbooks and are supplemented with practical information and examples. Originally offered through the University of Wisconsin, they are now available directly through D.L.S. Electronic Systems, Inc.

Additionally, attendees will be offered an exclusive, hands-on personal consultation with the instructor or technical staff to apply what has been learned to their specific product.

To receive a detailed brochure, or for specific information about the classes, please call 1-847-537-6400, or access www.dlsemc.com.

About the Instructors

Donald Sweeney, Senior EMC Engineer is president of D.L.S. Electronic Systems, Inc. He is a graduate of the department of electrical engineering, University of Illinois at Urbana and has 35 years experience in the electrical engineering field. Most of his time has been devoted to solving problems in electromagnetic engineering and closely related disciplines. He has worked for Extel Corporation, Teletype Corporation, Gates Radio, and Collins Radio prior to forming D.L.S. Electronic Systems, Inc., a Wheeling, Illinois based company. He specializes in EMC, RFI, & EMI consulting and testing. Don has taught at Oakton

College & the University of Wisconsin (at both the Madison and Milwaukee Campuses), and consults nation-wide on electromagnetic compatibility. He has served as a special consultant to Lawrence Livermore National Laboratory and the Nuclear Regulatory Commission. He is a NARTE certified EMC Engineer, the founding chairman of U.S. Council of EMC Laboratories, was the Chicago area Chairman of the IEEE EMC Society and has served on the board of directors of IEEE EMC Society for six years.

Roger Swanberg, Senior EMC Engineer at D.L.S., teaches circuit board design. He is a graduate of IIT in Chicago and has over 35 years experience in EMC and electronics design, as well as regulatory compliance. Roger is Vice-Chairman for the Chicago Section of the IEEE EMC Society.

Corey Sweeney has been involved with D.L.S. since its beginning in 1983. He has worked on various computer projects and has participated in the IEEE EMC Computer Modeling, Technical Activities Committee, TC-9. He has been teaching the practical applications mathematical section of this class since 1998.

IEEE - IAS/IES Announcement 2003 Meeting Dates

There is not a scheduled IAS/IES meeting for December. Our regular scheduled meeting will start again in January 2003.

Our schedule for the rest of the session will be as follows:

January 15, 2003 Application of Large Motor, Low Voltage Starting Systems
February 22, 2003 Saturday Seminar - Industrial Power Systems Design
March 19, 2003 Application of Variable Frequency Drive Technology
April 16, 2003 Maintenance and Testing of Electrical Systems
May 21, 2003 Chicago Code, Emergency Power Systems

Typical Location and Time of our Dinner Meetings are as Follows:

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.

Time:

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

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 online 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.

**ON BEHALF OF ALL OF THE CHAIR MEMBERS OF THE CHICAGO CHAPTER OF IAS/IES, WE WOULD LIKE TO WISH YOU ALL
 HAPPY HOLIDAYS AND A HEALTHY NEW YEAR. WE LOOK FORWARD TO SEEING YOU IN 2003.**

SCANFAX

PLAN NOW for 2003



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.

From the size and attractive masthead to the full color cover and additional information provided, we intend to make SCANFAX even more of an essential handbook for IEEE Chicago Section members.

MECHANICAL REQUIREMENTS

SUBMISSION REQUIREMENTS (Traditional): Camera-ready reflective art (100 line screen) or negative film (right-reading, emulsion down, not to exceed 150 line screen). It is suggested that any ads containing halftone photos or screens be supplied as negative film. Provide print proof with all film (matchprint for 4/c process ads required). **(Electronic):** Platform: Macintosh (preferred) or Windows. Disk Format: 3-1/2, Zip (100MB), or CD. File Format: QuarkXPress (or Illustrator if saved as .eps). **Unsupported Formats:** Due to software limitations for production efficiency, we are **NOT** able to accept the following programs: PageMaker, WordPerfect, Microsoft Word, Microsoft Publisher, Harvard Graphics, PowerPoint, Excel, Corel Draw. **Electronic Ad Submission Checklist:** Verify ad dimensions. Don't use color if ad is black-only. Copy all materials to disk (include all placed graphics, scans, logos). Include all fonts on disk. Provide laser print of ad.

NOTE: Any ads not supplied camera-ready could incur additional charges. We prefer that 4-color ads be submitted as negative film with match print. If a four-color ad can only be sent on disk, there will be an output charge as our printer requires film and matchprints for all four-color ads.

The official publication of the INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS — CHICAGO SECTION —

Keep SCANFAX in your Marketing Plan for the Upcoming Year!

ADVERTISING RATES

AD SIZE	1X	5X	10X
Back Cover, 4/c	\$1,600	\$1,400	\$1,215
IBC or IFC, 4/c	1,310	1,140	1,020
Full Page	890	770	665
1/2 Page	650	560	490
1/3 Page	505	435	380
1/4 Page	375	315	270
1/6 Page	260	230	205

Professional Card 330
 One color (PMS) plus black \$150
 Four color inside pages \$300

10% premium on b/w position requests, 1/2 page or larger.
 15% to recognized advertising agencies on space only.
 For information on inserts, contact your account representative.

DIMENSIONS

(Dimensions are width by height)

Full Page	8-3/8" x 10-7/8"
(7-3/8" x 9-7/8" recommended print area)	
1/2 Page Horizontal	7-3/8" x 4-7/8"
Vertical	4-7/8" x 7-3/8"
1/3 Page Horizontal	4-7/8" x 4-7/8"
Vertical	2-3/8" x 9-7/8"
1/4 Page Horizontal	4-7/8" x 3-5/8"
Vertical	2-3/8" x 7-3/8"
1/6 Page Horizontal	4-7/8" x 2-3/8"
Vertical	2-3/8" x 4-7/8"

EMPLOYMENT OPPORTUNITY ADS

\$260 for two consecutive issues. Minimum 50 words, maximum 80 words. Send type written copy including mailing address, phone number and check payable to SCANFAX Magazine, P.O. Box 6096, Madison, WI 53716.

PROFESSIONAL CARDS

Include your business in the "Professional Card" section of each issue of SCANFAX throughout the year, for the low cost of \$330.00 (includes production). Dimensions of a Professional Card are 3-5/8" wide x 7/8" high. Your advertisement can include your logo, slogan and key information about your business. Ads will be listed alphabetically. Sign up today!

For advertising information contact:

SLACK ATTACK COMMUNICATIONS
BETH VANDER GRINTEN
 P.O. Box 6096, Madison, WI 53716
 PHONE (608) 222-7630 • FAX (608) 222-0658
 E-MAIL: bethv@slackattack.com

EDITORIAL SCHEDULE*

2003 January Issue

EDITORIAL FOCUS: Circuits and Devices
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Nov. 25, 2002

February Issue

EDITORIAL FOCUS: Industrial Applications
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Dec. 25, 2002

March Issue

EDITORIAL FOCUS: Communications
 Technology
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Jan. 27, 2003

April Issue

EDITORIAL FOCUS: Electromagnetics
 and Radiation
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Feb. 25, 2003

May Issue

EDITORIAL FOCUS: Engineering and
 Human Environment
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: March 25, 2003

June Issue

EDITORIAL FOCUS: Education/Universities
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: April 25, 2003

September Issue

EDITORIAL FOCUS: Energy and
 Power Engineering
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: July 25, 2003

October Issue

EDITORIAL FOCUS: Computers
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Aug. 26, 2003

November Issue

EDITORIAL FOCUS: Signals and Applications
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Sept. 25, 2003

December Issue

EDITORIAL FOCUS: Systems and Control
 SPACE RESERVATIONS AND CAMERA READY
 MATERIALS DUE: Oct. 27, 2003

*Features subject to change without notice

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
CTE ENGINEERS
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

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

EffectiveEdu.com 
Effective solutions for your distance learning needs.
anugoinfo.com
Phone: (630) 858-6161, ext. 12 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

ADVERTISER INDEX

DLS Electronic Systems, Inc.	6
Elite Electronic Engineering	IBC
Elmhurst College.....	BC
Inland Detroit Diesel - Allison.....	IFC
Patten Power Systems.....	5
Weldy/Lamont & Associates	IFC

Support these fine
businesses that
support **SCANFAX.**

PROFESSIONAL AND BUSINESS DIRECTORY

PANATROL
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
Attenuators, cable assemblies, circulators & isolators, connectors, couplers, terminations, and more
www.RFcomps.com
Visit www.RFcomps.com for a broad selection of RF & Microwave components.

To Reserve this Space, Call Beth Today!
608-222-7630

T&D Products, Inc.
Manufacturers Representatives - Transmission & Distribution Electrical Equipment
650 East Diehl Road, Suite 107
Naperville, IL 60563
Web: www.tdproducts.com
Phone: (630) 245-9130
Fax: (630) 245-9135
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.

 **Registration Open For Spring!**
<http://online.engr.uiuc.edu>
Programs in CS, ECE, & ME via the Internet.
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

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.

TEST LABORATORY
 **Elite Speed.**
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
A2LA 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.

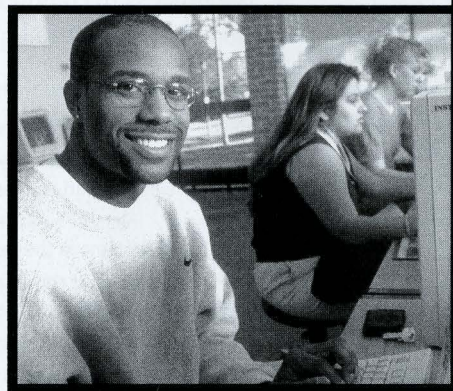
Elmhurst takes a distinctive approach to graduate study. We keep classes small, so each student works closely with our talented faculty. What's more, because you go through the entire program in cohorts, you will gain team-building experience and build a key professional support network.

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.