

September 2003
(VOL 51, NO. 1)



The  **IEEE**

MONITOR

PUBLISHED BY THE NEW YORK SECTION OF THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

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PERIODICAL
TIME SENSITIVE MATERIAL

Chairman's Column

Welcome Back



I hope you all had an enjoyable summer. The beginning of the summer was a little wet, but we did have some nice sunny weather for those days on the golf course or at the beach. The summer is only half over as I write this column, but it will have ended when you read this. I

hope the second half of the summer is just as enjoyable as the first.

My term as Chair is also half over, but our work is far from complete. Among NY Section Executive Committee accomplishments to date was the gala Annual Awards Dinner Dance held at the elegant and historic Union League Club for the first time, the re-activation of the Tappan Zee Subsection (formerly the Westchester Subsection), co-sponsoring the May 3rd Energy Conference at the Westchester County Center, the initiative to separate the NY Section Engineering Management Society (EMS) Chapter from the North Jersey Section and the initiative to establish an official Consultants' Network Affinity Group in the New York Section. Highlights for the upcoming Fall session include co-sponsoring a second energy conference in September, more activities from the Tappan Zee Subsection, our Broadcast Technology Society Chapter, PACE (Professional Activities) Committee, and Vehicular Technology Chapter. Please look for announcements in this newsletter and mark the meeting dates in your calendar or Palm Pilot. I'm looking forward to the second half of my term and I hope you'll enjoy and participate in the meetings, forums, seminars, and etc. that are being planned for you.

IEEE Elections

Another significant event this Fall will be the annual IEEE Elections. One of the positions you'll be voting for is Region 1 Director-Elect. Our own Dr. Charles P. Rubenstein is running for the Region 1 Director-Elect position. He is a Member-At-Large on the New York Section Executive Committee, but more importantly he is the first elected Chair of Region 1's Area B Sections. In this capacity his job is to support the six Area B Sections (New York, Long Island, Connecticut, North Jersey, Jersey Coast and Princeton) and act as liaison between these

Sections and Region 1. Dr. Rubenstein has been a tremendous help to the New York Section providing his expertise, assistance and guidance for all of our activities and initiatives.

Dr. Rubenstein has twenty years of service as a Region 1 IEEE volunteer. He began his Region service as Student Activities Chair for then Region 1 Director Alex Gruenwald. He created a student activities leadership infrastructure and worked with IEEE leaders to establish Student Professional Activities Conferences. Dr. Rubenstein was recognized for his efforts in student activities by RAB (IEEE Regional Activities Board) receiving its 1984 Innovation Award.

In 1996 Dr. Rubenstein created the Region 1 website and became the first Electronic Communications Coordinator under Region 1 Director Joel Synder. He has served as a member of the IEEE Publications and IEEE – USA Boards and as a Committee or Liaison Representative to the Technical (TAB), Regional (RAB), and Education (EAB) Activities Boards. He has also worked on the IEEE – USA PACE (Professional Activities) Committee as a Society and Division PACE Coordinator and has managed to be an SPAC (Student Professional Activities) facilitator and speaker. Dr. Rubenstein has also served as an Engineering Management Society (EMS) Board member for fifteen years and was re-elected to serve a fourth term as VP Member Relations for EMS. In this capacity he will be conducting his third EMS Chapter Chair Workshop for Region 1 Chapters this November 2003 in Albany.

Dr. Rubenstein has made significant contributions to the engineering profession, Region 1, and other IEEE major organizational entities. He has the professional and technical qualifications to serve as our Region 1 Director-Elect and will lead our Region to make regional IEEE activities relevant to our members. I whole-heartedly endorse his candidacy for IEEE Region 1 Director-Elect and encourage New York Section members to vote in the November elections.

The  **IEEE**
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Calendar of Upcoming Events

September 17 or October 8 (Wednesday) Tappan Zee Subsection Meeting at IBM. Date and time to be announced by Bernard P Gollomp, Subsection Chair – 845 359-8434

September 19, 2003 (Friday) 3:00 PM
The PES / IAS Fall Outing

September 23, 2003 (Thursday) 5:30 PM – 7:30 PM Refreshments at 5:15 PM
IEEE New York Section Computer Society presents “The Two (Software) Cultures.”
Con Edison Executive Dining Room, 4 Irving Place, 19th Floor, New York, NY
For information or Reservation call : Wilson Milian @ 646 252-2244 or
Dr. George Hacken @ 718 694-1782 460 4911

September 25, 2003 (Thursday) 5:30 PM – 7:30 PM Refreshments at 5:15 PM
PES / IAS Technical Discussion Group and the Edison Engineering Society – Square D
presents – “Power Monitoring Design Considerations”
Con Edison Executive Dining Room, 4 Irving Place, 19th Floor, New York, NY
For information or Reservation call : Sukumar Alampur @ 212 563 7400 or
Jim Nucito @ 732 380 1100 Ext. 4149

October 8, 2003 (Wednesday) 5:30 PM - 7:30 PM
PES / IAS Program Committee and the Edison Engineering Society presents – “Fuel Cells”
Con Edison Executive Dining Room, 4 Irving Place, 19th Floor, New York, NY
For information or Reservation call : Sukumar Alampur @ 212 563 7400 or
Jim Nucito @ 732 380 1100 Ext. 4149

October 23, 2003 (Thursday) 5:30 PM - 7:30 PM
PES / IAS Technical Discussion Group and the Edison Engineering Society – Square D
presents – “ASCO Switching”
Con Edison Executive Dining Room, 4 Irving Place, 19th Floor, New York, NY
For information or Reservation call : Sukumar Alampur @ 212 563 7400 or
Jim Nucito @ 732 380 1100 Ext. 4149

**The following New York Section members
have been elevated to Senior Member**

**Jaime H. Moreno
Lixin Tao**

PES Awards Ceremony

For nearly three decades the PES New York and Long Island Section have been awarding those committee members who have contributed significantly to the organization, not by years of service alone, but by productive work.



Joseph Connors

Their work stands out as unmatched, amazingly diverse yet still providing technical and interpretive challenges to today's engineer. For Chapters across the country and around the world, the NY Section remains the gold standard. The Section activities contain limitless possibilities for excellence.



Alan Osborne, P. E. & Uwe Enke

They reflect bold adventures, an intricate 21st-century achievement, a contemporary edge, grandeur, and just a little hard work.

The PES New York Chapter remains the leader and primary repository of engineering talent, especially in the power engineering arena. Among those

assembled in this company of twelve members were, eight – 10 year, two - 30 year , and two – 40 year awardees representing over 220 years of dedicated service to the Chapter.



Robert Pellegrino

Under the inspired leadership of Alan Osborne, this supremely talented group earned acclaim for its vibrant, definitive performance.



Mitch Lipinsky

This was highlighted by the keynote address on International Standards by Joseph D. Connors, President and CEO of S. W. Electric Systems.



Steven C. Kraemer

Mr. Connors emphasized the need for the IEEE standards committee to take the lead in setting a tone that provides transversal, uniform, and globally integrated specifications to meet the needs of international marketers.



Roland M. Dixon Jr.

It is no longer enough to sit on the sidelines without embracing modular technologies through open space while others engage in a sophisticated dialogue encouraged by economic goals. The score necessary for success must be creative, freestanding, flavored, and dynamic.



John Pascu, P. E.

At hand was Dr. Frank E. Schink, P. E., life member, Chairman of the Winter Power Meeting, and winner of the PES Outstanding Chapter Award. The PES Outstanding Engineer Award went to our past chairman, Robert M. Pellegrino.



Steve Stroumbakis

Although these two could not be more different in look and approach, they share an uncommonly strong connection in support of the Chapter.



Thomas Li, P. E.

Uwe M. Enke, a highly dedicated and trained engineer who led the Chapter for the past year, was presented with the Past Chairman's Award for meritorious service. The Awards event proved that diligence and hard work are always fruitful, and of course a good time was had by all.

We hope to see you at the next Awards Celebration. Take care out there and make sure it's engineered correctly.

The  **IEEE**
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Vol. 51 No. 1

September, 2003

OFFICERS

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 VICE CHAIRMAN, ACTIVITIES - Benjamin Schall
 TREASURER - Robert Noberini
 SECRETARY – Paul Sartori
 AWARDS CHAIRMAN - Peter Mauzey
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 PUBLICATIONS CHAIRMAN - Frank E. Schink

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THE nominations committee of the IEEE New York Section proposes the following slate for election as officers and elected chairs of the executive committee for the period: January 1, to December 31, 2004.

Officers

Chairman -	Benjamin Schall
Vice Chair Chapter Operations -	Robert P. Noberini
Vice Chair section activities -	Paul J. Sartori
Treasurer -	Stanley Karoly
Secretary -	Neil Weisenfeld

Elected Committee Chairs

By Laws -	William N. Coyne	Chapter Organization -	Phil Paterno
Managing Editor -	Michael A. Miller	Historian -	Melvin Olken
L. R. Planning -	William L. Perlman	Publications -	Dr. Frank E. Schink
Special Events -	Ralph Tapino	Web Master -	Harold Ruchelman

Tappan Zee Subsection

Chairman -	Bernard Gollomp
Vice Chair -	Dr. Lauren Balmelli
Treasurer -	Warner Johnston
Secretary -	Dr. Shu-Ping Chang

PES / IAS New York & Long Island Chapter

Chairman -	Michael A. Miller
Vice Chair -	Neil Weisenfeld
Treasurer -	Bill Montgomery
Secretary -	Ralph Mazzatto

Selections from the SCOOP

Published for IEEE Section Chairs

Vicki Waldman, Editor; Tracy Hawkins, Manager Section/Chapter Support

FIND CONFERENCES SCHEDULED IN YOUR SECTION

There may be opportunities in a number of Sections for enhancing technical opportunities. IEEE Societies have hundreds of conferences around the world each year. These conferences may be held in the geographic area of your Section or in a neighboring Section. The IEEE Conference Search Web Page can help your Section identify conferences that will be held in the territory of your Section. The web address is <http://www.ieee.org/conferencesearch/>. There is a sheet for each conference with information on contacts, locations, and dates. The Conference Search database can be searched for city, state, Region, by sponsor, and by year.

Professional Activities Information Page

This page dedicated to member professional activities information

So what is PACE all about?

I have been doing this column for many years and talking about Professional Activities issues. But I don't know if all of you are familiar with the PACE Network and what activities it covers within the IEEE. The PACE Network is a function of IEEE-USA. The Professional Activities Committees for Engineers (PACE) is a grassroots network of IEEE volunteers and committees organized at the section and chapter level in the US with support from regions and IEEE-USA. The network promotes the professional interests of IEEE's US members and provides a mechanism for communication of member's views on professional needs.

PACE activities include the following:

Career Enhancement, including continuing education, professional development, professional training and career maintenance;

Employment Assistance including resources for career transition and seeking employment;

Government Relations including position papers on issues affecting IEEE members, Congressional activity by staff members in Wash, DC and supporting Congressional Visit Days by IEEE members;

Member Professional Activities Conferences; Pre-Education Projects; and Student Professional Awareness Conferences.

Peter Greco PACE Chairman
Tel.: 212-614-3357 Fax: 212-529 5237
email: p.j.greco@ieee.org

Calendar of Upcoming Events. The following are proposed Section activities. Dates and locations will be announced in future issues when they become available.
September 10: General Meeting
October 8: General Meeting
October TBD: Financial Seminar
November 12 General meeting

IEEE-USA EMPLOYMENT ASSISTANCE

IEEE-USA's Job Service Site:

<http://jobs.ieeeusa.org/jobs/services/>
The IEEE-USA's Job Service Web Site brings together number of job-search resources in a single location. The site includes the following:

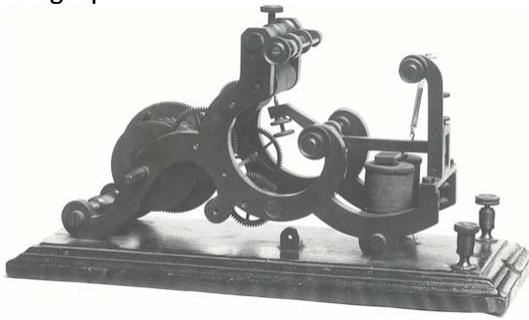
IEEE Job Site: This highly rated job listing service was replaced by a new internet-based job site, and is sponsored by IEEE-USA and IEEE Spectrum. The site allows the active and passive job seeker more control over the recruiting process. For more details go to www.ieee.org/jobs.

IEEE-USA Resume Referral Service:
Put your resume for maximum exposure! A link to the registration and other services.

Entry-Level Employment Service Site: If you are an engineering graduate, recent graduate, of IEEE Student Member looking for the first job this is one of the best places to begin your career. Special entry-level employment services include job listings, links to company sites and job-search tips and techniques.

The Telegraph

After the discoveries of Coulomb, Ampere, Ohm and Volta, electric current was ready for use outside of the laboratory, and many saw the possibilities for communication with the speed of an electric telegraph. The field was open to inventors, driven largely by hopes of personal gain. Their ideas were based on a minimum of electrical theory, but they often received aid from scientists. Therein lies the truth behind Joseph Henry's theory that progress results from discovery followed by invention. He believed that once the science was ready, any knowledgeable investigator of electricity would see the possibility of an electromagnetic telegraph.



The Morse Telegraph

In England William Cooke turned his thoughts to an electric telegraph after witnessing some electrical experiments in Heidelberg. In London he sought the assistance of Michael Faraday, who introduced him to Charles Wheatstone of Kings College who was already working on a telegraph. In 1838, they transmitted signals over 1.6 km. Their system indicated letters by using five wires to position magnetic needles. In 1839, they extended their system to 11 km. After discussion with Henry, Wheatstone adapted electromagnets to a form of telegraph that directly indicated the letters of the alphabet.

In 1832, a young American artist, Samuel F.B. Morse, directed his attention to the need for a telegraph. Morse proceeded slowly, and by 1837 he had transmitted a signal 500 m over two wires. His telegraph used an electromagnet in a receiver that provided an inked record on paper tape. An enthusiastic backer, none other than Joseph Henry himself, encouraged Morse.

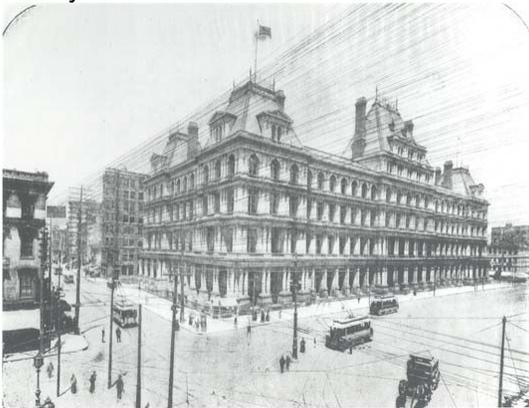


Samuel F.B. Morse (1791-1872)

Morse sought and received a government grant of \$30,000 in 1843 for a 60 km line from Baltimore to Washington along the B&O Railroad line. On May 24, 1844, this line was opened with the famous message "What hath God wrought?" and Morse's system of telegraphy using the dot and dash code and the receiving sounder devised by his assistant, Albert Vail, was established. Since the circuit and the apparatus were simple and inexpensive, telegraph lines were rapidly built, and by 1861 the continent was spanned.

Morse soon laid a cable under New York harbor, and a cable was laid from Dover to Calais in 1851. A cable spanning the Atlantic Ocean from Newfoundland to Ireland was attempted in 1858. The design and insulation of this 3200 km line were faulty, and it failed after a few weeks, but not before carrying a greeting from Queen Victoria to President Buchanan.

William Thomson (later to become Lord Kelvin) had developed the theory of cable transmission, including the weakening and the delay of the signal to be expected. But it took an additional seven years of study of cable structure, cable-laying procedures, insulating materials, and receiving instruments before a fully operational transoceanic cable was successfully installed in 1866. During that operation, they also succeeded in dredging up the broken end of a cable lost in 1865, and completing it to its terminal in Newfoundland. Thomson was largely responsible for the research effort underlying this work. The initial Atlantic cable project, in which the laying of the first cable preceded an understanding of its basic principles, is an example of an expensive failure to act on Henry's theory.



Cincinnati, circa 1890....telephone poles carried as many as 25 cross arms, with up to 10 wires on each arm.

There followed a flurry of cable laying. Approximately 150,000 km of cable were in use by 1870, linking all continents and all major islands. This worldwide extension of the telegraph system made possible government at a distance, the Victorian age of the British Empire being supported on a network of telegraph wires and submarine cables.

The telegraph business expanded as industry grew after the Civil War. But, in short time, an economic problem came to light; simultaneous messages required individual lines, so more wires were needed over each route to handle the increased number of messages. By 1876, there were 400,000 km of lines on 175,000 km of routes in the US. This multiplicity of lines not only tied up capital, but it also darkened the skies over city streets. Telegraph poles carried as many as 25 cross arms, with up to ten wires on each arm. The chaos that followed heavy snow or freezing rain is hard to imagine. Great rewards were envisioned for an inventor who could make one line carry several messages simultaneously. In fact, Western Union paid handsomely for the duplex patent awarded Joseph Stearns, which doubled the capacity of a telegraph line. As we know, today a single multiplex circuit can carry thousands of messages at the same time.

The search for a multiplex telegraph system was instrumental in the invention of the telephone, but more about that at another time.....

The Next Generation of Dry Type Transformers

The reactivated Technical Discussion Group chaired by James R. Nucito, P. E.



James R. Nucito, P. E.

and Sukuma Alamar, P. E., of the IEEE Power Engineering Society featured Andrew Topinka, CPMR, President and Founder and Philip J. A. Ling, P. E., Vice-President, of the Technical Group Services, Inc., a Power Quality Service Corporation as its featured speakers at the opening meeting. This proved to be



Andrew Topinka

a wise choice and excellent speaker selection for this very interesting and informative evening. Andy has lectured on Power Quality and Harmonics at the National Electrical Contractors Association, New Jersey State Council of Electrical Contractors, NJ Electrical Inspections, AT&T, Johnson Controls, Electrical Exposition & Conference, LDI

1998-99-00, and many other organizations. Joining Andy on the podium was Phil Ling, technical design engineer of Power Systems International.



Phil Lang, P. E.

Phil develops the designs and energy-efficient, harmonic filtering transformers and other electrical system technologies that comply with IEEE recommended practices. The speakers covered designing for linear loads, current & waveforms, power quality, case studies on failures, magnetic connection, energy savings, and concluded with a discussion of current technologies.



The AC system, invented in 1882, did not take hold until after the transformer was patented in 1888, and there has been little improvement from the original design. The crucial factor in bringing about design changes was the movement from linear to non-linear loads around 1980 with the proliferation of PCs and other electronic devices. Today, most

loads are non-linear. Non-linear loads tax electrical systems and decrease reliability; transformers overheat, circuits overload, and distribution systems become less efficient.



The harmonics caused by the non-linear loads are the root cause of these effects. Basically only incandescent lighting and induction motors are linear. Computers, ballasts, fluorescent lighting, and variable frequency drives are non-linear. The standard sine curve of current and voltage cycling at $1/60^{\text{th}}$ of a second that we all recognize is that of a linear load drawing power evenly.



Computers work differently and now they exist in sufficient numbers to alter power loads, the current is drawn in short “gulps” or pulses. Voltage and current waveforms are irregular and don’t match. The waveforms are said to be distorted and produce harmonics, which in turn causes equipment to fail and waste energy. An undistorted

waveform is a pure sine wave with no harmonics, typically the power waveform has a frequency of 60 Hertz. Distorted waveforms include the 3rd, 5th, and 7th multiples of 60 Hertz.

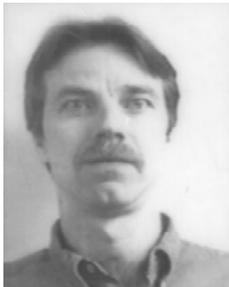


The typical transformer loss is 10% of input power which is usually caused by harmonics. K-rated transformers were overbuilt and designed to deliver rated power to non-linear load and cut the loss to 4.5%. They do nothing to reduce the harmonics. The New Generation of transformers are typically 2 to 3 times more energy efficient and cut the loss to 1.4%. In addition they run cooler, weigh less, have less volume, and a smaller footprint. In the delta-wye transformer, all of the harmonic currents flow in the windings. By changing the winding configuration, the phase shift cancels the 5th and 7th harmonic currents giving secondary flux cancellation, excellent power transfer, low losses, and low voltage distortion. PowerSmiths Transformers offered to provide the names of customers in the process of changing to PowerSmiths Transformers for the testing and confirmation of these statistics. In all 44 people attended this presentation and came away with a new look at transformers. Take care and see you at the next Technical Discussion Group seminar.

The Long Island Chapter of IEEE Electromagnetic Compatibility Society is presenting a lecture titled:

Overview - Lightning Protection of Aircraft and Avionics

Tuesday, October 14, 2003



WHO SHOULD ATTEND? Individuals concerned with lightning protection design and verification of aircraft and aircraft avionic and other electrical systems, individuals responsible for certification or qualification of aircraft and/or aircraft systems, individuals interested in learning more about the lightning environment, the effects of lightning on aircraft, and protection against those effects.

SPEAKER: Mr. Rob Majkner – Sr. Engineer, Electromagnetic Technologies, Sikorsky Aircraft, Stratford CT

Abstract:

All of us have witnessed, and many have been awed by, the pure power of Mother Nature's fury during thunderstorms. While we may marvel at lightning from a distance, too close of a call can be frightening and downright dangerous. The aircraft industry also must respect lightning strikes. With electrical currents of upwards of 200,000 amperes generated during severe cloud-to-ground strikes, aircraft, which intercept or trigger the lightning channel, must be able to fly through it with minimal structural damage and minimal loss/upset of on-board avionics, flight controls, and electrical systems. On previous generation aircraft, highly conductive metal fuselages inherently provided protection for the aircraft and its occupants. Electromechanical and pneumatic flight instruments proved relatively robust against the indirect (induced) effects of the lightning current flowing through the airframe. With the advent of composite structural usage and integrated digital avionics, special means of protection must be incorporated in the aircraft design to allow the aircraft to survive in-flight lightning strikes.

Discussion will center on the lightning environment, the effects of lightning on structure and coupling mechanisms for equipment, commercial and military design/test requirements, protection design scenarios and techniques, and certification/qualification plans, test methods, and procedures.

Seminar Coordinators:

Bruce Willard, IEEE Long Island Section Electromagnetic Compatibility Chapter Chair, and the RFI Corporation.

Speaker Bio:

Rob is currently the atmospheric electrical hazards specialist for Sikorsky Aircraft Corporation, responsible for lightning and static interaction with all vehicle models including the recently certified commercial S-92, the all-composite RAH-66 Comanche, as well as the H-60, S-76, S-61, and H-53 series aircraft. Rob has worked at Sikorsky since 1987 in the Avionics Test and Electromagnetic Technologies sections and is also the company FAA DER for atmospheric electrical hazards. Prior to his work at Sikorsky, Rob spent a total of eight years at Fairchild Republic, where he was responsible for atmospheric electrical hazards design and verification on the SF-340 and T-46 programs. He also worked as a systems test engineer at Hazeltine for one year. Rob received a Bachelor of Technology degree from New York Institute of Technology.

Location, Time, and Registration:

This lecture will be held at RFI Corp located on Pine Aire Drive, in Bay Shore, NY. The facility is located just east of the Sagtikos Parkway on Pine Aire Drive. The presentation will begin at 7:00 PM, but coffee and a snack will be served beginning at 6:30 PM. Seating is limited. If you wish to attend, an RSVP is required by no later than 3 October. Please do this via the IEEE Long Island EMC Chapter Web Site <http://www.ieee.li/emc.htm> for those without internet access, a message may be left at (631)265-2282.



The IEEE New York Section Computer
Society Chapter Presents
The Two (Software) Cultures



YOU ARE INVITED TO A MEETING
of the IEEE New York Computer Society Chapter
Tuesday, September 23, 2003

PRESENTING: The Two (Software) Cultures

The speaker at our September meeting will be George Hacken, PhD, Chairman, New York Section, IEEE Computer Society. The presentation's theme is based on a loose analogy with scientist-novelist C. P. Snow's explication of *The Two Cultures*, in a 1960's book of that name. Dr. Snow posits a dichotomy between the humanist culture and that of the scientist.

Several software practitioners and academics (including the Dr. Hacken) claim an analogous dichotomy between mathematically based software development, whose epitome is Formal Methods, and 'unmathematical' software development. The dichotomy pertains to software specification and development methodology, not to the domain of application.

Dr. Hacken works in software development for the New York City Transit Authority. He is a Senior Director for train control software. Dr. Hacken graduated with an AB from Columbia College where he majored in Physics and Mathematics. His PhD is also from Columbia, and is in Physics.

Tuesday, September 23, 2003

Refreshments: 5:30 pm

Program: Starting at 6:00 pm

Location: Con Edison Executive Dining Room, 19th Floor
4 Irving Place, NY 10003

Nearest Subway: Union Square

Reservation to : Wilson Milian @ 646 252-2244

Or

Dr. George Hacken @ 718 694-1782

Please Post

Please Post

All Invited !



THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.



EZ-Pass and How it Works

The speaker at our June meeting was Alex Richardson, P.E. who described the elements of the EZ-Pass system and how the components work together to facilitate fast and easy toll payment for drivers on our highways.

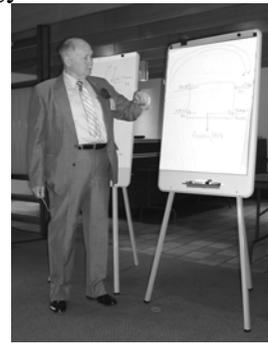


The physical layout, tag and tag reader functions, error protection, signal formats, and the fiber optic backbone of the system were discussed as well as the reliability and privacy concerns. Alex presented a look towards the future of this technology and gave us a fascinating glimpse of the other applications that are already in the works.



Alex Richardson was employed as a Project Engineer for Telecom for the New Jersey Turnpike, the lead agency in the five member Consortium charged with the implementation of the EZ-Pass program. Alex graduated from Cornell University with BEE and MME Degrees

in 1951 and from Stevens Institute in 1961 with an MS. He is a Professional Engineer in NY and NJ and is a Life Senior Member of the IEEE. He worked for ITT Avionics for 31 years in military electronics, ECM communication and navigation technology.



EZ-Pass was installed by a five agency consortium consisting of the NJ Turnpike, Garden State Parkway, Atlantic City Expressway, Port authority and Delaware DOT. It can be used anywhere within the states NJ, NY, MA, MD, DE and PA. Each reader monitors three lanes simultaneously, transmitting and receiving information from your EZ-Pass tag. Information is passed on based on signal strength and verified by a picture of your license taken instantaneously. If they match with records on the data base, you are passed through and the toll collected. Your minimum balance varies from agency to agency with the minimum being \$ 10.00, as required for security. Communication is via fiber optics from toll plaza to the Customer Service Center. 80 reads per car are recorded as you travel by the sensor. 20 agencies are currently on-board with a possibility of 120 signing on. Speed limit through the toll gate is based on the exit conditions, choice of lanes, roads, ramps, intersections, merging, congestion rather than the speed of the scanning equipment. The installed fiber has a bandwidth capable

of supporting innumerable readers. The output of the optical transmitters is -8 dBm, and the receiver sensitivity is -38 dBm. Typical overall losses for a link are about 1.4dB per mile. An adequate margin is built in for aging and other losses. 6" and 8" conduit was used throughout and plowed into the ground. The fiber cable was then pushed into the conduit through a sheave with 100 pounds pressure. Compressed air can blow the cable up to 15000 feet. A directional bore was used in areas where the plow could not directly bury the cables such as on access bridges, tunnels, overpasses, and ramps. Fiber splice loss was calculated at ¼ dB each. The 600 toll plaza installations showed consistency of a high quality.



The greatest link loss recorded was 28.6 dB was over a 20 mile span. All fibers were tested in place after splicing and splices were spaced about 2,000 feet apart. Data is clocked and read at each regenerating station. A T1 line is capable of transmitting 1.55 megabits per second through 24 channels. 84 T1 channels are available for signals of 134 megabits payload. There is significant available capacity on the backbone. The system is only loaded to about 20% of capacity to date. Tag files are downloaded daily. The network is controlled from Albany NY using leased lines to the using agencies. 856 fibers are available for lease, which could generate

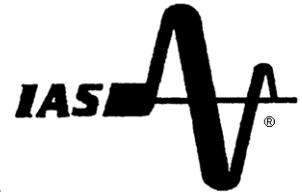
about \$ 2 million in annual revenue. The traffic data collected is sensitive and by law can not be used for anything unrelated to the collection of tolls criminal prosecution. Many in the audience seemed to doubt that this could not be changed depending on circumstances. At inception the legislature was concerned with the privacy of the data collected. Questions were raised about matching of license plates with tags and what if I am driving a rental car, can I use my tag? These issues are being addressed. The transmitter sends signals at 902 MHz and the tag responds at 915 MHz. Backup and redundancy are provided by UPS units which have an 8 hour capacity, and one week of data is stored at all lanes.



Mr. Richardson is President of Learning Systems, Inc. which trains Parliamentarians. The agency is located at 117 West Mt. Pleasant avenue, suite 145 in Livingston, NJ 07039-2928 (Phone/Fax 973 535-3440) email: Manager@Learnsystems.net and web: www.learnsystems.net. He is a consulting engineer and has an address at 23 Blackstone Drive, Livingston, NJ Phone/Fax 973-535-3440, email: Arichardson2@CompuServe.Com



**POWER ENGINEERING SOCIETY AND
INDUSTRIAL APPLICATIONS SOCIETY
NEW YORK & LONG ISLAND CHAPTER**



**YOU ARE INVITED TO A JOINT MEETING
of the IEEE and Edison Engineering Society
September 25, 2003**

PRESENTING: Power Monitoring Design Considerations

This month's meeting will feature Glenn Kwederis, Business Development Specialist for Square D Company. Glenn works in the Power Management Organization at Square D, specializing in PowerLogic monitoring systems. With territorial responsibility for New York and New Jersey, he interfaces with consultants, contractors, and end-users from a wide variety of industries to help them with their power monitoring concerns.

Presentation will cover:

- Introduction to Topic – The importance of Power Monitoring to end users
- System Components – Devices, Communications, Software, Services
- Device Selection – Selecting device function vs. price vs. criticality
- Communications – The key to delivering reliable information
- Software – Providing the knowledge to make better decisions
- Services – How product mix and system implementation come together to help serve a wide range of objectives
- Conclusion

September 25, 2003

Refreshments: 5:15 pm

Program: Starting at 5:45 pm

**Location: Con Edison Executive Dining Room, 19th Floor
4 Irving Place, NY 10003**

Nearest Subway: Union Square



**Reservation to :
Sukumar Alampur @ 212-563-7400
Jim Nucito @ 732-380-1100 x4149**



All Invited !

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