

SCANFAX

May 2004

Volume 56, Issue 5



IEEE

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

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

Pace of Technological Change

Driving the Educational Needs of Engineers

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Pace of Technological Change

Driving the Educational Needs of Engineers

By Paul Zukowski

The exponential boom in technology has not only caused expansion in older, established fields of engineering such as mechanics and electricity, it has led to the creation of altogether new fields such as nanotechnology and fiber optics. Who could have anticipated hand-held communication devices with more computing power than the largest mainframes from 30 years ago?

In addition, what had once been clear divisions between engineering disciplines, such as mechanical engineering, electrical engineering and civil engineering, are becoming indistinct and may even disappear. Being able to manage resources and programs is also becoming a necessary skill set.

All of these evolutionary forces are not only changing the way engineering is taught in college, it is also increasing the demands on those already in the profession to keep their knowledge recent.

Reflecting on how engineering is changing, Bob Wulf, president of the National Academy of Engineering in Washington D.C., said in a recent article that there is a need to establish a culture of lifelong learning in the profession.

"After all, engineering will continue to change," he said in Machine Design (2/19/04), "and it's likely that rate of change will accelerate, so you can't assume four or six years of education in your late teens and early twenties will be enough for a life of employment. Other fields such as medicine and law have lifelong learning built into their cultures. Engineering hasn't. And the average engineering school makes very little provisions for education beyond formal degrees. A few city schools do, most residential universities do not."

Luckily, the Chicago area is richly endowed with the "city schools" Wulf was talking about which makes provisions for education beyond formal degrees, often in conjunction with larger companies who employ numerous engineers. Many of the residential universities in Illinois have also made provisions for the continuing education needs of engineers.

Choices in the Chicago area run the gamut from traditional residential universities that have established flexible programs for working professionals to short-course training institutions that have expanded their curriculum to bachelor's and master's programs. These courses are available on a part-time or online basis, to suit the needs of those with full-time jobs who want to add to or update their knowledge.

Illinois Institute of Technology

One school making a major effort to offer flexible educational alternatives for working engineers is the Illinois Institute of Tech-

nology. Rooted in a tradition that dates back more than 100 years, the IIT Armour College of Engineering (www.iit.edu/~armour/) continues to provide state-of-the-art education programs for today's busy engineering professional.

Armour College comprises the education and research programs of five engineering departments: Biomedical; Civil and Architectural; Chemical and Environmental; Electrical and Computer; and Mechanical, Materials and Aerospace. Together, these departments offer 28 Professional Master's and Master of Science degree programs, with another 25 graduate certificate programs designed to provide expertise outside the formal degree programs.

Classes are offered live at IIT's two Chicago campuses, the Rice Campus in Wheaton, and Moffett Campus in southwest-suburban Summit-Argo. IIT Online — the university's distance education program — meets the heavy scheduling demands of working professional, delivering coursework via the Internet and IITV broadcasting to more than 50 public and corporate receiving sites. Accelerated courses, available during semester breaks and summer sessions, offer concentrated material over a short time period, enabling students to complete their graduate programs sooner.

In addition to IIT's formal graduate engineering coursework, the IIT Center for Professional Development (www.cpd.iit.edu/) offers a number of "short courses" for engineering professionals who wish to update their credentials without committing to a formal degree program. CPD offers courses at all IIT campuses and via IIT Online. According to Scott Pfeiffer, director of outreach at the IIT Wheaton Campus, "Working engineers do not have a lot of time to be students. They want relevant information in a short time and at a convenient time. Our programs meet those needs. We offer a variety of programs in a variety of modes, including many online, that are highly convenient for the full-time engineer."

DeVry Chicago

What began as the DeVry Institutes has become DeVry University, offering career-oriented programs in technology, business, and management at campuses, centers, and online. The DeVry Institute System was acquired by Keller Graduate School of Management in 1987 and offerings have continually evolved ever since.

Bachelor's programs are available in technology fields such as Computer Engineering Technology, Computer Information Systems,

Network and Communications Management, and Technical Management, often on an accelerated basis or a weekend degree plan.

Master's programs through Keller are also available on a flexible basis for working professionals, with options such as 10-week sessions, weekend classes, and online classes. A popular offering is the Master of Information Systems Management Program, geared for IS management career positions that are projected to be among the fastest growing through 2006. Concentrations are available in Distributed Systems Management, Electronic Commerce and Large Systems.

University of Illinois at Chicago

The College of Engineering at University of Illinois at Chicago offers an online Master of Engineering (MEng) degree program based exclusively on course work, without a research project or thesis required. The main emphasis of the program is on Internet courses, but live teaching is also offered both on campus and at remote sites through TV-audio systems. Videocassette courses are also available.

Topics include Wireless Communications and Signal Processing, Electromagnetics, Chemical Engineering, Computer Engineering and Science, and Energy Resources. Like most of the newer courses, MEng is designed to provide graduate training for adults who already have a university education at the bachelor level and want to expand and update their knowledge.

Northwestern

There are now eight professional master's programs offered at Northwestern's McCormick School of Engineering and Applied Science. The original programs, Master of Engineering Management, Master of Information Technology, Master of Project Management, and Master of Management in Manufacturing have been joined by the Master of Product Development, the Masters in Biotechnology, and the Master of Science in Computer Information Systems, plus the Communication Systems Strategy and Management Program in the School of Communication.

All combine technical training with business management courses and have flexible schedules. "The ultimate flexibility, I think, is part of the appeal," said Jeanne Husain, Associate Director of the Master of Engineering Management Program.

"The other is that these are very stimulating courses, and because we have a work experience requirement of at least three years, and the average age of our students is over 30, so they come

in with considerable expertise," she said.

"Many of them are already in management positions, so they have very tangible reasons for why they want to be back in school. They apply what they learn in the classroom immediately, and it cycles back and forth, so that's part of the richness of the course. The faculty learn from the students, the students learn from each other and from the faculty."

Elmhurst College

Elmhurst College offers fast-track programs designed especially for working professionals in several disciplines including Business Administration, Information Technology, and Managerial Communication. It is possible to earn all the requirements for a major in as little as a year. Elmhurst also has an Academic Partnership Program that brings degree programs directly into workplaces throughout metropolitan Chicago.

University of Illinois at Urbana-Champaign

As a top-tier university UIUC wants to offer their degrees in a format that doesn't ask working professionals to sacrifice quality or accreditation for convenience, according to Laura Miller, Director of Online Engineering Programs. The technology they have chosen to accomplish this is streaming video.

"We take the lecture that's being given on campus, record it and stream it over the Internet," Miller said. "So students who get their degree online can be sure it is the same quality of course that they would have received on campus. We're bringing the material to them rather than them having to come to us."

She said the typical EE course is either two 80-min. lectures or three 50-min. lectures per week, and students can access the recordings 24/7 via the Internet.

For engineers who want more management training, one of UIUC's newest programs offers a certificate in Strategic Technology Management. It explores the ways that technological innovations are created and adopted throughout the modern world. "That has been a very popular program for those who may not want to go back for an entire MBA but want a little bit of the management curriculum that's geared toward engineers," said Miller.

Southern Illinois University Carbondale

SIUConnected is the name used by the online Division of Continuing Education at SIUC to provide alternative credit and non-credit educational opportunities to the people of Illinois and the region. Web-based courses and two-way interactive video courses are offered, including a course in Information Systems Technologies.

Northern Illinois University

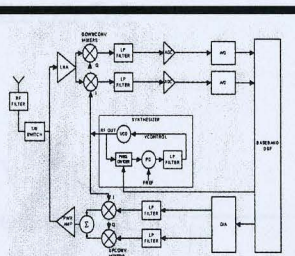
NIU in DeKalb has a University Outreach department that administers course offerings regionally for the College of Engineering & Engineering Technology. Engineering Outreach at NIU seeks to expand the college's initiatives with off-campus credit courses and degrees as well as offering professional-development conferences and seminars for engineering, safety, and technical professionals. Site-based education and training can also be arranged for client companies. NIU's distance learning facilities can link with a company's interactive learning system or any of the 400 distance learning sites in the state of Illinois and beyond to connect people in several locations to instructors. n

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ALL DAY EVENT

IEEE EMC Society-Chicago Chapter 6th Annual EMC Mini-Symposium Tuesday, May 18, 2004

Dr. Tom VanDoren, Professor, University of Missouri-Rolla

About the Topic:

The Mini Symposium provides a great opportunity to receive world-class EMC training to improve your understanding of EMC design principles, regulations, test methods, and test equipment.

About the Speaker:

The featured presenter this year will be Dr. Tom VanDoren, a Professor of Electrical and Computer Engineering at the University of Missouri-Rolla. For the past 23 years he has specialized in electromagnetic compatibility education and research. Over 17,000 engineers and technicians have attended his short course on "Grounding and Shielding of Electronic Systems." He is a Fellow of the IEEE.

Dr. VanDoren's presentation, "Experimental Demonstration of EMC Principles," will be used to enhance the understanding of some very important electromagnetic compatibility principles. The demonstrations will show:

- What path current takes.
- That wires do not have inductance.
- How to contain electric and magnetic fields by self shielding.
- That grounding connections do not carry current.
- Where to connect the shield on a twisted pair cable.
- How magnetic-field shielding works.
- How to make metal enclosures electromagnetically tight.
- Several practical examples involving circuit boards and cables will be presented that show how these principles are applied to improve electromagnetic compatibility.

In addition to Dr. VanDoren's presentation, there will be an afternoon session covering a variety of EMC topics. Plus there will be an exhibits area with over twenty vendors available to discuss their EMC related products, test equipment, and services.

Location:

Holiday Inn - Itasca, IL
860 West Irving Park Rd.
630-773-2340

Time:

8:00 AM-5:30 PM

Cost:

Admission for IEEE members is \$35 (\$45 non-members, \$15 students) and includes rolls, coffee, lunch, and entry into several raffles.

Reservations:

Call Ray Klouda or Steve Laya at Elite Electronic Engineering (630) 495-9770. Information and a copy of the registration form is available on www.ewh.ieee.org/soc/emcs/chicago/sectfiles/events.htm.

EVENING MEETING

IEEE Fox Valley Subsection and IIT-Rice Campus Hybrid Propulsion System Technology of Current Production and Upcoming Vehicles Wednesday, May 19, 2004

Theodore Bohn, Argonne National Laboratory

About the Topic:

The quest for higher fuel economy and better emissions has led to vehicles that combine internal combustion engines and electric drives. The 2004 Toyota Prius was named Motor Trend Magazine's Car of the Year indicating that hybrid vehicles are no longer coming soon, they have arrived.

Most people are familiar with currently available hybrids; Toyota Prius, Honda Insight and Civic. This presentation will review the technology and benefits of these powertrain topologies. The next wave of hybrid vehicles will capitalize on lessons learned from previous generations as well as meet the needs of today's American car buyer. The two passenger Honda Insight EPA rated at 68mpg will be overshadowed by several full size cars and SUV's in the 40mpg range. The 235hp Honda Accord and 270hp Lexus RX400h (0-60mph in 8 seconds) reminds us that 'horsepower sells'- giving V8 performance with 4 cylinder fuel economy and emissions. This talk will focus on the propulsion technology and review the hybrid offerings of American and Japanese car makers.

About the Speaker:

Mr. Bohn is a Power Electronics Engineer at Argonne National Lab, in the Advanced Powertrain Research Facility, where he works on hybrid vehicle controller experiments. Mr. Bohn divides his time between Argonne Lab and WEMEC lab at UW-Madison where he teaches part time in addition to conducting research on soft magnetic composite segmented stator electric machines. He has 22 years of experience in electric machine and vehicle research. His current areas of interest include student design competitions, fuel cell power conditioning, solar car racing, and renewable energy projects in general.

Before joining Argonne National Lab Mr. Bohn had worked for General Motors ATC, PowerDesigners Inc, and Fermi National Accelerator Laboratory. He earned B.S. and M.S. degrees in Electrical Engineering from the University of Wisconsin, Madison and has been a member of the IEEE. for many years.

Location:

IIT's Rice Campus, 201 East Loop Road, Wheaton, Illinois. Take Rt.56/Butterfield Rd. to first stoplight

east of intersection of Butterfield & Naperville roads. Turn north onto East Loop Road (Phillip's 66 Gas Station on the corner); the campus will be on your right about a block north of Butterfield Road. More detailed directions and a map are available at www.rice.iit.edu/directions.html.

Time:

6:00 PM Networking time
7:00 PM Presentation

Reservations:

Reservations are not required.

Professional Engineers: this meeting qualifies for Professional Development Hours. The Fox Valley subsection web page is at www.ieee.org/foxvalley/.

Sponsorship:

IEEE's Fox Valley Subsection and Illinois Institute of Technology's Center for Professional Development (Rice Campus).



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LUNCH MEETING

IEEE-IAS/IES Luncheon Presentation City of Chicago - Plan Review Check Lists Wednesday, May 19, 2004

Eric Slosson, Burnham Nationwide, Inc.

About the Topic:

Eric Slosson graduated with a double major in Psychology and Sociology from the University of Illinois at Chicago in 1999. Mr. Slosson initially worked as a Project Manager and has permitted a range of structures from power plants to high rise buildings. He is currently the acting Operations Manager and maintains a close relationship with the City of Chicago - Department of Buildings and other associated City Departments. His applicable knowledge gained from 5 years of permit management will help you to create more concise drawings that contain the information that examiners are looking for.

Topics of Discussion:

- Submittal Process & Timeframes
- Permit Fees
- Code Matrix
- Energy Code Compliance
- Electrical Shortforms

- Floor Layout
- Life Safety Systems
- Load Calculations & Fixture Schedules
- One Line Riser Diagram
- ComEd Participation

Location:

Costa's (Greektown)
340 S Halsted St.
Chicago, IL

Time:

11:30 AM Social
12:00 PM Lunch
12:00-1:00 PM Presentation

Directions:

Costa's is located in Greektown on the corner of Van Buren and Halsted. See www.iaschicago.com for detailed directions and a map.

Cost:

Your cost includes the presentation and lunch with a choice of the main entrée - 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.

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.

Note: 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 Consultants' Network A Joint Affinity Group of the IEEE Chicago and Rock River Valley Sections Work Life Balance - Get Automated! Monday, May 24, 2004

Karen Preston

About the Topic:

This informative and entertaining presentation is targeted for the working segment of our society today. Especially for the engineer! It reflects on what has been speculated in the past and where we are today. Eight areas are duly noted on what we as Americans can do to ease our stress filled life style: Speed It Up, Single Life/Family Life, Career, Health, Getting Organized, Schooling, Services, and finally Well Balanced Life Styles.

Engineering in the Chicago area has taken a huge hit this past year for many regular employees who are now unemployed. Finding a job has become a full time position. For those still working, the new world of employment consists of looking for work as you are employed, interviewing, keeping skill sets tuned through classes and seminars, and continuing with the state license requirements by acquiring PDH's! It is sometimes difficult to fit a family life in with our career.

To balance our lives, we may need to risk starting an independent company, as leadership remains a very valuable asset. This presentation may lead people into balancing one additional item - generating more jobs.

About the Speaker:

Karen Preston is an accomplished Senior Test Engineer with broadly based hardware and software experience in the test development industry. Special expertise involves object oriented C/C++ technologies for a more holistic approach in the architecture for precision test programs. Karen is presently pursuing a Master of Science Degree in Computer and Electrical Engineering at Illinois Institute of Technology.

Location:

Palatine Public Library
700 North Court, Palatine, IL

Dinner Location:

Bakers Square
270 E. Northwest Highway (at the corner of North Court St.), just south of the library.

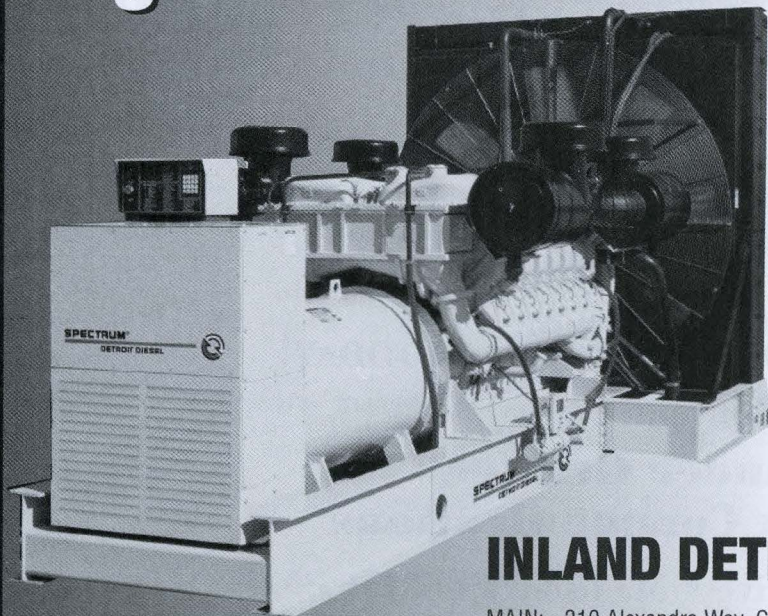
Time:

6:15 PM Optional Dinner at Bakers Square
7:30 PM Meeting - Presentation and Open Discussion.
9:00 PM Adjourn.

Information:

Email consultnet@bmillerengineering.com or JAuerConsulting@worldnet.att.net, or visit www.drblank.com/coaction.htm. Attendance at this meeting will earn 1.0 PDH. Meetings are usually held on the last Monday of odd-numbered months. Members and non-members are invited to both the meeting and the optional dinner. (Reservations are NOT required).

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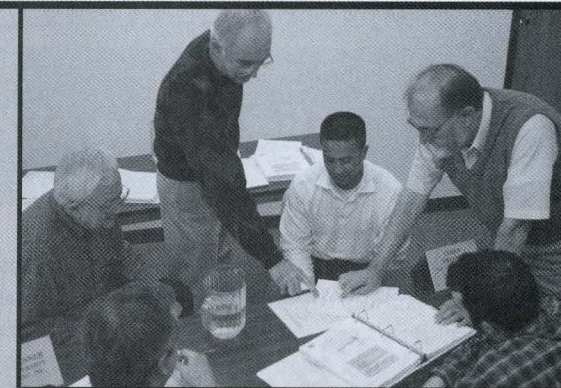
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EVENING MEETING

IEEE Product Safety Engineering Society Chicago Chapter Product Safety From a Legal Perspective Wednesday, June 2, 2004

Kenneth Ross, Of Counsel to Bowman and Brooke, LLP

About the Topic:

Most of us in the product safety field understand the technical requirements and much of the rationale underlying the evaluation and testing of electrical and other products according to published safety standards. But how does our work as engineers impact the world at large? What are the legal ramifications of our work as product safety engineers?

More companies are taking a real interest in the implementation of product liability prevention techniques that can bring about many process related improvements in a manufacturing organization. Risk minimization should be a fundamental consideration during every stage of design, manufacturing and after-sale service.

About the Speaker:

Kenneth Ross is an internationally known expert in all aspects of liability law. Currently Of Counsel to the national law firm of Bowman

and Brooke LLP, he has in the past served as Assistant General Counsel for Emerson Electric Co, where he was in charge of product liability and environmental matters, and as counsel at Westinghouse Electric Corporation.

Ken has practiced for 30 years in the areas of product safety, preventive law, risk management, general corporate counseling, corporate and regulatory compliance and litigation. He advises U.S. and foreign manufacturers, product sellers, insurance brokers and insurance companies on ways to minimize the risk of liability, especially product liability and contractual liability. As a frequent writer and lecturer on risk management, legal and regulatory compliance, product liability, product safety, contracts and ethics and compliance, he has presented on these topics to lawyers, engineers, and business people in the U.S., Europe and Asia-Pacific.

Location:

D.L.S. Electronic Systems/D.L.S. Conformity Assessment, Inc.
1250 Peterson Drive
Wheeling, IL

Time:

5:30 PM Meeting
6:15 PM Presentation

Directions:

D.L.S. is located in Wheeling, just west of Palwaukee Airport. Take I294 to the Willow exit and take Willow west to Wolf Road. Wolf Road north past the Clark station on your right, then turn left onto Marquardt (left hand turn lane) and follow it to the end, following Peterson Drive to the left. D.L.S. is just past the railroad tracks. You can get a map from the website at www.dlsemc.com.

EVENING MEETING

ED/CAS/SSC (Electron Devices/Circuit and Systems/Solid State Circuits) The Future of Human Space Exploration Thursday, June 17, 2004

Jim Plaxco, National Space Society

About the Topic:

This presentation provides a detailed examination of President Bush's new space exploration initiative which calls for a return to the Moon and a human mission to Mars. Addressed are the changes to NASA, the planned phases and components, and associated issues. The reasons why such goals are vital to our future are examined as well as the political and technological difficulties associated with their attainment.

About the Speaker:

Jim Plaxco is the Vice President of Chapter Affairs for the National Space Society and a Director of the Chicago Society for Space Studies. He currently serves as a NASA JPL Solar System Ambassador providing educational presentations to schools, museums, and various organizations and space interest groups. Mr. Plaxco's previous non-profit experiences include having served on the Board of Advisors for the

Harper College Center for Meteorite and Planetary Studies; being the Program Director for the Henize Science Learning Center; and serving as Membership Director, Editor, Webmaster and Vice President of the Planetary Studies Foundation. He is also the creator and webmaster of Astrodigital (www.astrodigital.org), an educational web site. Mr. Plaxco received a Bachelor's in Economics and a Master's in Computer Science from Northern Illinois University. Professionally, he is employed as a Database Administrative Specialist.

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.

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 1:00 PM Tuesday, June 15th. For information, call Norm Phoenix at (312) 631-4917.

Future Planning Session:

The Executive Committee of your ED/CAS/SSC Chicago Chapter will be holding a planning meeting in mid June near O'Hare Airport. If you would like to attend or have ideas for next season's topics, please call Chairman Norm Phoenix, (773) 631-4917, so we can let you know the exact location and date.

Preregistration is required.

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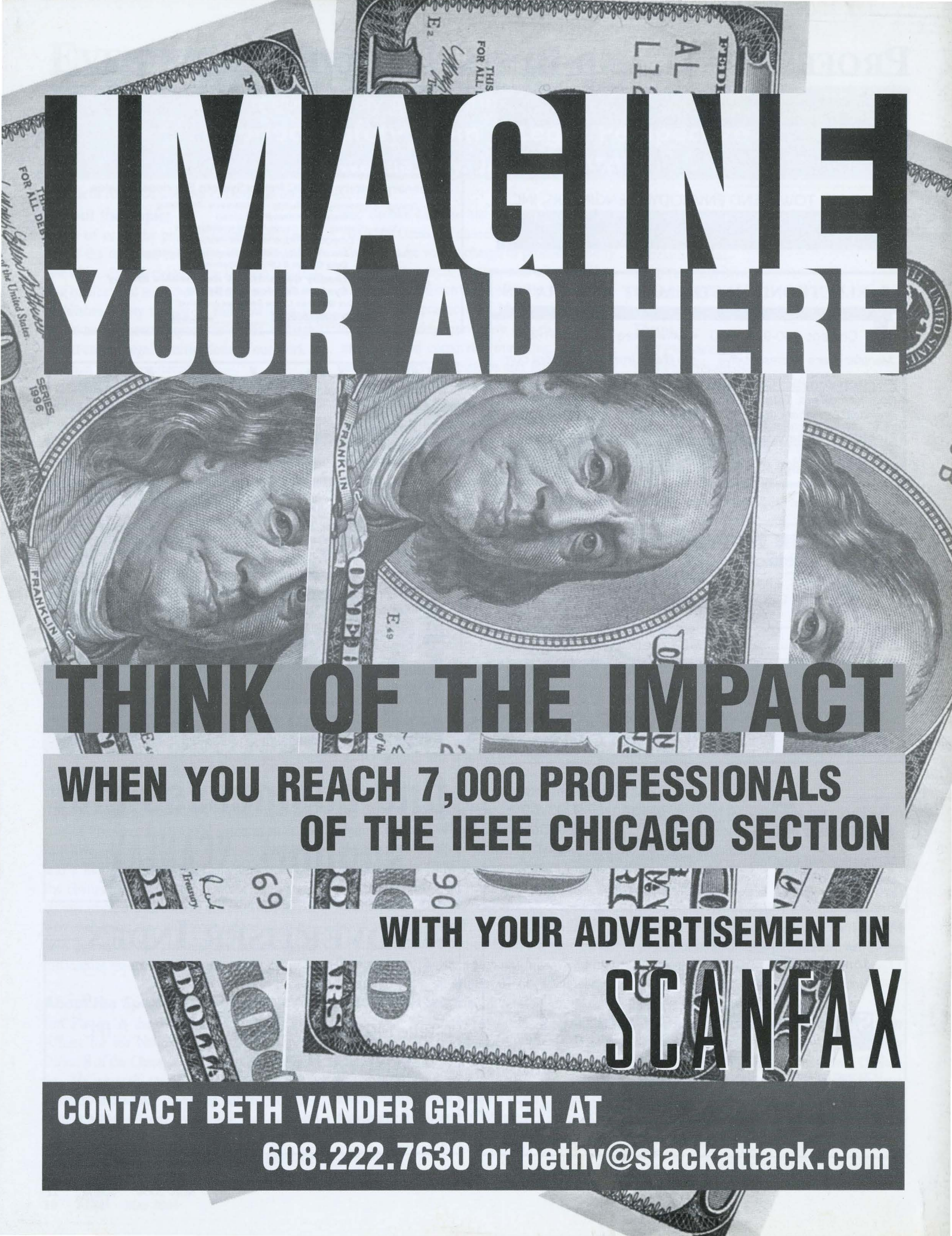
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