

# THE ♦ BRIDGE

*The Magazine of Eta Kappa Nu*

SPRING 2009

## Adventures in Engineering

### FEATURES

*HKN to Merge with IEEE*

*Two Generations of Hams in Space*

*Intelligent in-House Smart Metering*

*Larry Dwon: Engineer, Educator  
and Lifelong Volunteer in the  
Engineering Profession*

*HKN Delegates Report on MIX09*



[www.hkn.org](http://www.hkn.org)





## LETTER FROM THE HKN PRESIDENT

**Dr. Bruce A. Eisenstein | Beta Alpha Chapter Member**

Dear HKN Members and Friends,

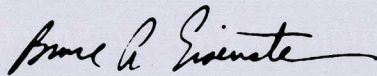
HKN has had an active and successful academic year 2008-2009. The HKN-IEEE merger has been approved by all parties involved and will bring new opportunities for HKN in the future. Included in this issue of *THE BRIDGE* is a feature article outlining the merger and answering many of your questions.

HKN members continue to network through Experience, Inc., the career database and alumni networking site. In March, Microsoft, through the Experience network, offered two HKN students a trip to Las Vegas for the MIX09 conference. They share their experiences in a feature article this spring. We look forward to continuing the relationship with both Microsoft and Experience as well as your participation in the other networking groups established on LinkedIn, Facebook, and others.

I look forward to seeing many students again at the 2009 student leadership conference in Dearborn, Michigan October 23-24, 2009. The 2008 conference was a great success and HKN is pleased to continue to bring students together to interact with each other and industry professionals.

Thank you for your continued support of HKN. We appreciate your contributions and encourage all members to contact HKN Headquarters for opportunities to serve the association with your time and talents. I can also be reached through the HQ office at [info@bkn.org](mailto:info@bkn.org).

Best regards,



HKN President

## LETTER FROM THE EDITOR

**Barry J. Sullivan | Beta Omicron Chapter Member**

The theme of this issue—Adventures in Engineering—must sound redundant to anyone engaged in the adventure that a career in engineering represents. Just the same, it is worth noting from time to time the diverse paths engineers take in pursuit of their profession.

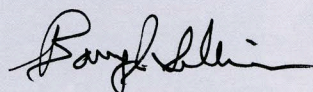
The first article is a remembrance of Larry Dwon, who wove a strong thread of service through his engineering adventures, especially in support of students and fellow HKN members. His formal positions as HKN vice president, president, executive council member and chair of the Distinguished Service Award Committee only hint at his dedication to this organization.

The article by Owen and Richard Garriott describes the adventures by the first American father-son pair to experience space travel, albeit a generation apart. Following this, two HKN student members share their adventure in Las Vegas at the MIX09 event. Finally, an article on smart metering lays out the latest development in the evolution of the electric power grid.

A report on the merger by HKN President Bruce Eisenstein on the merger with the IEEE rounds out the current issue.

We encourage HKN members to share stories of their own adventures in engineering, either in a full-length article or through a member profile. If you are interested in contributing an article or a profile, please contact me at [editor@bkn.org](mailto:editor@bkn.org).

Warm regards,



THE BRIDGE Editor



**Eta Kappa Nu**  
**The Electrical and Computer**  
**Engineering Honor Society**

Founded October 28, 1904

**Executive Director**  
Roger L. Plummer

**Board of Governors**  
**President**  
Bruce A. Eisenstein

**Vice President**  
Stephen M. Goodnick

**Past President**  
J. David Irwin

**Directors**  
Michael DeMaioribus  
Evelyn H. Hirt  
David Hodges  
John Orr  
David Soldan  
Casimir Skrzypczak

### HKN Awards Committees

**Outstanding ECE**  
**Student Award**  
Thomas Rothwell, Chair

**Outstanding Young**  
**Electrical or Computer**  
**Engineer Award**  
Cecelia Jankowski, Chair

**Outstanding Teaching Award**  
David Soldan and  
John Orr, Co-Chairs

**Outstanding Chapter Award**  
Alan Lefkow, Chair

**Eminent Member**  
Richard Gowen, Chair

**Distinguished Service Award**  
Mohammad Shahidehpour, Chair

**Karapetoff Award**  
James D'Arcy, Chair

Contact HKN at [info@bkn.org](mailto:info@bkn.org)



Spring 2009

**Editor**  
Barry J. Sullivan

**News Editor**  
Melissa A. Swartz

**Art Director**  
**Graphic Design**  
Joseph T. Man

**Advertising Sales**  
1-800-406-2590

### HKN INTERNATIONAL HEADQUARTERS

Address editorial, subscription, and address change correspondence to:  
300 West Adams Street, Suite 1210  
Chicago, Illinois 60606-5114, USA  
1-800-406-2590 phone | 1-800-864-2051 fax  
[www.hkn.org](http://www.hkn.org)

### POSTMASTER

Send address changes to:  
Eta Kappa Nu Association  
300 West Adams Street, Suite 1210  
Chicago, Illinois 60606-5114, USA

Eta Kappa Nu (HKN) was founded by Maurice L. Carr at the University of Illinois on October 28, 1904, to encourage excellence in education for the benefit of the public. HKN fosters excellence by recognizing those students and professionals who have conferred honor upon engineering education through distinguished scholarship, activities, leadership, and exemplary character as students in electrical or computer engineering or by their professional attainments.

*THE BRIDGE* is the official publication of the Eta Kappa Nu Association.

Subscription Price: \$15.00 (3 years)  
Life Subscription: \$60.00

Ideas and opinions expressed in *THE BRIDGE* are those of the individuals and do not necessarily represent the views of the Eta Kappa Nu Association, the Board of Governors, or the magazine staff.

# THE BRIDGE

The Magazine of Eta Kappa Nu

## features

**6 Larry Dwon: Engineer, Educator and Lifelong Volunteer in the Engineering Profession**  
*by Roger Dzwonczyk*

A long-time HKN member, officer, volunteer and leader is remembered by his son.

**12 HKN to Merge with IEEE**  
*by Bruce Eisenstein*

The HKN president reports on the upcoming merger with the IEEE.

**14 Two Generations of Hams in Space**  
*by Owen and Richard Garriott*

An HKN eminent member and his son describe their adventures in space.

**16 HKN Delegates Report on MIX09**  
*by Janis Lee and Patrick O'Keefe*

Two student members travel to Las Vegas for the annual Microsoft Web Design and Development Conference.

**20 Intelligent In-House Smart Metering**  
*by Vineet Kumar*

Advanced metering infrastructure will provide the platform for future "smart grid" services.

## departments

**5 2009 Leadership Conference**

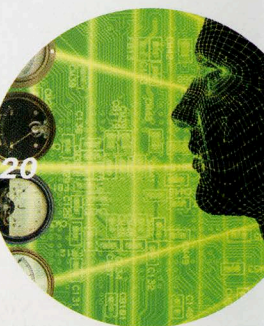
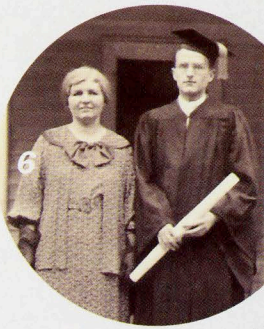
**10 Member Profiles**

**22 Notes from Headquarters**

## award winners

**8 Vladimir Karapetoff Technical Achievement Award and 2008 Outstanding ECE Student Award**

**9 Outstanding Chapter Award Winners**





# Imagination Ideas Innovation

Creating engineers for a borderless planet

## Professional Master's Program

Enhance your B.S. degree in ECE and enhance your value to industry.

- Earn a Master's in Electrical and Computer Engineering in 12-18 months.
- Complete an optional project as part of the degree
- Fellowships available for qualified applicants

## Ph.D. Program

Create original research in a program ranked in the Top 5 in the U.S.

- Enter the program with either a B.S. or an M.S.
- Study with highly respected faculty with entrepreneurial experience
- Be part of a collaborative team at a university known for its interdisciplinary research.
- Dean's Fellowships available for qualified applicants

**Carnegie Mellon**  
 **Electrical & Computer  
ENGINEERING**

Applications accepted at:  
[www.ece.cmu.edu](http://www.ece.cmu.edu)

Women and Minorities are  
encouraged to apply



HKN is pleased to announce that Theta Tau chapter at the University of Michigan, Dearborn will host the 2009 student leadership conference October 23-24, 2009. The conference is entitled "Driving Towards Tomorrow's Technology." Conference chair and chapter President David Anderson explained the theme, "This title has an underlying automotive theme, but leaves the door open to address other technologies as well. We plan to also address energy, the economy, and the role engineers must take to ensure the future development of our country."



Dearborn, Michigan is home to the automotive industry which will bring some unique perspectives to the discussion and concepts learned.

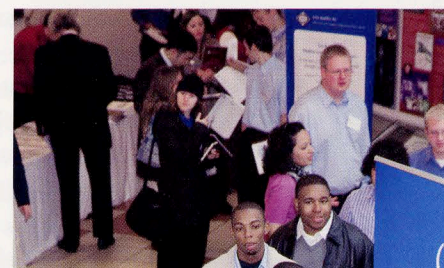
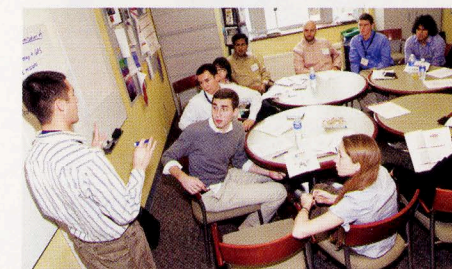
All HKN chapters are invited to send some student representatives to interact with each other and network with industry professionals.

Learn about what other chapters are doing regarding activities, fundraisers, recruiting techniques, and much more.

Corporate sponsorship opportunities are available. If you are interested in supporting the conference and interacting with the best of the best in ECE, contact Melissa Swartz at the HQ office at 1-800-406-2590 or [Melissa@hkn.org](mailto:Melissa@hkn.org).

The 2008 conference hosted by Sigma chapter at Carnegie Mellon University was a great success. One student participant recently shared with HQ that through the Welcome Reception icebreaker activity, he met a corporate sponsor representative and eventually landed a job in New York.

HKN is pleased to offer these opportunities to its members. Details of the 2009 conference will be posted online at [www.hkn.org](http://www.hkn.org) as they become available. Registration will begin in early September. Information from the 2008 conference is also available online. Theta Tau chapter and the HKN Board of Governors look forward to seeing you in October!



2009





# Larry Dwon: Engineer, Educator and Lifelong Volunteer in the Engineering Profession

by Roger Dzwonczyk

and Research Development and was assigned to Harvard Radio Research Labs and then Bell Telephone Labs, to work on classified war-related research and development projects, including radar systems. While at AEP he taught evening engineering and management courses at Pratt Institute and the Polytechnic Institute of Brooklyn, NY. At AEP he practiced power systems electrical engineering for 20 years and was subsequently promoted to Manager Engineering Manpower. Following his retirement from AEP my Dad taught at North Carolina State University and worked in energy conservation with the University's Industry Extension Services.

## Legacy to the Power Industry

It was in his position as engineering manpower manager for AEP where he leaves his most important legacy as an innovator and iconic maverick at a time when power engineering education on university campuses was at an ebb (educator dominated, as he used to say). His accomplishments in educating engineering students for the electric power industry remain as the cornerstone for the top power electrical engineering university programs in the country. His influence on engineering students is unsurpassed.

He developed procedures for utilizing technically educated people in power companies human resources functions, nurtured relationships between colleges and the power industry so that students would be properly trained for power engineering careers as well as developed detailed engineering recruitment procedures and in-company training and education programs. He conducted both salary and manpower utilization surveys to promote efficient and equitable utilization of engineers in the power industry. It was through these tireless efforts that my Dad fostered the power engineering profession and the tie between engineering schools and the power industry.

## Service to Eta Kappa Nu

As impressive as his paid work accomplishments were, he was most proud of his extensive volunteer work in engineering and engineering education. My Dad was elected to HKN in his junior year at Cornell (Kappa Chapter) and then proceeded to work for the organization as a volunteer for the next 75 years. He served as vice president and member of the executive council of the society in 1957 and as president in 1958. He held numerous leadership positions in the Outstanding Young Electrical Engineer Award Organization Committee.

In 1976 my Dad wrote the book entitled *History of Eta Kappa Nu* and he continued updating the material through 1999. From 1967 to 1989 he served both as assistant editor and then contributing editor of *THE BRIDGE*. He was elected an Eminent Member of HKN in 1984, one of only 122 engineers so honored in the past century.

## Service to the IEEE

My Dad has a long list of credentials with the Institute of Electrical and Electronic Engineers (IEEE) beginning in his sophomore year of college (when the organization was known as the American Institute of Electrical Engineers). He was chair and member of numerous committees and subcommittees related to engineering education. He conceived and organized the IEEE Power Engineering Education Committee in 1964. For many years my Father was active on the Student Professional Activities Committee (SPAC)



"Purdue University S-PAC (Student Professional Activities Committee) on January 25, 1989. Speakers are L to R, Jim Watson, Hans Cherney, Cecelia Jankowski, Larry, and Dr. Charles Alexander."

and conducted scores of SPAC conferences on university campuses around the country. For his extensive volunteer leadership work in IEEE, particularly in engineering education, my Dad was elected a Fellow of the Institute.

Additionally, my Dad volunteered his talents for the Engineering Council for Professional Development, the American Society for Engineering Education and the Edison Electric Institute. In his career he published 100 technical articles and gave 200 talks at engineering technical conferences and on universities. Of the many awards and honors my Dad received in his professional and volunteer career, he was particularly proud of one given to him by the Edison Electric Institute for his

This simple statement summed up the goals and objectives he set in 1935 for his career in engineering.

Following his retirement from AEP in 1978 he continued his work in engineering education at North Carolina State University as well as his involvement in HKN and IEEE.

My Dad leaves one son, two daughters-in-law, five grandchildren, one granddaughter, three nephews and one niece in his passing.

## Conclusion

What did I learn from my Father (and Mother)? A few good things: I learned the importance of professionalism, ethics, integrity, honesty and trustworthiness. Probably most of all I learned the importance of volunteerism both in the career and in the (global) community. Thanks, Dad.

On 4 February 2009 Larry Dwon, my Father, died naturally in his home in West Kill, NY. He was 95 years old. The date truly marked the end of my Dad's engineering career, a career that spanned 74 years.

My Dad was born Vladimir Dzwonczyk on 2 May 1913 in New York City to Polish and Ukrainian immigrants, Lukac and Mary Dzwonczyk. He received a Bachelor's degree in electrical engineering from Cornell University in 1935, which he attended on full scholarship. He also earned a Master's degree in business administration from New York University in 1954. He began his engineering career with Diehl Manufacturing Co, Elizabethport, NJ, designing electrical motors, and then Holophane Lighting, Newark, OH, designing prismatic lighting equipment. In 1938 my Father began a 40-year tenure with American Electric Power (AEP) Service Corp in New York City. During WWII, he was granted leave from AEP to join the Office of Science



For more on this topic, visit [www.hkn.org/bridge](http://www.hkn.org/bridge)

*"...untiring and unequalled leadership in promoting liaison between the electric utility industry and the educational community for the mutual benefit of both and for the ultimate good bestowed upon the public as the result of this cooperation."*

## ABOUT THE AUTHOR



### Roger Dzwonczyk

Clinical Associate Professor, Department of Anesthesiology,  
The Ohio State University  
Gamma Beta chapter – Northeastern University

Roger Dzwonczyk received his engineering education at Northeastern University and Ohio State. He has authored 40 journal publications and received nine patents in cardiopulmonary resuscitation, sleep apnea and myocardial electrical impedance technology. He has served extensively for the medical relief organization Project HOPE, helping solve electrical and clinical engineering problems in many hospitals in developing countries around the world.



# Vladimir Karapetoff Outstanding Technical Achievement Award

This award is given annually to an electrical engineering practitioner who has distinguished himself or herself through an invention, development, or discovery in the field of electrotechnology resulting in significant benefits to humankind.

### AWARD WINNER

Presented January 2009



### Leo L. Beranek

Dr. Beranek's lifelong interest in music is reflected in his distinguished career in acoustical engineering. He has made major contributions to all aspects of acoustics, including physical acoustics, psychoacoustics, architectural acoustics, electroacoustics, systems research, and noise control, and he is famous for his work on the design of several international opera houses and concert halls. Through the firm he co-founded, Bolt Beranek and Newman, his influence extended beyond acoustics into the field of computer engineering. At BBN, he assembled the software group that invented the Arpanet, the foundation of today's Internet. He remains active in concert hall design, recently serving as acoustical consultant for four concert halls, one opera house, and two drama theaters in Tokyo, and has been consultant on many other concert halls, including the Tanglewood Music Shed in Western Massachusetts, the Aula Magna in Caracas, and the Meyerhoff Hall in Baltimore.

### Beranek at a Glance

- > Acoustical Design Consultant
- > President, American Academy of Arts and Sciences
- > Partner, President, Chief Scientist and Director, Bolt Beranek and Newman
- > Associate Professor of Communications Engineering and Technical Director of its Acoustics Laboratory, Massachusetts Institute of Technology
- > Faculty Instructor and Director, Systems Research Laboratory, Harvard University
- > Gold Medal recipient, Acoustical Society of America and Audio Engineering Society; American Institute of Architects Honorary Member; National Medal of Science; Per Bruel Gold Medal, American Society of Mechanical Engineers; HKN Eminent Member
- > Member, Beta Theta chapter
- > B.A., Mathematics and Physics, from Cornell College (Iowa); M.Sc. and D.Sc., Physics and Communications Engineering, from Harvard University

## Outstanding Electrical and Computer Engineering Student Award 2008

The OECE Award winner receives a certificate, plaque, cash grant, and trip to the ECEDHA Annual Meeting for his/her award presentation. Nomination forms are available online ([www.hkn.org](http://www.hkn.org)) and are due June 30 for a graduating senior. All chapters are encouraged to nominate their top senior for this prestigious award.

### 2008 AWARD RECIPIENT

**Charles A. Gammal III, Worcester Polytechnic Institute**



Charles A. Gammal III, "Chuck," a 2008 graduate of Worcester Polytechnic Institute (WPI), accepted the 2008 Outstanding Electrical and Computer Engineering Student Award (OECE Award) at the annual ECEDHA-HKN Awards Banquet March 23, 2009 at the 25th annual meeting of ECEDHA, the Electrical and Computer Engineering Department Heads Association, in New Orleans, Louisiana.

The Los Angeles Alumni chapter manages the award and determined Chuck to be the 2008 winner in light of his excellent accomplishments in a variety of social, volunteer, and academic activities. Chuck defines what it means to be a member of HKN. He double-majored in Mechanical Engineering (ME) and Electrical and Computer Engineering (ECE) and maintained a 4.0 grade point average. He revived Phi Kappa Theta fraternity at WPI and led a variety of alumni and social outreach committees including organizing a Relay for Life marathon raising \$55,000 for the American Cancer Society. Chuck is now studying for his MBA at the MIT Sloan School of Management.



### Honorable Mention:

**Nithin Michael, Drexel University**

### Finalist:

**Frank Kuo, University of California, Los Angeles**

**Adam J. Flynn, Missouri University of Science & Technology**

**Heather M. Owen, University of Kansas**

## Outstanding Chapter Awards

2007-2008



Eighteen Outstanding Chapter Award (OCA) winners for 2007-2008 were recognized March 23, 2009 in New Orleans, Louisiana at the 25th annual meeting of ECEDHA, the Electrical and Computer Engineering Department Heads Association. In a private HKN reception, with the Board of Governors and special guests in attendance, the department heads from each winning chapter accepted the OCA plaque on behalf of their students.

The OCA is presented annually to chapters with outstanding induction rates and service activities at the department, university, and community levels. The award committee reviews the Annual Chapter Reports and determines the winners based upon the person-hours of service, thus giving large and small chapters equal opportunity to win.

Annual Chapter Reports are due October 15 for the previous academic year. The Short Form, available at [www.hkn.org](http://www.hkn.org), is the minimum requirement, but chapters are encouraged to include pictures and more detailed descriptions of their activities in a longer report.

### 2007-2008 Outstanding Chapter Award Winners

<b>Alpha Chapter</b>	<i>University of Illinois – Urbana-Champaign</i>
<b>Beta Chapter</b>	<i>Purdue University</i>
<b>Beta Epsilon</b>	<i>University of Michigan</i>
<b>Beta Mu</b>	<i>Georgia Institute of Technology</i>
<b>Delta Omega</b>	<i>University of Hawaii – Manoa</i>
<b>Epsilon Beta</b>	<i>Arizona State University</i>
<b>Gamma Chi</b>	<i>New Mexico State University</i>
<b>Gamma Rho</b>	<i>South Dakota State University</i>
<b>Gamma Theta</b>	<i>Missouri University of Science &amp; Technology</i>
<b>Iota Gamma</b>	<i>University of California – Los Angeles</i>
<b>Kappa Chapter</b>	<i>Cornell University</i>
<b>Mu Chapter</b>	<i>University of California – Berkeley</i>
<b>Omicron Chapter</b>	<i>University of Minnesota</i>
<b>Phi Chapter</b>	<i>Union College</i>
<b>Rho Chapter</b>	<i>University of Colorado – Boulder</i>
<b>Tau Chapter</b>	<i>University of Cincinnati</i>
<b>Theta Mu</b>	<i>Stony Brook University</i>
<b>Theta Nu</b>	<i>North Carolina A&amp;T State University</i>



# Member Profiles



**Brian Boulter**  
President/Chief Consulting Engineer  
Applied Industrial Control Solutions LLC  
Epsilon Alpha chapter

### Career Highlights

- 1) Forming and growing ApICS LLC – an industry recognized leader in Industrial Control System Consulting Engineering
- 2) Solving customer's production quality and productivity problems, thereby saving jobs for hard-working American families. I do this by finding workable solutions to difficult problems in various control applications for manufacturing industries. Many of these solutions are either in the patent process, or protected by NDAs.
- 3) The most satisfying career achievement: Designing a model-based integrated control solution for the USS Lorain, Tube-works Rotary Rolling Mill process that decreased pipe scrap by 90%, significantly impacting a senior management decision to keep the plant open.

### Education and Career

Without the cultivation of a solid work ethic, and a desire to make a difference in the lives of those with whom, and for whom, you work, you cannot find true fulfillment in your engineering career. Discipline and participation in professional societies during your education is fundamentally important in the acquisition of these attributes.

The most useful aspect of my formal education can be summed up as the "development of the rational mind," the ability to think clearly and rationally, and to identify problem solving strategies. This ability is acquired through the problem solving required in the many and varied engineering disciplines that the student is exposed to in college, each and every one of which has significance in the acquisition of this skill.

### Advice to Engineering Graduates

Specific to engineering: It is paramount to ensure that you understand everything a professor says during a lecture, whether it be Mathematics, Science or Engineering. Often this requires study and collaboration with other students. This collaborative process is part of developing engineering maturity. It is also paramount to acquire a creative interest, to enjoy problem solving, and explore multiple paths to a given problem solution.

It is also important to develop social and leadership skills. Leadership skills should not be confused with "bossiness." Leadership skills are best displayed through example in team environments, where all parties are treated with respect, and each member is provided with a set of responsibilities that ensures both the success of the team, and personal fulfillment.



**Matthew Pollack, P.E.**  
Associate Vice President, AECOM USA, Inc.  
Program Director  
Metropolitan Atlanta Transit Consultants  
Sigma chapter

### Career Highlights

Although I have worked on many enjoyable projects, serving as a systems designer for the Tren Urbano rail system in San Juan, Puerto Rico, was a pivotal project in my career. In addition to the challenges involved in designing a rail system from its inception, the project was memorable because I was under the direction of a senior engineer, Thomas Edwards, who was kind enough to take an interest in my technical and professional development. Having Tom as an informal mentor gave me the tools, encouragement, and knowledge I needed to seek greater challenges, and I am forever grateful for his time and effort. One of the most fascinating assignments in my career is my current job: leading the engineering services consultant team for MARTA, the Metropolitan Atlanta Rapid Transit Authority. MARTA is confronting the same fiscal challenges that are now part of every transportation agency's landscape. And meeting the technical requirements of the system, while meticulously observing stringent budgetary limits, is a challenge that brings out the best in my engineering experts. My team takes great pride in designing cost-effective replacement systems and facilitating repairs to keep an aging but venerable electrical infrastructure working and in service.

### Education and Career

As a program director, I am somewhat removed from the day-to-day design efforts. However, as the leader of a team, I am responsible for effectively communicating technical recommendations, results, and needs to the client. Senior client managers have to make very difficult decisions regarding scopes, schedules, and budgets. A big part of my job is communication—describing very complex systems and designs with sufficient clarity to help managers make informed decisions with confidence. My educational background in electrical and computer engineering equipped me to perform that important role, successfully conveying the complexities of the electrical designs and the opportunities to optimize those systems. The most important lessons I gained from college were how to function under stressful conditions, and how to operate as a member of a technical team. Designing in a collaborative way is not an intuitive skill; it requires both technical know-how and the ability to get along with others. The undergraduate course that best exemplified this concept was titled "Analysis, Synthesis and Evaluation." As part of the coursework, the professor would describe a fictional product of great complexity; our team assignment was to investigate the underlying principles for this product and try to determine whether this product could even function. The course taught the technical skills needed to achieve results under pressure, and the interpersonal skills required to work as a team.

### Advice to Engineering Graduates

While the pursuit of technical achievement is an exemplary goal for engineers, take the time to observe the equally subtle intricacies inherent in all levels of management you encounter along the way. And then give some consideration to management as a worthy career path. There is a shortage of effective managers in the engineering industry. Becoming an outstanding manager is not a matter of being the smartest person in the room; a manager's success derives from providing leadership to organizations, and motivating staff to contribute to the organization's mutual goals while pursuing their own career objectives.



**John Curry**  
Physicist  
National Institute of Standards and Technology  
(NIST)  
Gamma Upsilon chapter

### Career Highlights

The highlight of my career has been the opportunity to work at NIST. It's a pleasure to come to work every day when you have the benefit of an incredible support staff, and it's professionally thrilling to be able to work with some of the smartest engineers and scientists in the world.

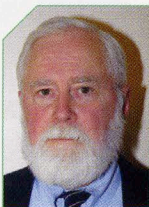
### Education and Career

Getting a Ph.D. taught me a lot about perseverance and taking on a challenge alone. It's great to be part of a team, but sometimes you are handed responsibility for something important that no one else is able to help you with. When my thesis advisor described to me an interesting research program, I was thrilled at the thought of working with the rest of the group on such a fascinating endeavor. It took quite a while for me to realize that he had been describing what he expected me to accomplish by myself. He and his other students had their own, equally fascinating, projects.

### Advice to Engineering Graduates

My advice is to remember that you are not finished with your education when you receive your degree. Success requires continually learning how to be better today than you were yesterday. One of the most important abilities to continue developing is your ability to communicate. You will go only as far as your communication skills carry you. Of course, you must have something worthwhile to communicate.

# Member Profiles



**James Fitzpatrick**  
Assistant Vice President  
SAIC  
Gamma Upsilon chapter

### Career Highlights

I have had the opportunity to work on numerous projects of significance to our country. This is rewarding in itself, but it has given me the opportunity to work with people of the highest technical ability and professional integrity.

### Education and Career

The Johns Hopkins University undergraduate engineering program was focused on fundamentals during my time there. I believe it provided me with a good foundation in problem solving where the first step is to accurately define the problem to the appropriate fidelity for the solution sought. I was working full-time while attending graduate school at George Washington University. My major was Systems Analysis and Engineering. Most of my courses were in communications and signal processing. They were particularly relevant to my work experience so I felt I was able to get the maximum benefit from them. These two factors continue to benefit me today.

### Advice to Engineering Graduates

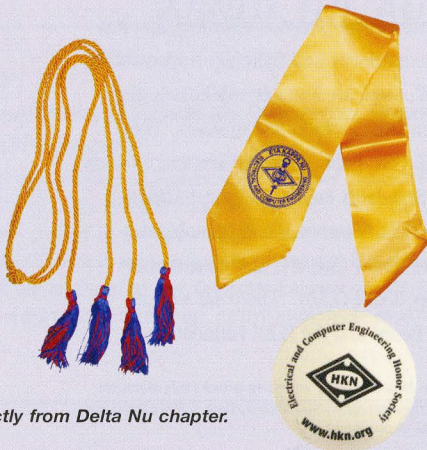
Hone your communication skills, both written and interpersonal. The ability to produce products and to work as a team member with others will both enhance your contribution as an engineer and enable you to achieve your career potential.



## HKN Merchandise

Please visit [www.hkn.org](http://www.hkn.org) for order forms and more details about ordering HKN merchandise.

- ▶ **HKN Decal \$2.00**  
Perfect for car windows! Plastic removable decal showcases your HKN membership.
- ▶ **Honor Cord and Stole**  
Cord \$15.00 Stole \$25.00 Set of Cord and Stole \$32.00  
Display your accomplishments at graduation by wearing an HKN honor cord and stole!
- ▶ **Jewelry**  
Visit the Web site for a link to Herff Jones, where you can order tie tacks, enameled crests, and key rings.
- ▶ **THE BRIDGE**  
Don't let your subscription to THE BRIDGE run out!  
Lifetime subscriptions are \$60.00 and three-year subscriptions only \$15.00.
- ▶ **Brass castings of the bridge**  
Visit <http://hkn.eng.ua.edu/bridgesales.html> to order these pledge projects directly from Delta Nu chapter.







# HKN to Merge with IEEE

by Bruce Eisenstein, HKN President

IEEE has about 375,000 members in 140 countries. The members are grouped geographically into 10 Regions (Regions 1 to 6 are in the US, Region 7 is Canada, Region 8 is Europe and Africa, Region 9 is Latin America, and Region 10 is Asia/Pacific.) The Regions are further divided into 324 local sections and 1,784 chapters comprised of local members with similar technical interests. In addition, IEEE members have the option of joining any of the 38 societies and 7 technical councils. Examples of the technical societies are Computers, Power Engineering, Communications, Signal Processing, Antennas and Propagation, Solid State Circuits, etc.

I could go on, but this recitation of numbers and boards and sub-boards will become tedious and the information is available on the website. You get the picture though. IEEE is a large and complex organization. Most important to HKN is where do we fit in this picture? The answer is — Everywhere! IEEE-HKN members will have access to all of the vast resources and networking opportunities of this prestigious international organization.

However, post-merger, there will be only several key interfaces for HKN in IEEE. The details of these interfaces are presently being worked out by several transition committees, but some broad patterns are discernible.

Let's start with the HKN chapters. At almost all of the places where there is an HKN chapter, there is also an IEEE student branch. For the foreseeable future, the two organizations will continue to operate as they do today. At some institutions, they work very closely with one another sponsoring joint events and even sharing officers. At other institutions, they are distinct, with separate officers and separate events. Following the old adage — *If it ain't broke, don't fix it!* — we intend to leave the chapter/branch relationships to the local wisdom.

For HKN members and inductees up to the date of the official merger, there are no changes in your membership status, titles, or privileges. For those HKN members who are also IEEE members, they will have the option of adding the IEEE-HKN title to their IEEE record and that title will appear on their IEEE membership card. The post-merger inductees will be members of IEEE for one year and the IEEE-HKN designation will appear on their membership cards<sup>1</sup>.

If they continue with IEEE membership, they will continue to be able to call themselves members. If they choose not to continue their IEEE membership, they have two options for designating the HKN honor on resumes or other documents. One is to write: Elected to IEEE-HKN in 20XX, or the other is to write: Member of IEEE-HKN 200X to 20XX. This is exactly consistent with the designations used by IEEE for the highest grade of membership, Fellow. I can call myself a Fellow of the IEEE as long as I am a member in good standing. If I drop my membership in IEEE, I can write that I was elected Fellow in 1986 or that I was an IEEE Fellow from 1986 to 2009.

Presently HKN is governed by a Board of Governors and an Executive Council. Post-merger, the IEEE-HKN president will sit on the IEEE Educational Activities Board (EAB) and the IEEE-HKN Board will be a committee of EAB. EAB is one of the 6 major sub-boards of IEEE, headed by a vice president who sits on the IEEE Board of Directors and will be the IEEE-HKN pipeline to the IEEE Board. The HKN Board of Governors is very happy



Left to right: Richard Gowen, John Vig, Bruce Eisenstein

with this placement within IEEE since EAB is the right place to discuss excellence in education, relationships to the various engineering schools around the world, accreditation issues, and student and faculty recognition. These are all areas in which HKN can participate and learn from.

The funds that are held by HKN in the form of endowments for prizes, restricted reserves for lifetime memberships, or unrestricted reserves are presently managed by the financial manager of the IEEE Foundation, a separately incorporated 501(c)(3) entity whose mission and purposes are similar to those of HKN, namely recognizing and rewarding excellence.

This relationship will continue and the HKN president will be an *ex officio* member of the Foundation Board and the present HKN Executive Council will become the Trustees of IEEE-HKN who, with consultation with the IEEE-HKN Board, will dispense the funds of HKN and have financial oversight over these funds. The HKN Board feels that this arrangement is a seamless continuation of the present arrangement.

On the date of the official merger, IEEE will deposit \$1.2 million into the IEEE-HKN restricted account held by the IEEE Foundation which will be in addition to the funds presently held in that account. Over the coming years, when returns from investments exceed 4%, IEEE will continue to deposit money into this account up to \$5 million. With a conservative 5% spending rule, this will yield approximately the current budget of HKN. The Board of Governors is very excited about the prospect of using this additional money to support chapter activities, fund awards that are currently unfunded, and, perhaps most importantly, spread the word about HKN around the world for the benefit of HKN members now and in the future.

The excitement about the signing ceremony has already generated a buzz around the world. We have received requests to start HKN chapters in Australia, Canada, Hong Kong, and Mexico. Many of the 250 people who witnessed the signing ceremony came to me and said that they were inducted into HKN years ago and have had no further contact. They are anxious now to renew their involvement with HKN.

## Conclusion

We are going through some hard times now and the world has changed in ways that Maurice Carr could not have dreamed possible in 1904 both technological and societal. There is no doubt that both good times and more difficulties will occur in the future. There is also no doubt that technological innovations will continue in ways that we cannot anticipate or envision. The HKN Board of Governors is enthusiastic about the merger with IEEE because it ensures that the Eta Kappa Nu name and reputation as the electrical and computer engineering honor society will be perpetuated and enhanced.



For more on this topic, visit  
[www.hkn.org/bridge](http://www.hkn.org/bridge)

## ABOUT THE AUTHOR



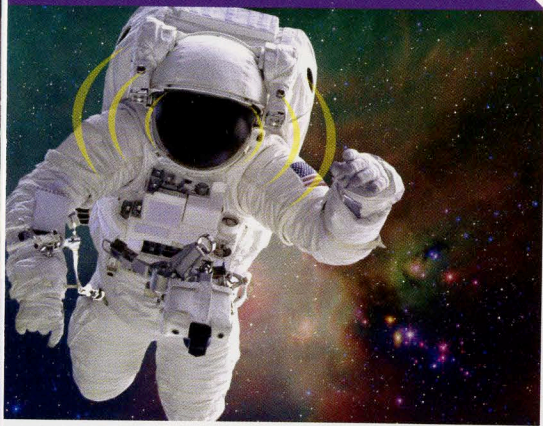
### Bruce A. Eisenstein

Arthur J. Rowland Professor of Electrical & Computer Engineering, Drexel University  
Beta Alpha chapter — Drexel University

Dr. Eisenstein was a NASA/ASEE Fellow at Stanford University and the Ames Research Center; he was Visiting Research Fellow in Electrical Engineering at Princeton University under the sponsorship of the National Science Foundation. In 1980 he was appointed Professor, and from 1980 to 1995 he served as Head of the Department of Electrical and Computer Engineering at Drexel and in 1996 was named Arthur J. Rowland Professor of Electrical and Computer Engineering. Dr. Eisenstein has published 50 papers in the areas of digital signal processing, pattern recognition, blind deconvolution, and biomedical engineering.

<sup>1</sup> The HKN Board strongly encourages that HKN members identify themselves so that we may have a more complete database of our members.





### Owen Garriott

Back in about 1944 toward the end of WW II, my father (also Owen Garriott) came home one evening and asked if I would like to attend an evening "radio theory" class with him and a dozen or so other adults. Pleased but also a bit intimidated, I looked forward to participating with my father in a new and interesting activity. Scrolling ahead a year or so, and also having completed a code class (13 words per minute were required in those days), we both had passed our ham license examinations and received call signs W5KWQ (my father) and my still current call, W5LFL. Little could we imagine where this small start might lead our family!

### From Ham to Engineer

First came a job throughout High School at our local AM radio station as an FCC licensed engineer and control operator. The Chief Engineer was another ham, of course. Then off to college at the University of Oklahoma majoring in EE and then a three year commitment to the US Navy with collateral responsibility as the Electronics Officer on a destroyer at sea. But there was a desire for further graduate education, so after resigning my commission, I was accepted as a graduate student in the Radio Propagation Laboratory at Stanford University, where it turned out, many EE faculty members were also licensed hams.

1956 was the start of the International Geophysical Year (IGY) so radio propagation was a major research discipline. By the following year I was looking for a research topic for a dissertation when what should be heard around the world on October 4, 1957,

# Two Generations of Hams in Space

by Owen and Richard Garriott

but a "beep-beep" transmitted from the world's first artificial satellite, Sputnik I, on 20 and 40 Mhz. And studies of radio transmissions through the ionosphere became that needed research topic for me.

Another important milestone came a few years later after receiving a post-doc fellowship from the National Science Foundation for one year of study at Cambridge University in England. While there our third son (Richard) arrived, still holding dual citizenship even today, though having lived in the UK only a matter of months in 1961. We then returned to the faculty at Stanford for more research and teaching.

### From Engineer to Astronaut

In about 1963 I heard that NASA was considering the selection of flight crewmembers with research backgrounds and not requiring years of jet test-flight experience. In fact those accepted would be given a whole year of jet schooling with the USAF to qualify us in the T-38. In hindsight the Astronaut Office wanted to make sure that these "fuzzy haired" scientists (mostly with standard crew-cuts of the day) could actually be taught to fly jets safely and successfully, while we were greatly pleased to find that we were to be given this training! The three of us without jet experience all graduated on schedule and some (in the second group of Scientist Astronauts) led their entire classes in both academics and flying skills. We then continued to fly the T-38 regularly for the next 20 years.

When back to the Astronaut Office in 1966 we all made some contributions to various Apollo missions. One of us, the geologist Jack Schmitt, went to the moon on Apollo 17 and the other three of us flew on each of the long duration Skylab missions. The Skylab flights were all world record durations at the time of about 1, 2 and 3 months in space. Much of this activity has been chronicled in a recent book "Homesteading Space" describing the whole program from the crewmembers perspective. On my own two month flight we tried to get approval to take a ham transceiver on board but approval was not forthcoming for several reasons. Waiting patiently, my next flight opportunity

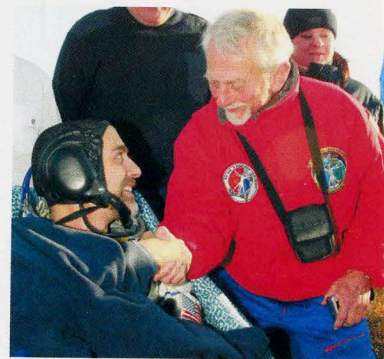


Figure 1

After Richard landed in remote Kazakhstan and extrication from the Soyuz and is greeted by his father Owen. He was feeling great!

came in 1983 on STS-9/Spacelab-1. With a lot of help from the ham community we were approved to take a modest hand-held transceiver along and I had the privilege of operating the first ham station in space. But what was son Richard, all of 12 years old at the time of Skylab, doing in these years?

### Richard Garriott

During my youth, when my father would come home from work at NASA, it was common for him to retire to his study and continue his work or research. This would occasionally include firing up his Ham Radio equipment, and speaking with people around the globe. Thus was my introduction to amateur radio. But dinner time discussions were most often wide ranging, from space activities to science experiments on orbit and even business opportunities that might become possible.

Throughout my school years I was an inveterate competitor in science fair projects. In my last two years of high school I sought a sufficiently challenging subject and one that preferably took advantage of my burgeoning computer skills as the field of computing was still quite new,

and I had many self taught years under my belt, unlike most other high school students of the 1970's. Studying the propagation of radio waves in the ionosphere with computer ray tracing seemed natural. I could get the fundamental science from my father, and apply my new skills which few HS students would have. This project which I continued for two years, brought me International Science Fair awards and furthered my knowledge of radio wave propagation.

### A Dream Deferred

Also in my teen years I became devoted to finding my own way into space, after a NASA flight physician told me that my poor eyesight would prevent me from becoming a NASA astronaut. When 30 years later I finally appeared on the threshold of making this dream a reality, ham radio was an early consideration. I knew that I would be flying to the ISS on the 25th anniversary of my father's 1st Ham transmission from space, and so I would not want to miss the opportunity to "reverse" the call! To that end, not only did I immediately go out to secure my own ham license, but then sought out my grandfather's call sign W5KWQ.

Ironically, the very reason that provoked me to consider alternate paths than NASA to reach space, now became an experimental area that I could advance for NASA. Corneal surgery (PRK, or photorefractive keratectomy) was recently approved for astronaut candidate selection, but no one in the corps has had this surgical modification as they could not have been selected. Except that I had done it years before and was therefore able to complete extensive pre-, in-, and post-flight visual acuity tests to confirm that the surgery did not compromise an astronaut's vision in weightlessness.



Figure 2

Following in his father's footsteps, Richard becomes another ham in space.

### A Second Ham in Space

When I launched aboard Soyuz TMA 13 on October 12, 2008, I took with me a Slow Scan TV device, so that I could transmit voice and live video as well. During my 12 day stay, I completed numerous school contacts, hours of open calls, and planned to transmit SSTV pictures from a folder of prepared images or the new SSTV camera I brought up. Upon arrival I set up a slide show as the "test broadcast" while I settled in aboard the ISS. These images included, test patterns, images of my father's flight, and some irreverent pirate flags labeled "Richard Garriott takes over the ISS" which apparently amused the ham community and others. Soon after I began my program of open calls and school

programs, as well as live SSTV. I was amazed to discover how active the global ham community was, and how technically savvy they were in decoding my data from space. I quickly learned that the ground stations receiving my transmissions could work out the battery life of the SSTV camera with more accuracy than I could onboard. I received very helpful data relayed through the community and back up via Russian mission control to me on station. This feedback allowed me to work with much greater success, and with more dedication, knowing how closely I was being monitored globally!

During my 12 days on orbit, I made over 500 two way QSO's (contacts where we confirmed the two way exchange of call signs) and contacted over a dozen schools and Challenger Centers. I can absolutely state that my experience with ham radio from the ISS was the singular highlight activity of my time on orbit.

### Conclusion

The clear way that I touched the many I spoke with and the way they all touched me was far beyond what I could have speculated would occur when planning this activity. I am now very pleased and proud to have played my small part in the rich history of amateur radio.



For more on this topic, visit [www.hkn.org/bridge](http://www.hkn.org/bridge)

## ABOUT THE AUTHORS



### Owen Garriott

Astronaut (retired), National Aeronautics and Space Administration  
Beta Xi chapter – University of Oklahoma; HKN Eminent Member

Dr. Garriott was one of the original six astronaut-scientists chosen by NASA in 1965. Dr. Garriott set an endurance record by spending 60 days in space aboard Skylab in 1973, and he spent 10 days aboard Spacelab-1 in 1983. He held several posts at the Johnson Space Center and worked as a project scientist at the Space Station Project Office. After leaving NASA in 1986, he consulted for various aerospace companies and served as a member of several NASA and National Research Council Committees. Dr. Garriott also served as a professor in the Department of Electrical Engineering at Stanford University and an adjunct professor in the Department of Biological Sciences at the University of Alabama at Huntsville.



### Richard Garriott

Game designer

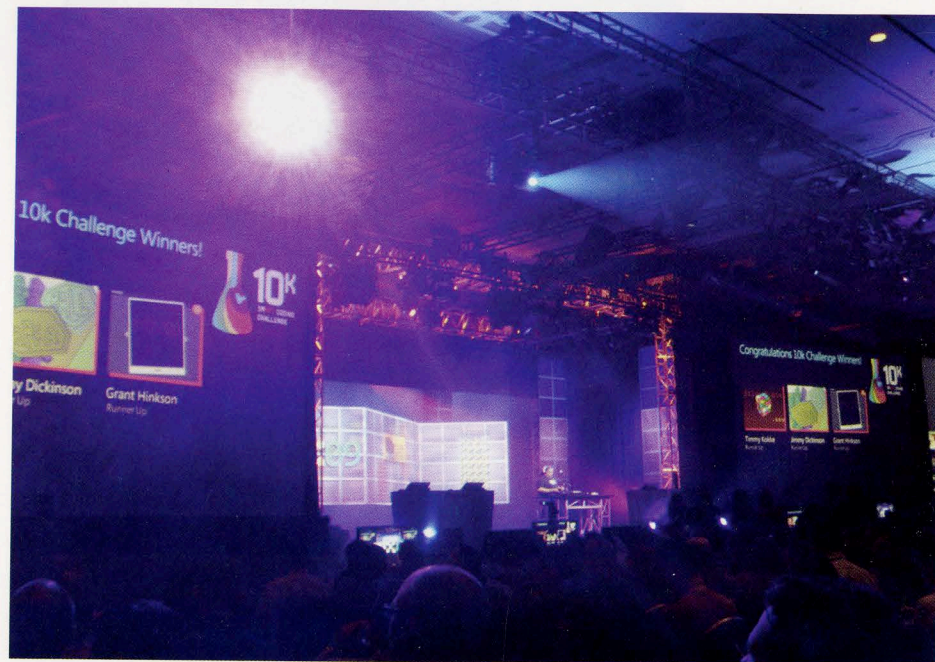
Richard Garriott, famed video game developer, is following in his father's footsteps and has launched aboard a Russian Soyuz spacecraft to the International Space Station. Richard is the first second generation American in space, and also the sixth private astronaut client of Space Adventures.





# HKN Delegates Report on MIX09

by Janis Lee and Patrick O'Keefe



Microsoft has invited HKN members to participate in the Microsoft Students to Business (S2B) program through the Experience Network, HKN's career management resource. HKN and Microsoft have partnered to offer free software training, career opportunities, and much more. As part of this new partnership, Microsoft offered two HKN student members a free trip to Las Vegas for MIX09, the Microsoft Web Design and Development Conference, in March 2009. Janis Lee (Alpha) and Patrick O'Keefe (Epsilon Kappa) share their experiences below.

## Janis Lee: Magic in Vegas

Vegas, Vegas, Vegas! Four days, three nights in a city skyline full of signs—what happens in Vegas, stays in Vegas. Staying at an extraordinary hotel gleaming with class and beauty, the MIX09 Conference was an educational and impactful conference. It brought in participants from all over the country and of diverse backgrounds. Not knowing what to expect from the conference, MIX exposed students and company representatives to the diverse range of web development programs. Even if you are not an expert with any particular program, MIX offered great insight to developing tools, designing methodologies, and anything in between.

## Mixing at MIX09

Throughout the conference, we were able to meet people and learn from their experiences—designing problems, entrepreneurial quests, and the latest development in the opening talks and keynote speakers. After breakfast in the great hall, about 2,000 people of all ages gathered in the conference room for the opening speech. Bill Buxton, the principle researcher at Microsoft, gave a phenomenal speech about the magic behind design and the key aspects about innovation.

One always hears about the importance of engineering and business in the world of industry, but not many emphasize the element of design. Design is the interface with the user that takes into consideration things users are supposed to do and not supposed to do. With timing and the nature of the transition, one is able design the perfect product by considering pros and cons of the features. The combination of the three components of engineering, business, and design make up the pillars of success for a product.

Not only were we able to meet executives of Microsoft, but we also networked with executives and technology experts from other companies, including stackoverflow.com, Netflix, NBC, and consultants of Rolling Stone. They shared their experience with Microsoft products and the technique behind their design and audience analysis. Ideas they encapsulated into feasible features distinguished their company and values from other companies, enabling these companies to thrive in their niche markets.

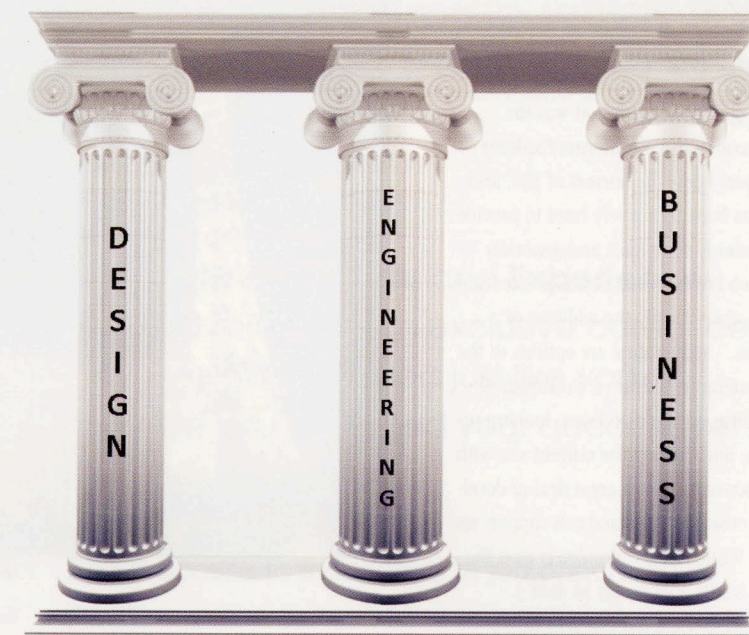
## More Mixing

The second day of the conference, we were introduced to Deborah Alder—the revolutionary designer that changed the appearance of medicine bottles for the first time in 40 years. It was inspirational to learn about her experience and the process she had to

go through to get her design accepted by the real world. After many alterations and compromises to her original design, she was able to change the impact of the bottle with support from a major company like Target to prevent deaths from prescription mess-ups. The attention to the consumers' needs enabled Alder to make changes and fulfill the needs of the people.

The most memorable part of the conference was networking with executives and representatives from various companies. The first night, Microsoft rented out a night club at the Venetian to build a casual atmosphere for the businessmen and students to mingle. While eating gourmet food, we chatted with executives and technology experts from companies of all sizes, including Blockbuster. They shared their experiences with programming, their lives, and general advice they had to give. It was exciting sharing similar backgrounds with each individual and networking with such a diverse crowd.

Attending the MIX09 Conference was a great opportunity to meet new people and learn new perspectives. Not only did we learn about new, experience-altering technology, but we were able to network with a broad range of companies and corporate representatives. Most of all, the flexible schedule enabled each individual to maximize their experience and networking opportunities. For those interested in learning about design, developing, or networking, I highly recommend attending the annual MIX Conference.



## Patrick O'Keefe: The Technology at MIX09

Amidst all of the networking and professional development seminars, Microsoft announced several new products that truly represent the future of the web. I'd like to highlight a few of these now.

## Streaming Media

Silverlight 3 stood apart with many revolutionary features. For those who aren't familiar with Silverlight, it is Microsoft's Flash competitor that was launched only eighteen months ago. In those eighteen months, it has been downloaded on over 350 million machines and is being used in more than 200 Microsoft websites and 10,000 other applications. My first experience with it was NBC's internet streaming of the 2008 Olympics (they announced their continuing partnership for the 2010 Winter Games at MIX). The new features—available now with the beta download of Silverlight 3—include GPU hardware acceleration, new codec support, improved logging, perspective 3D controls, Deep Zoom enhancements, multi-touch support, over 60 controls, and offline abilities.

There were several outstanding demos of this new technology at work. A Seattle-based radio station, KEXP, showed off their next version of their music streaming player. It incorporates social networking features alongside interacting with live content, but the truly amazing features were shown when they disconnected the ethernet cable. The KEXP player politely notified the user of the network status change, and then allowed them to browse and listen to previously downloaded content—all offline! The other fascinating demo was from Vertigo and Bondi Digital Publishing. They are working with Rolling Stone Magazine and Playboy to digitally archive and showcase old issues. They took us through the Rolling Stone web app, and showed us the beautiful browsing interface that used the Deep Zoom technology to its full extent. Also included is the ability to search for specific bits of text across all of the issues. It must be seen to be believed—the Rolling Stone site will go live this summer, but the Playboy Archive is live now.



For more on this topic, visit [www.hkn.org/bridge](http://www.hkn.org/bridge)

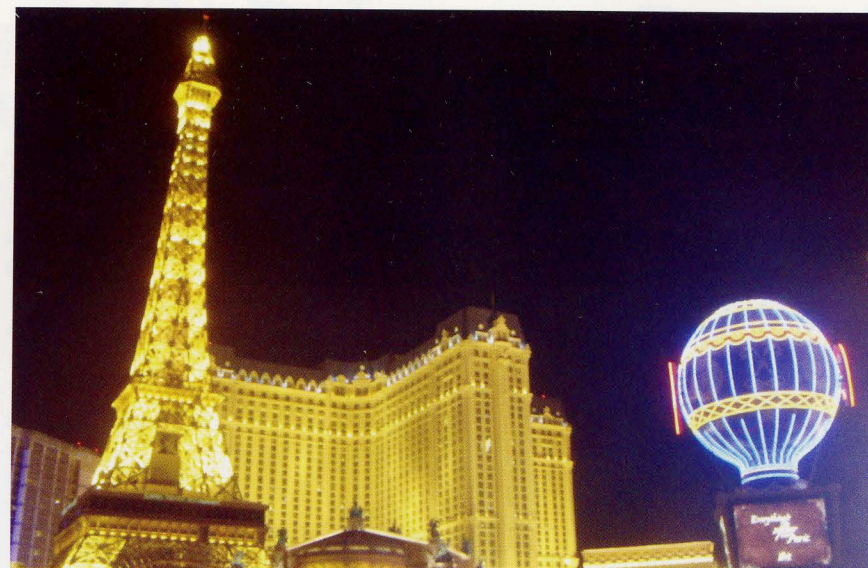


continued from page 17

### Browsing the Cloud

The next biggest announcement was the immediate availability of Internet Explorer 8. Web developers know the horrors of IE6, and Microsoft has been trying very hard to provide a more standards-compliant and generally improved web browser. One of the new features of IE8 that others lack is the addition of "Accelerators." Accelerators are options in the right-click menu to perform a multitude of tasks including getting directions, looking up a definition, and sharing the current site with a friend. Microsoft spent a great deal of development on ensuring the standards support was acceptable. While it does completely pass the Acid 2 test, it still does poorly in Acid 3 (21/100). Internet Explorer 8, although still not perfect, is an obvious improvement to its predecessors and puts Microsoft back in the browser game.

Windows Azure, Microsoft's answer to cloud computing, was also highly featured at MIX09. I attended a couple sessions detailing how it works and how to properly develop applications for it. The idea of Azure is brilliant—



being able to have five users one day and five million the next without needing worry about resource allocation or scalability is astounding. That's not to say that your code shouldn't be optimized. Even though the resources behind your application are "infinite," you pay for what you use!

Many other great technologies were demoed:

ASP.NET MVC 1.0, ASP.NET 4, Visual Studio 2010, Web Server Extensions, Web Platform Installer, Web App Gallery, Expression Blend and some others. MIX09 was a great atmosphere to be the first to learn about these new technologies and talk with the actual developers. I'm definitely going to pursue attending MIX10 next year.

**As an engineer, you have a lot on your mind.  
That's why it's good to keep things simple when it comes  
to managing your career.**

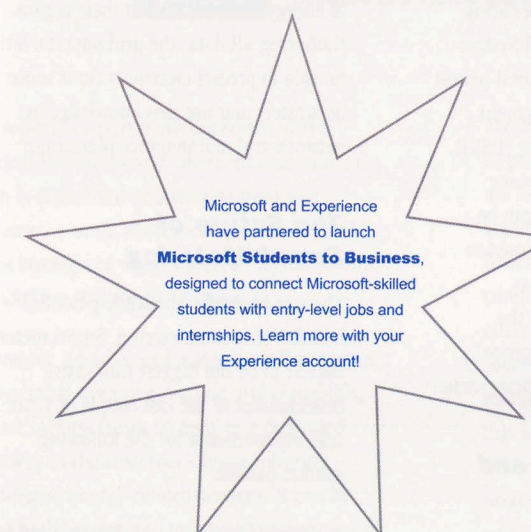


### Eta Kappa Nu and Experience

teamed to deliver an exclusive career center  
for members just like you.

Have you accessed your account yet?

- **FREE** access to thousands of job opportunities
- **FREE** member to member job postings
- **FREE** content addressing interview and resume tips and techniques, professional profiles and articles of interest
- **FREE** career resources from Hoovers, Salary.com and more
- **Plus**, Rising Star profiles featuring HKN members!



Whether you're looking to start your career, seeking a job or needing to fill a position at your company with an HKN engineering professional, Experience is the exclusive destination for members at the nation's top engineering schools and technology-minded firms.

Get connected with top employers and HKN members looking to advance their careers.  
Visit [www.hkn.experience.com](http://www.hkn.experience.com) today to access your FREE Experience account.



**ETA KAPPA NU ASSOCIATION**  
*Electrical and Computer Engineering Honor Society*



Widely known for its eRecruiting™ platform and award-winning network, Experience connects students and alumni from 3,800 colleges and universities with more than 100,000 employers each year - delivering jobs, internships and career resources targeted to your organization.

[www.experience.com](http://www.experience.com)

## THE BRIDGE

The Magazine of Eta Kappa Nu

### Key Dates, Article and Profile Submissions

- > **September 15, 2009** Deadline for submissions, Autumn 2009 issue
- > **October 1, 2009** Notification of selections for Autumn 2009 issue



### Be a Contributor (and It Won't Cost a Thing!)

**Got something to share?** We are seeking articles from members at all levels for future issues of *THE BRIDGE*. Whether you are already a published author or you still wonder what it's like to see your words in print, we invite you to submit an article for consideration.

Topics can include—but are not limited to—technical perspectives (past, present, and future), first-person experiences, career issues, and observations on industry and the profession.

Articles for *THE BRIDGE* are 1,000–1,200 words in length and can include up to two figures (photos, graphs, or other images). Manuscripts should be sent in electronic form via e-mail to [editor@hkn.org](mailto:editor@hkn.org) (MS Word .doc files preferred).

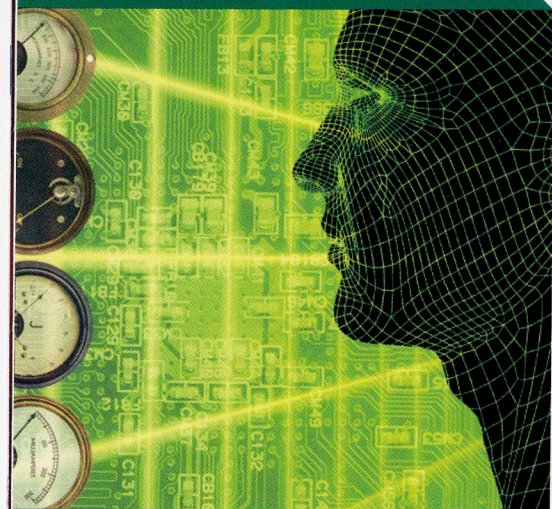


### Share Your Wisdom

This issue of *THE BRIDGE* includes Member Profiles, an opportunity for members who are established in their careers to share the wisdom gained from experience with younger members.

Members interested in contributing to this feature should send a 100-word career synopsis via e-mail to [editor@hkn.org](mailto:editor@hkn.org). If selected, we will ask for your responses to a set of interview questions addressing your educational and career experience and your advice to young engineers.





# Intelligent In-House Smart Metering

by Vineet Kumar

Usually, a smart meter is considered for electricity registry, but gas and water consumption registration is also a possibility. An example of a typical smart meter and its functions are schematically shown in Figure 1.

The intelligence of the meter is incorporated in the electricity meter. It has three basic functions: measure the electricity used (or generated), remotely switch the customer off, and remotely control the maximum electricity consumption. An important characteristic is the communication infrastructure used by the smart meter for this communication. Among the possibilities are broadband over power line or power line carrier (PLC, using the existing electricity grid); a wireless modem (Global System for Mobile Communications [GSM] of general packet radio service [GPRS]) or an existing permanent Internet connection (digital subscriber line [DSL]). An interface connects the smart meter to home appliances or a home display. Appliances can be controlled directly, and the display can be used to show (historic) energy data and energy cost. In this example, a gas meter is coupled to the electricity meters and borrows the "intelligence" and communication facilities of the electricity meter.

## Introduction to Smart Metering

Smart metering generally involves the installation of an intelligent meter at residential customers and the regular reading, processing, and feedback of consumption data to the customer. A smart meter has the following capabilities:

- Real-time or near-real-time registration of electricity use and possibly electricity generated locally, e.g., in case of photovoltaic cells
- Possibility to read the meter both locally and remotely (on demand)
- Remote limitation of the throughput through the meter (including, in extreme cases, cutting off electricity to the customer)
- Interconnection to premises-based networks and devices (e.g., distributed generation)
- Ability to read other on-premises or nearby commodity meters (e.g., gas, water)

## Benefits of Smart Meters and Parties Involved

Many advantages are attributed to smart metering, including lower metering cost, energy savings for residential customers, more reliability of supply, variable pricing schemes to attract new customers, and easier detection of fraud. Additional benefits are foreseen in relation to distributed generation. The smart meter can be used to separately measure electricity delivered by the distribution generation to the grid, and the smart metering communication infrastructure can be used to remotely control distribution generation (e.g., in a virtual power plant concept). Smart meters offer benefits to multiple parties.

Demand response by domestic energy users is not yet a common practice but would be enabled by smart metering. Smart meters are capable of limiting or even cutting off energy use when triggered by market developments. Limiting the electricity use may be accomplished by cutting off the electricity when the flow exceeds a certain maximum value during a certain time and restoring it when the flow is reduced.

When energy use is monitored by smart meters, utility companies will receive a much more actual and accurate overview of energy consumption in their region. Gathering all data, the grid operator will be able to predict electricity flows more accurately and use this knowledge in network and maintenance planning.

## The Future of Smart Metering

There is no doubt about the potential benefits of smart metering. Smart meters appear to be the biggest innovative development of the last couple of years, and indispensable for the following market parties:

- Utility distributors, to decrease meter reading costs
- Grid operators, to prepare their grids for the future
- Energy suppliers, to introduce new, customer-made services and reduce call center costs
- Governments, to reach energy-saving and efficiency targets and improve free-market processes
- End users, to increase energy awareness and decrease energy use and energy costs

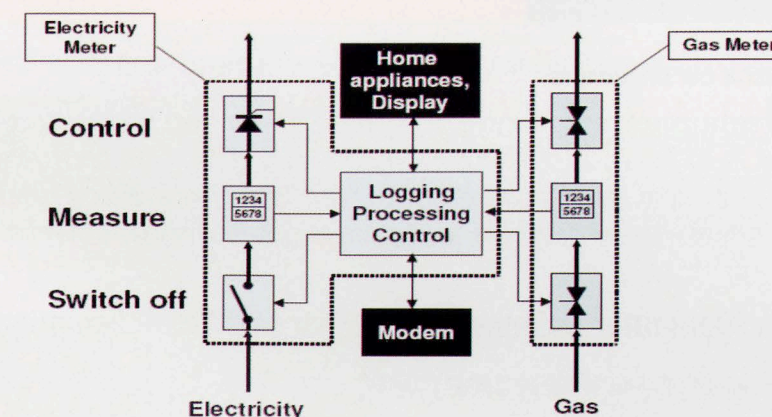


Figure 1 Overview of a Typical Smart Meter Configuration

Introducing smart metering seems also a logical step in a world where all communication is digitalized and standardized (e.g., Internet, e-mail, short message service [SMS], chat boxes) and where costs of "digital intelligence" are still rapidly decreasing.

Moreover, an advanced metering infrastructure offers more than just reading and controlling smart meters. It can be seen as a dedicated gateway to the customer's home, offering additional energy-related services. It can be used both for demand response (stimulation of the customer to change energy behaviors) and demand side management (direct control of household appliances such as the washing machine or the air conditioner). In relation to local generation of electricity, it offers the possibility to realize a virtual power plant.

However, two important issues hamper the general introduction of smart metering. First, there are many parties involved, and the benefits of smart metering may accrue more for some parties than for the ones that bear the costs. Second, there is still much uncertainty

about the quantification of the benefits, as practical experience and historical data are lacking. Therefore, an investment in smart metering means taking risks. In a liberalized market, these risks are weighed carefully. In a regulated market, there are often no incentives to take risks. This sometimes leads to an impasse in the energy market. Currently, the way to break through this impasse is by setting national and/or international standards and adopting appropriate national and/or international rules and legislation based on a firm energy policy. This is the main driver.

Adopting open standards for both the meter and customer and utility application development will drive smart meter (AMI) implementation down dramatically and increase the realizable benefits to both customers and utilities. It will also enable the level of application innovation required to deliver the benefits. So it looks like future of smart metering will depend heavily on the energy policy and decisiveness of the governmental bodies involved. Energy savings and an increased security of supply will be main drivers, and belief in smart metering as a means to reach these goals is indispensable.

## Conclusion

Smart metering and AMI systems cannot be glued together in some gerrymandered architecture. A much more robust, flexible, and extensible architecture is required. Again, as with the meter, standardization and openness is an absolute requirement. Only through such open and standard state-of-the-art architectural approaches will AMI applications be successfully and effectively integrated to perform all the functions required to achieve AMI benefit, but there needs to be focus on systems applications—and not on the replacement of electrical measuring devices—for this to be successful.



For more on this topic, visit  
[www.hkn.org/bridge](http://www.hkn.org/bridge)

## ABOUT THE AUTHOR



### Vineet Kumar

Senior Manager, Business Development, Crompton Greaves Limited

Vineet Kumar, having background in Information & Communication technologies (ICT), accountable for driving new business innovation, establishing advantage in the area of business & technology innovation for the emerging third world, the objective consists of both technical and application engineering. Also supports technology innovation to diverse solutions that are designed for emerging communication technology including Metering & Monitoring Solution, as well as for whom, access to the technologies remains largely out of reach.



powered by  
innovation



guided by  
integrity

everything is possible.

**They define our culture: integrity, innovation and the way we value our differences.**

We dream the biggest dreams, and put them into action with creativity and a commitment to everyone on the Lockheed Martin team. We move boldly, guided by clear principles. We exceed expectations, because it's important that we do. Further, we believe that our inclusion is one of our most defining competitive strengths. Because the more unique we are as individuals, the more we can inspire, create and accomplish as a team. This is what a career at Lockheed Martin is about. Experience it for yourself. Explore one of the foremost systems engineering, software, and systems integration companies in the world.

**We are now hiring nationwide in:**

**Engineering (Electrical & Computer) • Software/Computer Science • and other technical disciplines.**

Visit our Web site at: [www.lockheedmartin.com/careers](http://www.lockheedmartin.com/careers) for complete details on our college recruiting program.

*An Equal Opportunity Employer*

**Voted #2 Ideal Employer of undergraduate  
engineering students in 2008.**

*— Universum Undergraduate Survey, 2008*

**LOCKHEED MARTIN**



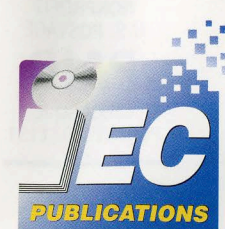
## Notes from Headquarters



*Chapters, here are a few reminders from the Headquarters office!*

- Chapter Reports are due October 15, 2009 for the 2007-09 academic year. Be sure to inform incoming officers of this responsibility and track your activities throughout the year. Early submissions are accepted and encouraged. The Short Form, available online, is required from each chapter but chapters are encouraged to include photos and more descriptions in a detailed report. Outstanding Chapter winners are chosen based on person-hours from the Annual Report.
- The IRS 990N form (for chapters grossing less than \$25,000) or 990 form (for chapters grossing more than \$25,000) is due October 15 for the fiscal year July 1, 2008 to June 30, 2009. This applies to all chapters whose EIN is a subordinate of HKN HQ. Regardless of EIN affiliation (university or HKN HQ) all finances should be documented carefully based upon a July 1 – June 30 fiscal year.
- Until further notice, all HKN chapters should continue to operate as usual prior to the HKN-IEEE merger. If processes change post-merger, chapters will be notified accordingly.
- Nominations are due June 30, 2009 for the Outstanding ECE Student Award. Chapters are encouraged to nominate their top graduating senior for this prestigious award and cash grant. Forms are available online and late submissions are not accepted.
- Don't forget to send the New Member Requisition Form and dues for inductions during the 2007-08 academic year. Inductees are not considered HKN members until HQ has received completed paperwork and processed certificates.
- Update your address online as you move. HKN wants to keep in touch with you!

*As always, the HKN Web site ([www.hkn.org](http://www.hkn.org)) is the best source of information, paperwork,  
project ideas, award information, and upcoming activities.*



**IEC PUBLICATIONS**

*presented by the International Engineering Consortium*

IEC Publications is proud to be a leader in continuing education in the information and communications technologies industry. We hope you will find a variety of texts to suit you, whether you are brushing up on the latest in your area of expertise, taking the first step in learning about an unfamiliar field, or educating students on the most recent technological achievements and trends.



### *The Basics Series*

IEC Publications has taken its Basics books—some of its most popular publications—and bundled them into one convenient package. Our Basics series is perfect for the beginner in the telecommunications field because it takes a simple yet thorough look at some of the technologies everyone is talking about today—satellite communications, 802.11 wireless LANs, telecommunications, voice over Internet protocol, cellular, and IPTV.

### *IEC in the Classroom*

In keeping with our emphasis on and dedication to education, IEC Publications offers a discount to universities that use our books as classroom texts. For information on how to obtain this discount, please contact the Publications team.

### *Publishing Opportunities*

IEC Publications accepts articles and manuscripts on the full range of information and communications technologies and electrical and electronics engineering topics. For details on preparing a paper or manuscript for submission, visit [www.iec.org/pubs/guidelines.html](http://www.iec.org/pubs/guidelines.html). To peruse IEC Publications' call for papers, visit [www.iec.org/pubs/call\\_for\\_papers.html](http://www.iec.org/pubs/call_for_papers.html). To submit a manuscript, contact Barry Sullivan at +1-312-559-3302 or [bsullivan@iec.org](mailto:bsullivan@iec.org).



**IEC Publications**

Phone: +1-312-559-4600

E-Mail: [pubs@iec.org](mailto:pubs@iec.org)

On-Line: [www.iec.org/pubs](http://www.iec.org/pubs)





Eta Kappa Nu Association  
300 West Adams Street, Suite 1210  
Chicago, Illinois 60606-5114, USA

CHANGE SERVICE REQUESTED

NONPROFIT  
U.S. POSTAGE  
**PAID**  
CHICAGO IL  
PERMIT NO. 1131

Get Connected at **www.hkn.org**

Update Your Member Profile Today!



## The HKN Web Site

### HKN News Features

HKN members can stay up to date on the latest society activities and notable accomplishments of fellow members by visiting the HKN Web site. The site's home page features news headlines that link to articles and press releases.

### Career and Alumni Services

Job openings, free career posts to other HKN members, resume and interview techniques, and networking opportunities are available through Experience, Inc. Free registration is available on the HKN Web site.

### Chapter Administration Forms and Information

Everything needed to establish and run an HKN chapter is available in one spot on the HKN Web site.

