



ISSUE 1 2017 // VOLUME 113

THE BRIDGE

The Magazine of IEEE-Eta Kappa Nu

Outreach and Impact

*MOVE Makes a
Difference*

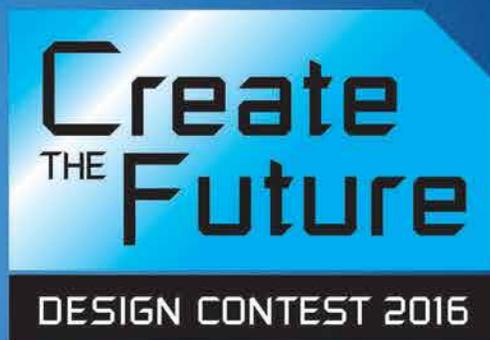
*Project Lead
The Way: A
STEM Program
for Electrical
and Computer
Engineering
Students*

*HKN's Greatest
Asset: Alumni*



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THE BRIDGE

The Magazine of IEEE-Eta Kappa Nu

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Timothy P. Kurzweg

Epsilon Chapter

kurzweg@ieee.org

Welcome to the inaugural issue of THE BRIDGE for 2017!

It is a pleasure to serve as the IEEE-HKN President for 2107. IEEE-HKN is coming off of a record year, in which we had more new members join, reconnected with many of our alumni members, formed new Chapters around the world, reestablish some our of dormant chapters, all while continuing to be recognized as the leaders in the Electrical and Computer Engineering disciplines, and all of IEEE's fields of interest. However, this is not the time to rest on our accomplishments. It is time to look forward, continue to grow, and best serve our members and our communities.

I completed my BS degree at Penn State University, where I was inducted into HKN with the Epsilon Chapter in 1993. I completed my MS and PhD at the University of Pittsburgh, and this is my 15th year as a Professor at Drexel University. I am the faculty advisor for the IEEE-HKN Beta Alpha Chapter at Drexel, and believe strongly in the tenets of HKN, scholarship, attitude, and character. As I told our recent inductees in the Beta Alpha Chapter, HKN is simple...it is about being a good engineer and a good person. The world can be a better place with people like this!

I want to congratulate our newly elected Board of Governors members for 2017. Our President-Elect, Steve Watkins, is a tremendous IEEE-HKN supporter and active volunteer. He has been the Editor of this fine BRIDGE publication for many years, and Steve and his team are responsible for many of the awards that the BRIDGE has received. I also want to congratulate our other new elected Board of Governors, Karen Panetta, Enrique Tejera, Kyle Lady, and Michael Bensen. These newly elected will join current Board members, Past President S.K. Ramesh, Ron Jensen, Gordon Day, and Ed Rezek to comprise our 2017 IEEE-HKN Board of Governors. We have an outstanding Board and I want to thank all of these volunteers for their time and effort in support of IEEE-HKN.

It is now time for this Board to get to work. I feel that we have to communicate the message of IEEE-HKN better to those outside of IEEE, but to those inside of IEEE as well. We need to provide more value to our members, and figure out what is wanted and needed by our members. We will continue to make sure that IEEE-HKN is financially secure. It is an exciting time for IEEE-HKN, but challenges still remain.

I would be remiss if I did not thank Past President S.K. Ramesh for all his efforts and achievements to IEEE-HKN in his time as President. He put in place a strategic plan for HKN, which gives us a path to follow for financial security, as well as growth and visibility. Ramesh is still on our Board of Governors, and I will look for his guidance and advice throughout the year.

I hope that you reading this note will consider joining the HKN volunteer team. We are always looking for individuals that have new ideas and drive to make IEEE-HKN a stronger place. If interested in helping out in anyway, please contact me!

I hope you are off to a great 2017, and know that you can count on me to do everything I can to strengthen IEEE-HKN and ensure its full integration into IEEE.

Best wishes,
Tim



Timothy P. Kurzweg
2017 IEEE-HKN President



Dear Eta Kappa Nu Members and Friends,

This issue of THE BRIDGE magazine has a theme of "Outreach and Impact." We have original features that discuss the Project Lead the Way (PLTW) pre-college program and the IEEE-USA MOVE community initiative. Both of these highly effective efforts demonstrate direct involvement of our technical community with the public. An author of the PLTW feature is Dr. R. Joe Stanley who is the recipient of the 2016 IEEE-HKN Outstanding Teaching Award. It is not surprising that an outstanding engineering educator would also be involved with pre-college outreach. The MOVE outreach initiative provides emergency relief services in areas that naturally fit with IEEE -- communications, computer, and power support.

The reprint feature "HKN's Greatest Asset: Alumni" has a great message; its author was a longtime HKN and IEEE volunteer who modeled a life of service. I encourage you to consider both the feature and the accompanying biography of Larry Dwon. Anyone who has benefited from HKN membership or from participation in an IEEE SPAC (now SPAX) program can thank volunteers such as Mr. Dwon. The feature gives examples from HKN's history of valuable means for HKN alumni to contribute to our organization and profession. The IEEE-HKN website gives additional examples of how to stay involved. Alumni can link their IEEE and HKN membership records and can explore volunteer opportunities.

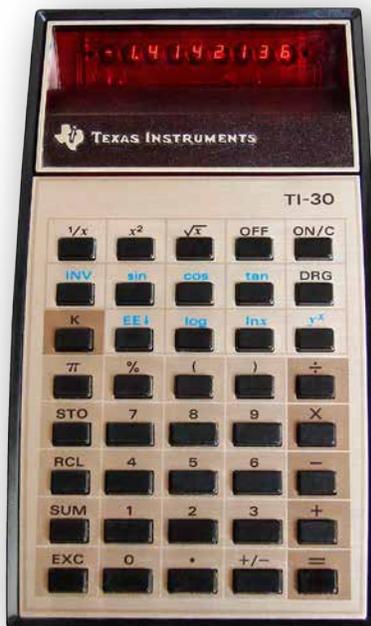
An ongoing interest of mine is my institution's display of vintage equipment. I recently added a Keuffel & Esser slide rule and a "pocket" TI-30 calculator. The TI-30 designation is still in use, but this particular calculator was an early model as shown in the figure. This device, with its red-LED display, brought back memories since it matched my first calculator. The initial TI-30 was introduced in 1976 as a "48-function electronic slide-rule calculator." The price for the TI-30 was much less than that of other handheld electronic calculators of the time, and was approximately equivalent to the price of an advanced mechanical slide such as the Keuffel & Esser professional-grade device in my display. As such, it sold in excess of 15 million units and it contributed to the decline in the use of mechanical slide rules.

Regards,

Steve E. Watkins

2017 IEEE-HKN President-Elect

► Early TI-30 Calculator by Texas Instruments



Steve E. Watkins

Gamma Theta Chapter

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Nancy M. Ostin

Gamma Theta Chapter

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Dear HKN Members and Friends:

Welcome to the first issue of THE BRIDGE for 2017. We hit several milestones in 2016, and have worked to create a vision for the future to better meet the needs of HKN students, faculty, alumni, and chapters:

- Installed our 250th Chapter -- Mu Iota at Seattle University
- Expanded to 14 chapters outside the US and in 12 countries
- Welcomed back six chapters
- Have over 200 Active Chapters

The IEEE-HKN Board of Governors established the following Strategic Priorities which will drive our 2017 Operational Objectives:

- Priority 1: Establish Financial Security
- Priority 2: Integrate IEEE-HKN fully into IEEE
- Priority 3: Clearly Define IEEE-HKN's Value Proposition
- Priority 4: Enhance IEEE-HKN's Global Presence
- Priority 5: Establish a clearly defined, implementable strategic plan with metrics
- Priority 6: Realize Sustained Membership Growth

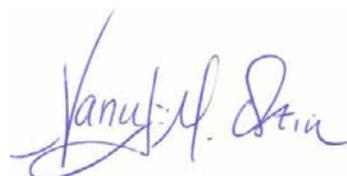
Operationally, the Board of Governors has approved plans for:

- Redesign and re-launch of www.hkn.org
- Integration with IEEE
- Lifecycle Plan - Programs for a lifetime of HKN involvement
- Focus on Fund Development, both Philanthropic and Corporate
- Developing new revenue sources
- Defining present and desired member experience (journey mapping)
- Growing Membership (chapters, inductions, alumni)
- Developing and promote resources for chapters

Look for more information in this publication, our newsletters, social media and emails.

We are very fortunate to have terrific leadership. Our 2016 President, S.K. Ramesh worked tirelessly throughout his term focused on building the programs and reputation of IEEE-HKN. Our 2017 President, Timothy Kurzweg has tremendous experience as IEEE Region 2 Director and as a Faculty Advisor of the Beta Alpha Chapter at Drexel University. Our President-elect, Steve Watkins has been responsible for the recent success of THE BRIDGE as Editor in-Chief, is co-Faculty Advisor of the Gamma Theta Chapter, Missouri S&T, and has devoted a lifetime of service to Eta Kappa Nu -- his love for the Society runs deep! Our three P's will work to bring together the people, resources, plans and programs we need -- it is an exciting time; Thanks for joining us on the ride!

Sincerely,



Director, IEEE-HKN

National Society of Professional Engineers (NSPE)

by: Tom C. Roberts, P.E., FASEE, FNSPE

Tom Roberts has more than 45 years' experience in planning, organizational development, and leadership training programs. After grad school and two years' active duty in the US Army, he worked for Black & Veatch for 16 years...including 11 years in human resources. Tom was also responsible for engineering recruitment & leadership development at Kansas State University for 21 years before retiring in 2014.

Tom currently serves on the National Society of Professional Engineers (NSPE) Executive Committee as President-Elect (2016-17). He served nationally as first Vice President of the American Society for Engineering Education (ASEE) and is currently Chair of the ASEE Academy of Fellows. He was recognized in 2014 as an Order of the Engineer Outstanding Link Coordinator. Tom is Assistant Dean Emeritus, College of Engineering, Kansas State University

Tom's responsibilities at both Black & Veatch and Kansas State included promotion of engineering licensure to practicing professionals, teachers, students and parents, while mentoring high school students to make effective career choices. He is married to Karen who serves as an industry educational consultant and professor in Human Ecology. They have two sons, Greg & Chad.



Tom C. Roberts

Take the FE Exam – Now!!

The worst advice my college advisor ever gave me was "Tom – you don't need to take the FE (Fundamentals of Engineering) Exam." Mind you – we were close and Dean was an outstanding advisor – as an undergraduate, in graduate school, and later in life. Dean was my friend, he mentored and advised me for 40+ years. However, he missed on this one.

So, what excuses have you heard lately?

- "I don't know what the FE Exam is all about."
- "I'll never need it."
- "I'm too busy."
- "I'll do it after I graduate."
- "I already have a job after graduation and they don't require it."
- Any other excuses?

Many college students (and faculty members) just don't understand the value of the FE and the importance of taking it before you graduate.

The fact is – the FE Exam opens doors. It also provides baseline credentials ... and credibility ... and, makes a positive statement about you, your professionalism, and your thoughts about ethics.

A college recruiter recently observed that at least a third of all career opportunities involve (even require) licensure. I have observed in my 40+ year career that you



never know when you'll need that credential, that door opener, that positive statement about ethics and professionalism, the FE Exam.

For example, just in the last 6 weeks, two former students (one IE and one EE – both grads in the mid 2000's) contacted me seeking help – with a job change. One because of changes in industry, the other wanted to move closer to home. Neither had taken the FE Exam (see excuses above) and both were looking at opportunities where licensure matters. Those doors are likely closed. Oh, they'll both find jobs, but it sure would be easier to help them get the interview if they had the FE on their resume.

Bottom-line: don't do what I did (7 years out-of-school before I took the FE). Take the FE Exam while all those classes and theories are fresh in your mind, before you have kids, or . . . (you fill in the blank).

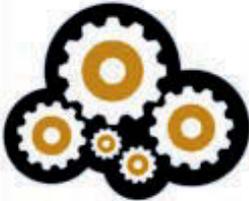
Go to www.NCEES.org and get started – now! And, two other things... join www.NSPE.org and sign up for the next Order of the Engineer ceremony www.order-of-the-engineer.org/. Given today's political climate – the world needs ethical decision-makers in ALL parts of our society, not just the one-third that involves licensure.

Don't Procrastinate: Take the FE Exam – Now!!

The logo for Purdue University, featuring the word 'PURDUE' in a large, bold, black serif font, with 'UNIVERSITY' in a smaller, gold, sans-serif font below it, separated by a thin gold line.

The annual IEEE-HKN Student Leadership Conference (SLC) is the premier event of IEEE-HKN. Each year, students from all over the world gather at a University Chapter for an exciting and informative weekend of programs, and the opportunity to network with fellow students, industry experts and the IEEE-HKN Board of Governors.

This year we are very proud to announce that the Student Leadership Conference will be hosted by the Beta Chapter at the University of Purdue, West Lafayette, Indiana, USA between 31 March and 2 April 2017. All Chapters will be receiving more information very soon, and we hope to see you there!

The IEEE-HKN logo, featuring a cluster of four interlocking gears of different sizes, colored in black and gold.

IEEE-HKN
Student Leadership Conference 2017

The IEEE-HKN logo, featuring a cluster of four interlocking gears of different sizes, colored in black and gold.



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MOVE Makes a Difference

by: James M. Conrad, University of North Carolina at Charlotte; Gregg Vaughn, University of Alabama at Birmingham; Grayson W. Randall and Mary Ellen Randall, Ascot Technologies and Percy F. Shadwell, Jr., Shadwell Technical Services

Abstract

IEEE has a mobile disaster relief program committed to assisting victims of natural disasters with short-term solutions for communications, computer-access, and power. These temporary emergency relief provisions help people stay connected and make sure they can access the help they need. The method of providing these services is through the IEEE-USA sponsored Mobile Outreach Vehicle (MOVE). This vehicle has a large array of technology on-board. Volunteers deploy the vehicle to disaster areas at the request of the American Red Cross Organization. When the vehicle is not deployed, volunteers conduct community outreach and learning opportunities for students and the general public in the areas of Science, Technology, Engineering and Math (STEM). This paper describes the project motivation; formation of a team; the process to fund, design, and develop the MOVE vehicle; truck functionality; special relationships developed; educational use; the impressive results of the first year of operations; and how you can get involved.

Keywords: disaster relief, technology outreach, command center, STEM

I. INTRODUCTION

Have you ever watched the news reports of a natural disaster and wished you could help? With all the talented people in IEEE and HKN, wouldn't it be powerful if we could come together to bring our special problem solving skills to bear to help those in need?

IEEE-HKN members thought they could develop a mobile disaster relief program committed to assisting victims of natural disasters, and MOVE was born.

MOVE stands for **M**obile **O**utreach **V**ehicle and refers to a program offering mobile emergency relief to victims of natural disasters when the power and communications infrastructure is impaired.

MOVE started as a project to engage members and apply members' unique technical skills and problem solving talents to help those in immediate need. Once an initial vehicle concept was developed, it was focus group tested with survivors of Hurricane Katrina and Superstorm Sandy. From that feedback, the concept was modified into what MOVE is today.

This MOVE vehicle has quickly deployable technology which includes two-way internet and phone communications available via satellite, a USB-based device recharging station for cell phone battery packs, onboard power, including solar, equipment hauling capacity, and a remote office environment which can be set up in less than 15 minutes.

Volunteers deploy the vehicle at the request of the American Red Cross Organization to disaster areas. Volunteers maintain the equipment, provide internet access and distribute power bank devices for charging cell phones. When the vehicle is not deployed, IEEE volunteers also conduct community outreach and learning opportunities for the general public and students in the areas of Science, Technology, Engineering and Math (STEM).

The primary goals of this project and vehicle are:

To help the general public who have been cut off by a natural disaster.

- To work cooperatively with the American Red Cross in a partnering agreement to assist us in the implementation and deployment of MOVE
- To reach out to members for skills and assistance, engaging them in a humanitarian project



Figure 1. The MOVE truck

- To engage volunteers by providing a common purpose in the design, development and implementation of a mobile communications center which may be replicated and adapted to other parts of the world
- To educate students on a wide range of communication, power and other technologies through educational outreach
- To utilize students in the implementation of this project
- To reach out to industries during this project
- To share results widely, adapt to other regions and organizations

II. CONCEPTION OF IDEA AND FOCUS GROUP

The MOVE concept was started by a group of volunteers in Region 3 in late 2013 as a pilot to be replicated in other regions worldwide. Region leaders wanted a major project that volunteers in the Region could help specify, design, build, and deploy as a way to engage members in a humanitarian effort close to home. Region 5 joined the effort in mid-2014. Once the IEEE-USA Board of Directors lent their support, the project gained momentum as a way to engage members in the US.

In order to identify the types of services the MOVE project should support, two 90-minute in-person focus groups were conducted on April 9, 2014 at the IEEE Headquarters in Piscataway, NJ[1]. Fifteen IEEE staff participated in total – seven in the first group and eight in the second group. All participants in these focus groups had first-hand experience in a recent natural disaster, Hurricane Sandy. The following is the information they provided:

Services lost during disasters:

- Participants lost power, which led to loss of electricity, and in some cases, water.
- Cell phones lost power, and reception was sketchy at best leading to a total loss of communication for

several days in some areas. People felt isolated and did not know what was happening outside of their homes (or where they were staying).

Services that were lacking:

- **Communication:** Participants agreed that communication was lacking. They did not know where to go for services such as water or power. They did not know what establishments were open. Nearly all information came by word of mouth.

When the concept of the MOVE truck was described to these participants, the idea was embraced by all. The idea was seen as a great opportunity for IEEE to get its name out to the public while providing a service well suited to IEEE's members' areas of expertise. Several participants also suggested we use the vehicle as an educational tool when it is not at an emergency site. Their ideas included bringing the vehicle to schools and libraries to educate children and raise awareness of IEEE among the general public.

III. VEHICLE TECHNICAL SYSTEMS

The MOVE vehicle was designed by IEEE volunteers specifically for the disaster relief mission of this program. It is built on a Freightliner chassis, but the body and interior were custom built to the team's specifications. The truck was manufactured by Matthews Specialty Vehicles in Greensboro, NC, a custom vehicle manufacturer.

A. Power

There are four sources of power in the MOVE vehicle. These are: truck engine, solar panels mounted on the roof, shore power, and a Cummins 10kW diesel generator. The truck engine is used to provide propulsion. The solar panels are used to keep the Rolls Surette S6-460AGM (S6460AGM) Deep Cycle batteries charged when the truck is not in use. The batteries provide limited lighting during travel, power for both satellite systems, and power to the stainless steel identified AC outlets in the body. These special outlets allow people riding in the truck to power laptops and phones while the truck is traveling, without the generator running.

The generator and shore power provide power to the all systems in the body of the truck. This includes the battery charging rack, satellite communications, direct TV for broadcast information, full lighting, heating, and air conditioning in the body of the truck. The 110V power receptacles with the white cover plates require the generator to be running or to have shore power

connected. Shore power is the ability to plug the truck into a receptacle that is powered by the utility company. This is often used when a vehicle is parked for extended time at a home location.

External (GFCI) electrical outlets are available on the outside of the truck body at each corner. This supports the ability to supply power outside the vehicle.

B. Generator Operations

The generator is a Cummins Commercial Quiet Diesel model number 10.0 HDKCC42345 [2]. It runs on low sulfur clean diesel fuel from the same tanks as the truck engine and produces up to 10 kW of power at 120/240 V AC or 41.7 Amps at 240 V AC.

C. Shore Line

The shore line is a power cord that attaches to the side of the truck and is plugged into a receptacle that has continuous power, normally from the utility company. This allows power to the truck without extended use of the generator.

D. Inverter

The inverter is used to supply some power when a primary source (shore power or generator) is not available. We can get 1000 watts of 110v power to operate some identified receptacles and some equipment in the rack. If the generator or shore power is available, the inverter will automatically transfer its load to that source in order to save the battery. When the generator or shore power goes away, the inverter will move the load back to the battery, much like a uninterruptable power supply (UPS).

E. Air Conditioners and Heating

The truck has two roof-mounted air conditioners and two electric space heaters in the body. This provides temperature control for people working inside the body.

F. Lighting

There are four light switches on the main control panel (Fig. 2) to the left of the main entry door. These switches control the following lights:

- 110v florescent lights -- If the generator or shore power is available, this switch will flood the entire room with bright florescent lights.
- 12v LED lights -- This allows some lighting when you enter the vehicle. There is one LED light over the seating area and one LED light over the storage area in the rear. The switch has two positions: "WHITE" turns on the white LED lights; "RED" turns on the red

light. The red light helps reduce glare to the driver when they are turned on at night.

- Left Scene light, when turned on will light the exterior lights on the left (driver) side of the vehicle.
- Right Scene Light, when turned on will light the exterior lights on the right (Passenger) side of the vehicle.



Figure 2. Main Control Panel

G. Solar functionality

The solar panels (Fig. 3) provide charging to the operational batteries in the truck. These operate even when the truck is not in use, thus keeping the batteries charged and ready for operations at all times. It also offsets the power draw when devices are using the batteries as a power source. The charge controller manages all function of the solar panels and requires no user action. It is a smart controller and manages the charging cycle to optimize battery life. It has a cycle that changes the charging current to minimize heat and gassing of the battery thus increasing battery life.

H. Satellite Operations

Direct TV is available with a special antenna mounted to the top of the truck. The satellite TV antenna is a tracking antenna that allows a satellite connection while the truck is in motion. This allows for receiving weather and news reports while en route to and during a deployment.

The Winegard WX1200D antenna is controlled by a Winegard Controller. It deploys the satellite dish, points at



Figure 3. The roof of the MOVE vehicle. In the rear is the satellite uplink antenna. In front of that is an air conditioner. In front of that are 2 solar panels, another air conditioner, satellite TV antenna, and finally, the third solar panel in the front. To the right is the communications equipment rack.

the known position of the satellite, and then executes a fine tuning algorithm to optimize the signal with the satellite. The controller automatically moves the satellite dish to a stow position and folds the dish down onto the roof.

I. Charging Station

One of the two 19-inch racks is dedicated to charging power banks. This charging can only be performed when the generator is running or shore power is available. Shown (Fig. 4) are a charging rack and a charging drawer. Using two 6-port USB chargers per drawer, we can simultaneously charge 12 units per drawer and 120 units per rack.



Figure 4. Charging rack and an individual charging drawer

The charging drawer is flexible and can be reconfigured to hold different size devices. Although we focus on the power banks, any device with a micro USB charging connector can be charged in this rack.

J. Power Banks

The team analyzed several power banks for suitability for this application. The most important features are: mAh capacity of 3500 or more (8000 is desirable for multiple phone charges), charge indicator lights so we know when to remove from the charging station, an illumination light, micro-USB battery charging port and one or more standard USB output connections. The model we chose is also water resistant, dust resistant, and ruggedized. The solar panel charging capability was added because of the small incremental cost and the ability for end users to recharge the devices themselves. The charge rate from the internal solar panel is very slow, but in an extreme emergency, it does allow for additional charge time. The battery bank we use (Fig. 5) was sold by DNK Power through Alibaba.



Figure 5. 8000 mAhr Power Bank

IV. DEPLOYMENT PLAN



Figure 6. Flooding in West Virginia

Each MOVE Disaster Response Team is composed of members performing various roles for which they have been trained and certified. ALL disaster team members must also be Red Cross volunteers.

For natural disasters, volunteers may be assigned to leave with the truck or meet it at its destination. The MOVE Program Director confirms with each volunteer the details for deployment.

During a natural disaster deployment, conditions may be very basic. The Red Cross will provide basic sleeping arrangements (such as a staff shelter) and food. Volunteers will be asked to bring a “Go Bag” or back pack with toiletries, change of clothes, cell phone, medicines and other personal items they will need. Volunteers are often away for 14 days or more on a disaster deployment.

V. THE MOVE TRUCK’S FIRST DEPLOYMENTS

The first disaster deployment of the IEEE MOVE vehicle was 21 days in June-July, 2016. The American Red Cross requested the truck be deployed first to Charleston, West Virginia to assist with relief from a 1,000 year flood. MOVE was subsequently sent to other sites in the state to help with Red Cross communication needs in smaller towns. The success and importance of the vehicle can be summed up in two published quotes:

“Because of the MOVE truck, the Red Cross can bridge the communication gap for folks in the middle of this disaster,” said Barry Porter, regional chief executive officer of the Red Cross in Eastern North Carolina. “People can use the vehicle’s internet to connect family members, and its generator is able to charge cell phones and laptops. IEEE is helping the Red Cross to alleviate some stressors for folks in an emergency situation.” [2]

Volunteer Mary Ellen Randall wrote on the Facebook post of the IEEE MOVE project:

“When the local internet service provider went down in the West Virginia hills, critical phone and internet communications stopped, but only until the IEEE MOVE vehicle’s satellite capability was deployed. Even FEMA stopped by to use our internet access for a short time.” [3]

VI. SUBSEQUENT DEPLOYMENTS

Subsequently, MOVE was deployed to assist with catastrophic flooding in Louisiana with Hurricane Hermine, and Hurricane Matthew, and wild fires in Tennessee -- all in 2016. The volunteers who deployed described the work as difficult, but very fulfilling.

With the possible exception of Hurricane Hermine, which quickly went out to sea, the impact of each storm, flood, or fire had wide-spread impact. The total impact caused relief agencies to provide over two million meals, over one million relief items, and impacted well over 100,000 homes.

Communications, power, technical support and response provided by MOVE and its volunteers helped enable the relief infrastructure needed to provide such services.



Figure 7. The IEEE MOVE truck deployed with other relief vehicles in West Virginia

VII. STEM OUTREACH

The MOVE vehicle provides many opportunities to enhance STEM education. The design of the vehicle makes it unusual, thus provoking curiosity and interest. Our observation is that this curiosity has been encouraging students from grades one through twelve to take time to listen to a short classroom discussion about the vehicles electrical subsystems and then to take a guided tour of the vehicle.

To date, we have had more than 1,000 students from primary and secondary grades tour the vehicle and learn about its technologies. We are observing that at least 50% of the students at each grade level are truly curious to learn more about how things work. They ask questions and follow-up questions. In addition, many of the students have been drawn in by the humanitarian purpose for the vehicle's design.

Included in the presentation is an explanation of geosynchronous orbits, and the equatorial positions of the satellites employed by the vehicle. The realization that our main dish was having a two-way conversation with a satellite 23,000 miles in space really seemed to stimulate their imaginations.

Another aspect of this project's educational objectives is the electronics experimenter's kit that was designed as an adjunct program offered by the vehicle's IEEE volunteer operators. We have developed a rather sophisticated electronics kit that cost less than \$1 each to assemble. These kits (Fig. 4) allow the instructors to have each student perform a whole series of experiments demonstrating many of the fundamentals of electricity and electronics. The components selected included an integrated circuit that provides digital and analog functionality. In the process, students are also taught some of the mathematics of electronic circuit design, and may do calculations to predict circuit operation before new resistor values are installed. All math used at this time is simple, first order algebraic equations. Of course, the students get to keep their functioning kits at the conclusion of the program. With the interest in the MOVE vehicle, IEEE is invited into the classroom to raise interest in STEM, enhance education, and to raise IEEE awareness.

STEM engagements are a great way for HKN chapters to get involved in forming a bright future.

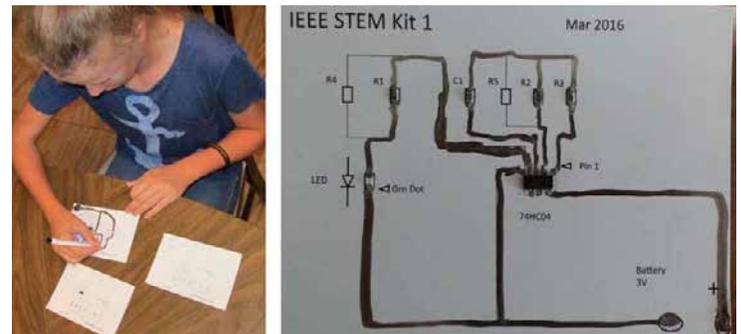


Figure 8. A student uses one of the IEEE MOVE electronics kits developed for STEM outreach

VIII. Summary

The MOVE truck was delivered to IEEE on 4 March 2016, and has been in steady use since that date.

MOVE has been to five natural disasters in 2016 alone with over 55 days of in-service time.

MOVE has been used for STEM education to schools, public visibility initiatives including a hurricane preparation and awareness program, and in two Red Cross Home Fire Campaigns.

On 26 June, the MOVE truck was called out by the Red Cross for disaster relief needed due to severe flooding in West Virginia, USA. MOVE was used to support a remote part of the state where cellular communication was not available. Then, in the West Virginia hills, when the local internet service provider went down on two occasions and when power was lost on another, critical phone and internet communications stopped, but only until the MOVE vehicle's satellite capability was deployed. On those three occasions, MOVE provided power, satellite phone service and internet access, reducing multi-hour outages to minutes.

During this first disaster relief deployment, power banks were distributed to Red Cross relief workers. Because of the rugged terrain, cell signals were inconsistent and cell phone batteries required frequent charging. One relief worker reported that the power bank was key to his ability to perform field work. He reported that he could rapidly charge his phone four times with the use of a power bank.

The next disaster relief effort was historic flooding in Louisiana. MOVE was used to haul equipment, provide satellite internet communications, and power banks to multiple Red Cross Facilities.

The next call was for support for Hurricane Hermine. Again, MOVE provided satellite communications to relief workers.

In the short time since March 2016 that MOVE has been available, it has proven to be a useful in many ways. It has been deployed as a STEM education tool and also educated the public on hurricane preparedness and fire prevention. Perhaps MOVE's most significant work to date was its deployment to the flood, storm and wild fire relief efforts where it provided valuable assistance with

timely communications. Timely communications were provided in the form of IP phones, internet access for reporting conditions and the needs of those impacted by the flooding, running kitchens and shelters, and also assisting in keeping field workers' cell phones charged during times of diminished infrastructure.

IX. What Can YOU Do to Help?

You can make a difference too! As an IEEE-Eta Kappa Nu member, you can help or participate in the following ways:

- Donate: The MOVE project will need to be self-sufficient starting in 2018. You can help by donating to the project by visiting: <https://ieeefoundation.org/donate> and selecting the project "MOVE IEEE-USA Community Outreach Fund"
- Volunteer: Visit <http://move.ieeeusa.org/> and select the "Be a Volunteer!" link
- Outreach: We can visit schools and IEEE Sections for outreach, but we need your local coordination and ask the local operational unit defray travel and fuel costs. Visit <http://move.ieeeusa.org/> and select "More info: STEM Outreach"

X. Acknowledgment

The IEEE MOVE Team would like to thank the IEEE-USA Board for their support of the vision of this project and approval of funding.

The IEEE MOVE Team would also like to acknowledge the American Red Cross for their support during deployment with respect to accommodations and providing for our basic needs.

MOVE is funded by the IEEE Foundation. We express our gratitude to the IEEE Foundation and its many donors. Sponsorships are also available.

For more information, contact Mary Ellen Randall at mer1@ascottechnologies.com.

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Project Lead The Way: A STEM Program for Electrical and Computer Engineering Students

by: R. Joe Stanley, Stuart Baur and Ben Yates

Abstract

Science, technology, engineering and mathematics (STEM) education programs are important in promoting and preparing K-12 students as tomorrow's leaders in engineering and technology fields. Programs such as *Project Lead The Way* (PLTW) provide K-12 students with a variety of areas, including engineering, biological sciences, and computer science, for which they can take structured, hands-on, project-based course sequences. PLTW is a quickly growing program offered in over 9,000 elementary, middle and high schools nationwide and in over 600 programs in the state of Missouri for the 2016-17 school year. There are numerous introductory and college preparatory course options for students interested in electrical and computer engineering available through the Launch, Gateway, Engineering, and Computer Science Pathways in the PLTW programs. This paper will outline what PLTW is, the involvement of Missouri University of Science and Technology (Missouri S&T) in high school teacher professional development, and course content relevant to electrical and computer engineering students, with emphasis on digital electronics.

Overview

PLTW is one of many K-12 STEM education programs that has been developed to promote growth and interest in science and math-related fields. PLTW had its beginnings in New York in 1986, where a career education director and some high school teachers developed pre-engineering courses to help prepare students with knowledge and skills for engineering-related jobs in their local area [1]. In 1997, the PLTW Engineering Program was established in Upstate New York high schools. Since the inception of the program, PLTW added a middle school Gateway program (2000), a Biomedical Sciences program (2008), a Launch program for K-5 (2013), and a Computer Science program (2013). PLTW is a non-profit organization with a number of National Partners that invest \$6 million or more over three years to support PLTW's endeavors [1].

From their beginnings, there have been numerous programs incorporated into these different programs [1]. A summary of courses and units available in each program are given as follows. The high school Engineering program includes *Introduction to Engineering Design* (IED) and *Principles of Engineering* (POE) as foundation courses, and *Aerospace Engineering* (AE); *Civil Engineering and Architecture* (CEA); *Computer Integrated Manufacturing* (CIM); *Computer Science Principles* (CSP); *Digital Electronics* (DE); *Environmental Sustainability* (ES); and *Engineering Design and Development* (Capstone Course) (EDD) as follow-on options. In the Launch program, there are 24 modules taught in 10-hour blocks each covering engineering, biomedical science and computer science topics in K-5. The Gateway program includes foundation units in *Design & Modeling* and *Automation & Robotics*, as well as specialization units in *Computer Science for Innovators and Makers*, *Energy & the Environment*, *Flight & Space*, *Science of Technology*, *Magic of Electrons*, *Green Architecture*, and *Medical Detectives*. The Biological Science program includes *Principles of Biomedical Science* (PBS); *Human Body Systems* (HBS) and *Medical Interventions* (MI) as foundation courses, and *Biomedical Innovation* (Capstone Course) (BI) as options. The Computer Science program includes *Computer Science Essentials* (CSE), *Computer Science Principles* (CSP), *Computer Science A* (CSA), and *Cybersecurity* (SEC) (in development) courses.

All the PLTW programs utilize collaboration from course constituents, research and evidence-based approach for instructional path development, and program-

based experiences for students [1]. PLTW courses are in-line with Common Core State Standards and are developed to complement schools' math, science and communication skills courses offerings [1]. All PLTW courses use activity-, project-, and problem-based curriculum to develop college readiness and workforce skills such as creativity, innovation, team work, time management, and problem solving

PLTW has a central headquarters, currently in Indianapolis, IN. The headquarters provides: 1) leadership, direction, and information for all of its programs; 2) software, equipment and resource guides for all courses; 3) facilities and experts for curriculum development and revision for all courses. There are PLTW regional representatives that work with states within their regions to promote and provide support for the PLTW programs. There is an Affiliate Director for each state that provides direction and oversight of the districts and schools participating in the PLTW programs. The Affiliate works closely and cooperatively with the state department of elementary and secondary education. The Affiliate Director also promotes and recruits districts and schools seeking to adopt PLTW programs. There are more than 9000 elementary, middle and high schools in all 50 states of the US and the District of Columbia that provide PLTW STEM education curricular programs [1]. The Missouri PLTW network has over 600 programs across 47 counties offered for the 2016-17 school year [2]. Each district that participates in a PLTW program must contractually agree with PLTW to fully support its curriculum for each course taught, which includes PLTW trained teachers, purchasing PLTW listed equipment and software necessary for teaching the courses. PLTW, at its headquarters, maintains a Learning Management System (LMS) through which all schools gain access to the curriculum for each course, blogs and resources for teaching the courses, and end of course exams which are required for all schools to give for each high school PLTW course offered.

PLTW has been endorsed by the US Department of Education (2004), Aeronautics Industries Association (2006), Bayer Foundation (2006), and many state and US government and industry leaders [pltw.org]. PLTW has also partnered with the National Aeronautics and Space Administration (NASA) (2003), American Institute of Aeronautics and Astronautics (2011), and College Board (2015) [1].

Missouri S&T Affiliate Partner

Since 2006, Missouri University of Science and Technology (Missouri S&T) has served as the state of Missouri institution to provide professional development, information for counselors/administrators in the Midwest, and high school teacher training through the Core Training Institute (CTI) for courses offered through the PLTW programs. Missouri S&T hosts training for PLTW courses for the high school Biomedical Science Program, Engineering Program, Computer Science Program, elementary Launch and middle school Gateway. Teachers can complete their PLTW certification at CTIs from other states as well as pre-service teacher education offered through university programs.

The CTI structure for PLTW course training for the high school teachers includes: 1) high school teachers registering for the course and providing background information related to the enrolled course; 2) teachers receive instructions for necessary software installation for enrolled courses which must be completed prior to the CTI; 3) course Master teacher (who is a high school teacher), co-instructor (some courses have an Affiliate Professors and others have high school teachers), and enrolled teachers receive access to the online course curriculum; 4) courses are taught over a 10-day period for 80 hours based on the course Scope and Sequence of Units and Lessons (Activities, Theory, Questions/Conclusions/Projects); 5) enrolled teachers submit their Questions/Conclusions/Projects online in the Learning Management System (LMS). Enrolled teachers are required to complete all designated lessons to be certified in the course. For each lesson, there are Established Goals, Transfer, Understandings, Essential Questions, Knowledge, Skills, and References aimed for students whom the high school teachers will teach in the high school PLTW classes. This CTI and curriculum structure is used for all PLTW courses in all PLTW programs.

There are over 150 higher education institutions that recruit PLTW students [1]. PLTW works with particular universities, colleges, and research institutions called Affiliates to promote and support PLTW programs within their states. These Affiliates host PLTW professional development training programs, annual conferences for teachers, school administrators and counselors, give support to PLTW schools, and provide student recognition opportunities [1].

ECE Components

Students who are interested in Electrical and Computer Engineering are recommended to take *Principles of Engineering* and *Introduction to Engineering Design* prior to taking *Digital Electronics*. The *Digital Electronics* course curriculum includes basic DC circuits, number systems, combinational logic and sequential logic with theory and numerous hands-on projects involving breadboarding, robotics kits, circuit design tools used in industry, and programmable logic devices. Figure 1 below shows how teachers use MultiSim® circuit design software to layout and simulate a digital circuit to display the individual digits of the teacher's birthday (in the format 07-15-70) using switches. Starting with the truth table with the switches for a common cathode

K-Map for Segment (b)

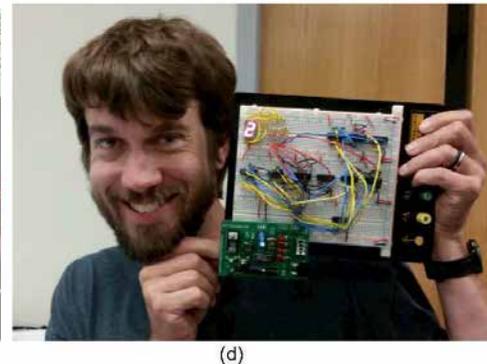
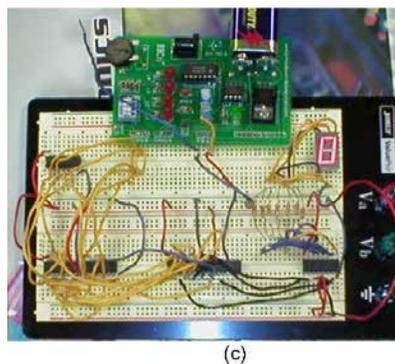
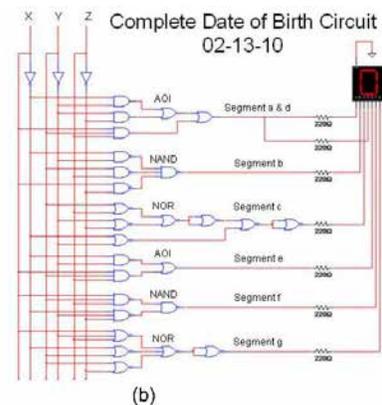
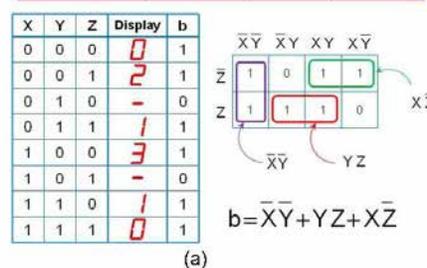
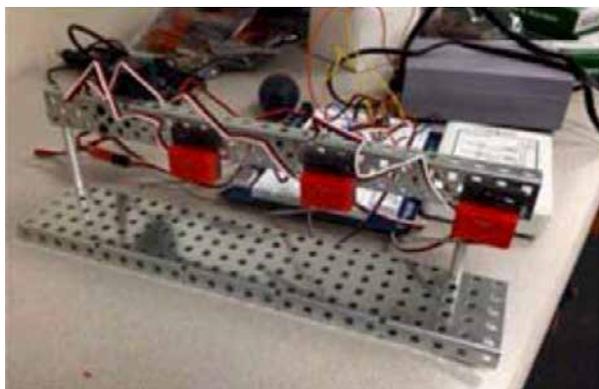
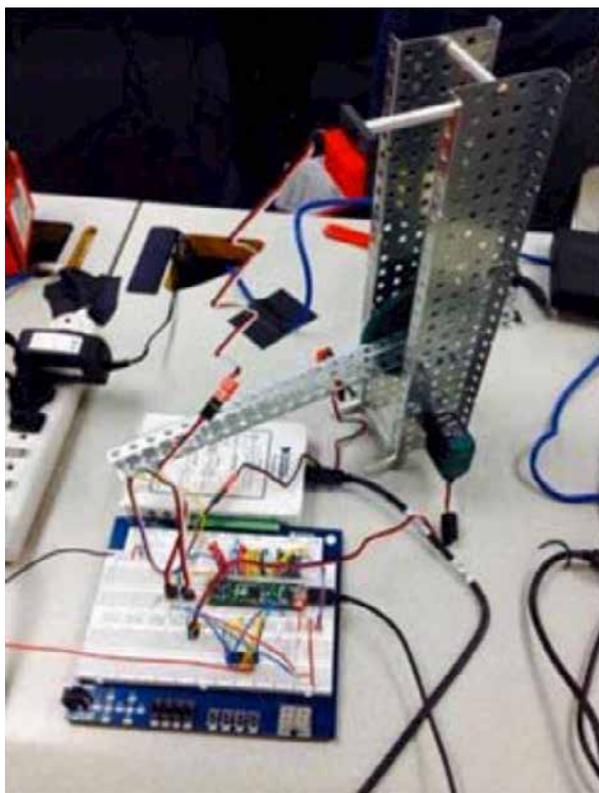


Figure 1. Birthday project (a) Truth table and Karnaugh map for segment b of the 7-segment display (b) MultiSim® implementation (c) Breadboard implementation (d) Teacher with completed birthday project



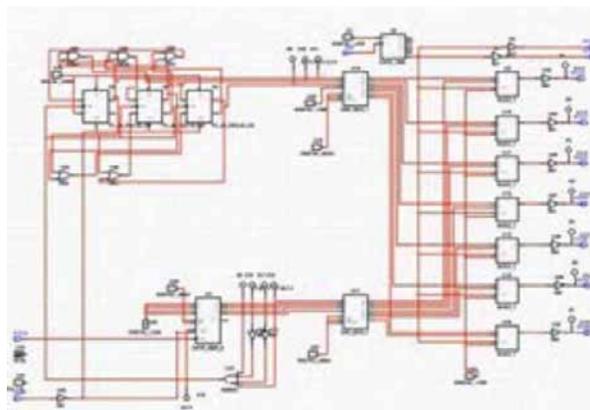
(a)



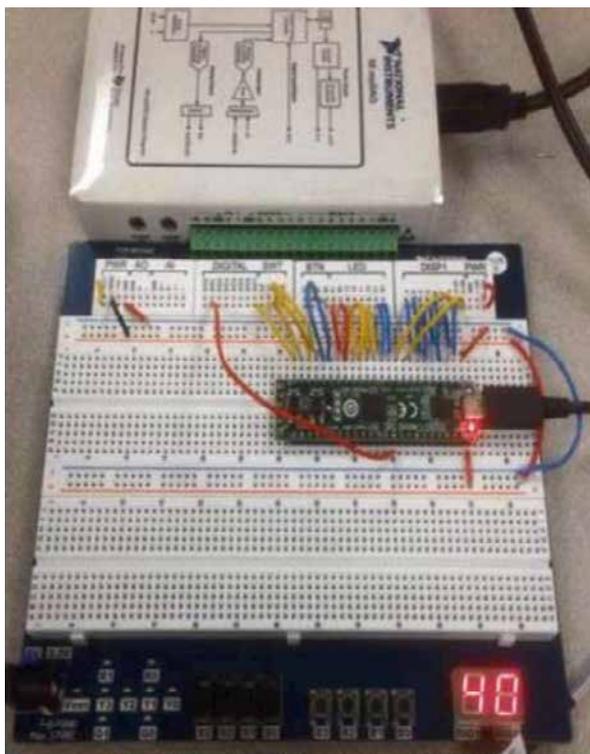
(b)

Figure 2. Project examples using Vex robotic kit and FPGAs (a) Copier Jam project (b) Toll booth project

7-segment display, simplified Boolean expressions are found to implement each of the segments a-g. Design constraints such as 2-input AND/OR/INVERT, NAND- or NOR-only logic are specified to require teachers to determine the most appropriate approach (such as using the fewest number of components) to implement the different segments. Teachers use the pin numbers and parts from their verified MultiSim® circuit layout and the switches from the breadboard companion (<http://www.breadboardcompanion.net>) to breadboard their circuits. The teachers repeat this



(a)



(b)

Figure 3 60 second timer project example (a) MultiSim® circuit design using Digilent CMOD S6 (b) Breadboarded circuit

problem and circuit design and implementation using a breadboardable Spartan-6 Field Programmable Gate Array (FPGA) (Digilent CMOD S6). Figure 2 shows two Vex Robotic kit-based projects with switches and DC motors for copier jam and toll booth gate applications. Both projects require teachers to layout circuits using MultiSim® to program the Digilent CMOD S6. The toll booth project utilizes state machine design to control the motor in opening and closing the toll booth gate. Figure 3 presents the MultiSim® design with Digilent CMOD S6 implementation for a 60 second timer. This

circuit uses multiplexers with an internal clock to switch between the two digits displayed to give the appearance that both digits are being displayed concurrently. Four-bit counter components are implemented to generate the ones and tens digits for the 60 second timer.

Table 1 below shows the number of Missouri High School teachers who took the Digital Electronics course from 2006-2016.

In addition to the CTI, the enrolled teachers receive technical support through available PLTW course-related blogs and from the Master Teacher and Co-Instructor. 126 high school teachers have been trained in Digital Electronics through this program. In addition, in 2015, Doug Starkey, Master Teacher for the Digital Electronics course from Camdenton High School, and one of the authors (Dr. Stanley) co-created, coordinated and co-instructed Digital Electronics refresher training courses. This was one of the first structured refresher courses of this type offered in the US, for high school teachers who have been certified to teach the Digital Electronics course with current previous versions of the Digital Electronics curriculum. Since 2015, there have been over 50 high school teachers and presented course revision experiences in three sessions at the Missouri PLTW State Conference and at Missouri S&T.

Table 1 High school teachers taking Digital Electronics course from 2006-2014.

Year	Number of Teaches in Digital Electronics Course
2006	12
2007	12
2008	17
2009	18
2010	8
2011	12
2012	13
2013	8
2014	10
2015	6
2016	6

In 2015, Missouri S&T began offering college credit (Computer Engineering 1200-Introduction to Digital Electronics) for high school students successfully completing the Digital Electronics course. Missouri S&T also offers *Mechanical Engineering 1720 - Introduction to Engineering Design* college credit for high school students completing both the *Principles of Engineering* and *Introduction to Engineering Design* courses, which is a required course for engineering majors. Missouri S&T offers college credit for several PLTW courses taken from the Biomedical sciences program.

There are other PLTW courses that would be of interest to electrical and computer engineering students, including *Engineering Design and Development* (Capstone Course) (EDD), *Computer Integrated Manufacturing* (CIM), *Computer Science Principles* (CSP), and several courses in the computer science pathway.

Impact

There have been a number of studies at other institutions highlighting the benefits of PLTW compared to students who have not taken PLTW courses such as math assessment scores [3,4], attendance [5], ethnic diversity [6,7], and grades [8]. Missouri S&T is completing its first year of a five- year study to examine the impact of PLTW on students in academic performance, retention, student organization participation, and career choice and opportunities, compared to students who did not take PLTW courses in high school. Initial studies have focused on PLTW teacher and Missouri S&T student surveys to examine factors impacting career choices, college selection, and academic performance [9,10,11]. A recent study [11] from over 1300 Missouri S&T students highlighted that: 1) *Digital Electronics* is the third most commonly taken PLTW course from the engineering program in high school, behind *Principles of Engineering* and *Introduction to Engineering Design*, which are foundation courses. 2) Over 88% of students who have taken PLTW courses are seeking careers in Engineering/ Technology/Industry compared to about 81% of students who have not taken PLTW courses in high school. 3) Students taking PLTW courses were shown to have completed higher levels of math and physics in high school than students who did not take PLTW courses. 4) Students who have taken PLTW courses had greater participation rates in Robotics clubs and teams than students who have not taken PLTW courses.

Close

PLTW is having a substantial impact in promoting STEM-related fields and preparing K-12 students for their college and professional careers, certainly in Engineering/Technology/Industry fields. There will be over 600 PLTW programs available in the state of Missouri for the 2016-17 academic years [2].

There are numerous outreach opportunities for current and graduated Missouri S&T students, student groups such as IEEE-HKN, and engineering professionals to support and promote student exposure to electrical and computer engineering career pursuits. Some outreach examples include: hosting or attending as judges PLTW design competitions and showcases; mentoring K-12 students in neighboring school districts with their project design-based activities and exposing those students to career opportunities through testimonials; and serving on technical advisory boards found in most school districts with PLTW programs to provide guidance, direction, and service for local PLTW-related functions.

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Author Biographies



Dr. R. Joe Stanley, Associate Professor of Electrical and Computer Engineering at Missouri University of Science and Technology (Rolla), received a Ph.D. from the University of Missouri-Columbia. His interests include image processing, medical informatics, and pre-college outreach. He is an Affiliate

Professor for PLTW for Missouri S&T. He was inducted into HKN by the Gamma Theta Chapter and is the 2016 winner of the C. Holmes MacDonald Outstanding Teaching Award.



Dr. Stuart W. Baur, Associate Professor of Civil, Architectural and Environmental Engineering at Missouri University of Science and Technology (Rolla), received a Ph.D. from the Missouri University of Science and Technology. His interests include alternative energy, architectural materials, and pre-college outreach. He is an Affiliate Professor for PLTW for Missouri

S&T. He is a registered architect in Florida.



Ben Yates served as Affiliate Director for the PLTW program at Missouri S&T from 2011-2016. He has a degree in Educational Administration from the University of Missouri-Columbia. Prior to 2011, he worked in teacher education at the University of Central Missouri and in various positions in

the secondary school system. He is a co-author of Gateway to Engineering, a middle school textbook that based on the PLTW program.



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HKN's Greatest Asset: Alumni

by: Larry Dwon, Kappa Chapter

The history of HKN is a struggle of setting honorable goals and striving to achieve them. There were occasions when the Association was in serious financial and governance trouble. It survived only because of its most valuable asset -- involved and dedicated alumni members. Alumni members who have not yet become actively involved in the affairs of our Society in a positive, honorable, and continuing manner represent a potential asset, which should be nurtured to become the association's greatest asset. Maurice Carr, principal founder of the Association, stated the foregoing in the following elegant manner: "Eta Kappa Nu grew because there have always been many members who have been willing and eager to serve it loyally and unselfishly..."

Tom Rothwell, a good example, expressed himself on this subject as follows: "Yes, alumni are HKN's greatest asset. We have the wisdom, the history, and bring the continuity to HKN that our formal governing bodies are incapable of providing."

EXAMPLES

John Weigt volunteered to edit and publish the Bridge when it was in its most serious editorial and financial difficulty period. Roger I. Wilkinson conceived, developed, implemented and guided the Outstanding Young Electrical Engineer Award program from 1936 until his death in 1985. He also served HKN in other distinguished ways. A. B. Zerby served our society unselfishly for 20 years before becoming Executive Secretary and Bridge Editor for an additional 23 years. Many other alumni members served on committees, as elected officers, or as advisors to elected officers, at the national and student chapter levels.

Three advisory groups played substantial roles in times of great difficulty -- National Advisory Board, New York Alumni Chapter's Advisory Council and the Los Angeles Area Alumni Chapter. Each of these groups of alumni members provided guidance (when requested) to those alumni who were elected and entrusted to govern Eta Kappa Nu honorably and effectively.

FACULTY ADVISORS

Faculty advisors guide our active college chapters and are expected to provide the continuity of HKN tradition among the new initiates and inspire them to become active on campus and in the adjacent community. Effective faculty advisors have an advisory responsibility to student members and can directly influence the quality of activities, the image of the HKN chapter, and the number of student member initiations. HKN should always find ways to get quality performers appointed as faculty advisors to its student chapters.

VISITATIONS

The Eta Kappa Nu constitution specifies visitations by the Executive Secretary or other alumni members to whom he delegates such duties. This provision was inserted when, for financial reasons, assembled conventions were discontinued. In 1962, a Regional visitation program by alumni volunteers was developed to supplement personal visits to chapters. They provided some of the benefits of former conventions, but with less cost than the original assembled conventions incurred.

The principal purpose of the regional visitation program was to facilitate open communication between alumni and college chapter members. Alumni with long experience in HKN affairs could provide guidance and motivate students to continue to serve the society for mutual benefit. Chapter activities, local and national HKN problems, and future goals of the association were discussed. The main idea in this program was to utilize

alumni to inform and help student members, faculty advisors and any officers who might attend.

ALUMNI AS MENTORS

Tom Rothwell, Chair of the Los Angeles Area Chapter, recommends a mentor program which deserves the attention of the association. Such an activity can be held wherever alumni work or live in close proximity of an electrical engineering school with an active chapter of HKN. It would be a continuing association between alumni and student chapters rather than one shot visits, as is the case with either visitation program. While personal contacts between a mentor and the students would be the most desirable, it is conceivable that mentors could also be effective using the telephone and/or email by which to communicate.

INDUSTRIAL CHAPTERS

Another idea that has great potential is the Industrial Chapter concept. Only one group of alumni employed by American Electric Power Service Corp. petitioned and was granted per mission to install such a chapter in 1975.

The Industrial Chapter concept was suggested by a Boardappointed committee comprised of B. Sheffield, Chair, W. H. Pickering, A. A. Chizmadua, and R. S. MacMillan. In 1973, these members stated that the creation of Industrial Chapters would provide a means of achieving or promoting the following objectives;

- To improve the professional image and to re-establish the identity of, and pride in, the profession of electrical engineering and thereby promote professional status and well-being.
- To provide continuity of associations and activity in Eta Kappa Nu following graduation from college. To provide an opportunity for individual development beyond that which is afforded by the typical two or three semester period of student membership



- To provide support and inspiration to college chapters and their members, and to provide a liaison with college chapters which may result in attracting and placing particularly promising new graduates.
- Contribute to and enhance the appeal of the Bridge.
- To broaden the membership base of the Eta Kappa Nu Association through the formation of new chapters and by the induction of a proportionally larger number of outstanding practicing engineers as professional members.

This program encompasses tremendous potential for alumni participation in the objectives of HKN regarding education, quality performance, as well as ethical and professional practices. It could lead to the formation of alumni chapters in areas where several industrial chapters exist. This would provide opportunities for alumni members who are employed in companies where industrial chapters do not exist to become active in HKN.

OTHER EXAMPLES

It should be pointed out that alumni may also serve on committees and write or solicit appropriate articles for the new Bridge.

CONCLUSION

As Maurice Carr stated, all it takes is loyalty, dedication and unselfish effort. A response by letters to the editor would be appreciated.

Don't just be members; Become HKN Assets.

Author Biography



Larry Dwon provided leadership at American Electric and Gas, and his dedication to teaching helped steer engineering education in a more practical direction. Born in 1913 in New York City to Polish and Ukrainian immigrants, Dwon earned scholarships to

attend Cornell University graduating with an E.E. degree (1935). In 1954, he earned an MBA degree from NYU Graduate School of Business Administration. He then joined Diehl Manufacturing Company designing electrical motors. His desire to work in power engineering led him to American Gas and Electric Company, which later became American Electric Power Service Corporation (AEPSC). Dwon remained with AEPSC for 40 years, working 20 years in engineering and 20 in management. During World War II, he was granted a leave to join the Office of Science and Research Development, first assigned to Harvard Radio Research Labs and then at Bell Telephone Labs. Following the war, he returned to AEPSC and taught electrical and illuminating engineering programs at the Pratt Institute and the Polytechnic Institute of Brooklyn. Following his retirement in 1978, he continued to teach at North Carolina State University and to work as an industry consultant.

Larry Dwon was a dedicated volunteer in Eta Kappa Nu and the Institute of Electrical and Electronics Engineers (IEEE) -- organizations he has served prominently and continuously for over 70 years. Perhaps his greatest contribution to Eta Kappa Nu is the History of the Association, which he wrote in 1976. He has also served as the Association's President and as chairman of several national committees. In IEEE, he conceived the need for and helped to found and develop the Power Engineering Education Committee. He served on the Education Advisory Board and volunteered extensively in IEEE-USAB, now IEEE-USA. His work with IEEE Student Professional Awareness Conferences (SPACs), which he conceived and helped to develop, has received many commendations and culminated in the Dwon Hall of Fame, created in 2002 to recognize outstanding IEEE Student Branches. Throughout Dwon's career, he earned many awards including the Eta Kappa Nu Distinguished Service Award in 1976, the EEI Special Citation for Leadership in establishing relations with engineering educators in 1977, and the IEEE Centennial Medal for Leadership in Power Engineering Education. He wrote and published many technical papers and articles and spoke at over 200 SPACs and before other audiences. Eta Kappa Nu named Dwon an Eminent Member in 1984, and he is a Fellow of IEEE. Larry Dwon died on 4 February 2009.

Interested in alumni activities? Interested in volunteering? contact info@hkn.org

The Engineering and Technology History Wiki has other information on Larry Dwon's career. http://ethw.org/Larry_Dwon

EPICS in IEEE: Empowering Students, Impacting Communities, and Changing Lives

by: Ray Alcantara, EPICS in IEEE Program Manager

Engineering Projects in Community Service (EPICS) in IEEE empowers teams of university and high school students to collaborate on socially innovative projects that will have a lasting impact on local humanitarian organizations and community members.

To date, EPICS in IEEE has supported over 99 projects developed by various student branches, providing assistance to over 150,000 people across the globe. Each year, EPICS in IEEE sees a tremendous increase in the level of diversity among these projects. While some focus on creating air-monitoring technology or waste recycling programs to help promote self-sustainability, others concentrate on powering rural villages with solar cells or building mobile devices for better healthcare screening. Additional projects involve preparing low-cost speech aid devices for the hearing impaired, providing interactive vision therapy for those with eye disorders, or developing intelligent communication software for special needs children.

IEEE-Eta Kappa Nu members looking to volunteer with EPICS in IEEE stand to benefit from a priceless, life-shaping experience. Student volunteers participating in the program gain a first-hand appreciation for how technology improves lives in their own communities. This is also certain to stimulate a lifelong interest in community engagement.

Through a combination of service learning and civic engagement, EPICS in IEEE allows those in the engineering field to witness firsthand how their knowledge and experience can make a real difference in people's lives. In addition, by designing and implementing sustainable solutions that meet individual and societal needs in communities, students have the opportunity to foster technological innovation and excellence worldwide.

Students involved in the EPICS in IEEE program continue to demonstrate positive growth in areas like project management, leadership development, critical thinking/problem solving, and emotional intelligence. As such, EPICS in IEEE helps build a global workforce of talented, diverse individuals prepared to take on the challenge of IEEE's core purpose: to advance technology for the benefit of humanity.

For more information and how IEEE-HKN members or chapters can get involved, visit the EPICS in IEEE website.



▲ IEEE Student Branch members working on a solar array in Senegal



▲ IEEE Student volunteers assembling and installing a solar panel to provide light for a school in rural Africa.



▲ IEEE Volunteer explaining engineering concept to high school students in New Jersey

Bridging the Language Gap in Education with a Free-Access Multilingual Online Platform



by: Rui Costa

Founder and Coordinator of IEEE Academic

Language is the key component for the success of our learning process. As we grow up, we develop a toolkit of techniques to accelerate the process of educating ourselves with the basics of mathematics, history, physics, the understanding of nature, poetry, and all. As technology evolves, the list of online educational initiatives is unending, but some concerns arise with all that diversity.

According to UNESCO's Global Education Monitoring Report, 40% of the global population does not have access to education in a language they speak or understand. That alone collides with the single basic component that unlocks the door for knowledge sharing and personal development.

The problem stands when the existing online education efforts adopt a one-size-fits-all model, creating content for a global audience all at the same time. We felt we could do something to help and give back to our community -- and that's when IEEE Academic was born.

It's a distributed project that recruits students and professors from all over the world, provides a set of common resources, and empowers them to create content addressing local needs -- often solving their

problems, as a single video can help countless students over the years. Videos are done in local languages, focusing first on the most difficult topics of the community, thereby helping people to enhance and accelerate their learning process without any barriers.

All contributions are published into a long-lasting library at academic.ieee.org, freely available to everyone in the world. Students can improve their learning -- professors can enhance their classes, thus flipping the classroom and freeing time to engage with their students and improving education overall. Professionals can stay up-to-date with the latest developments or review something they studied many years ago, working actively toward their career development. IEEE Academic provides global, diversified, multilingual, and easy-to-access knowledge for all ages and stages of the professional life.

When we started building IEEE Academic in 2011, we realized that by leveraging the efforts of a distributed international team of students, we could give back to our community as well as other communities all over the world. By combining the most innovative ideas and technologies, we can now help make education accessible to everyone, everywhere -- for free.

First Commercial Transistor Radio

by: Steve E. Watkins

The Regency TR-1 was introduced in October 1954 by two companies: Texas Instruments and Industrial Development Engineering Associates (IDEA). This AM radio exploited the availability of transistors for a pocket-sized radio as an alternative to conventional tube-based radios. The electronic circuitry was patented by Richard C. Koch (U.S. Patent 2,892,931) and the case design was credited to Victor Petertil (US Design Patent 176,480). The radio was based on four germanium transistors supporting a super-heterodyne circuit as shown in the patent schematic. Among the development challenges were keeping the manufacturing costs low and obtaining the needed miniature components. The radio was a commercial success with about 100,000 sold within a year of introduction. It created a new consumer market for portable radios, it was the first major electronic device to be made personal, and it helped introduce transistor technology to the wider public.

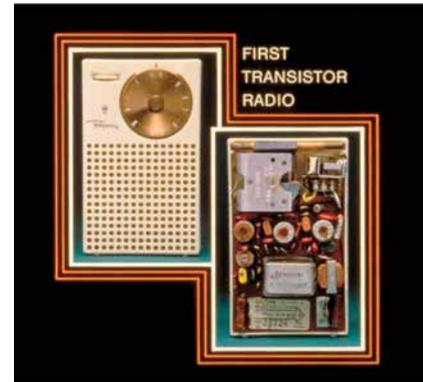


Figure 1. Regency TR-1, transistor radio from Texas Instruments. Image courtesy of TI News Center.

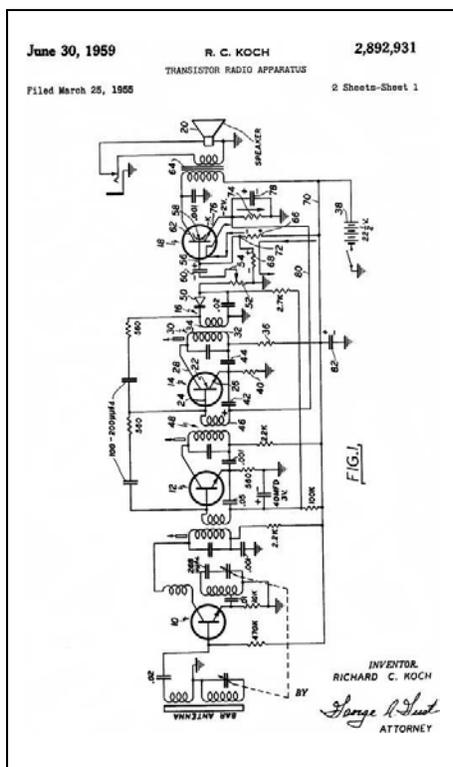


Figure 2. Schematic of transistorized radio. Image from U.S. Patent 2,892,931, Awarded June 30, 1959.

The case dimensions were 5x3x1¼-inch and barely accommodated the components as shown in Fig. 1. The case came in several colors including black, white, red, and gray. The tuning dial included red triangles to note the CONELRAD frequencies of 640 kHz and 1240 kHz. (The CONELRAD system was a Cold War system for emergency broadcasting.) An early production model with a clear case for demonstration is featured online by National Museum of American History, Smithsonian Institution in their Texas Instruments Collection," at http://smithsonianchips.si.edu/texas/t_266.htm.

The significance of this transistor radio was immediately recognized. The Regency TR-1 was featured in multiple technical and lay publications including the cover image for the December 1954 *I.R.E. Proceedings* by the Institute of Radio Engineers (a predecessor society for IEEE). The design was an improvement in terms of transistor count over prior laboratory prototypes and the approach led to market for miniaturized discrete components. Its commercial success encouraged the further development of transistorized radios and other electronic consumer devices by companies such as Texas Instruments, Raytheon, RCA, and Sony. Transistor production had supported a limited high-end market, e.g. military applications, with a small production volume. After the transistorized radio, transistor production and quality control increased dramatically and the associated unit cost dropped which further encouraged the consumer electronics industry. The schematic from the patent is shown in Fig. 2.

For further details on these historical events, see:

M. F. Wolff, "The Secret Six-Month Project: Why Texas Instruments decided to put the first transistor radio on the market by Christmas 1954 and how it was accomplished," *IEEE Spectrum*, 22(12) 64-69 (1985).

"T.I. Unveils Transistor Radio," Engineering and Technology History Wiki, http://ethw.org/T.I._Unveils_Transistor_Radio

IEEE Power & Energy Society Scholarship Plus and IEEE HKN -- A Natural Partnership

by: Dan Toland, Director - IEEE PES Scholarship Plus Initiative

The IEEE Power & Energy Society (PES) Scholarship Plus Initiative and IEEE-HKN are programs that recognize high achieving undergraduate students. In the case of PES, these students are electrical engineering majors who have committed to exploring the power and energy fields through both coursework and career experiences. As I'm sure you are aware, IEEE-HKN recognizes engineering students who demonstrate the qualities of Scholarship, Character, and Attitude -- I think both programs recognize outstanding students. I am pleased to report that the following IEEE HKN members were recognized as IEEE PES Scholars for the 2016-17 academic year.



IEEE Power & Energy Society
SCHOLARSHIP PLUS INITIATIVE®
Preparing the Next Generation of Power & Energy Engineers

First Name	Last Name	School	HKN Chapter
Zachary	Smith	Auburn University	Xi
Krista	Miguel	California State University Fresno	Theta Kappa
Liangjian	Gao	Drexel University	Beta Alpha
Stephen	Hebenstreit	Drexel University	Beta Alpha
Gabrielle	Madden	Drexel University	Beta Alpha
Matt	Marcou	Drexel University	Beta Alpha
Jose	Ruiz	New Mexico State University	Gamma Chi
Catherine	Ambrose	North Carolina State University	Beta Eta
Gianna	Scioletti	Northeastern University	Gamma Beta
Derrick	Webster	Prairie View A&M University	Zeta Lambda
Aaron	Barnes	Purdue University	Beta
James	Dixon	Purdue University	Beta
Henry	Wegehaupt	South Dakota School of Mines and Technology	Beta Chi
Andrew	Hora	South Dakota State University	Gamma Rho
Samantha	McBrayer	South Dakota State University	Gamma Rho
Holden	DeGrave	University of Alabama	Iota Alpha
Alisha	Goad	University of Alabama	Iota Alpha
Christopher	Ellis	University of California, San Diego	Kappa Psi
Zachariah	Lakel	University of Colorado at Boulder	Rho
Kelly	Higinbotham	University of Connecticut	Beta Omega
Derya	Tansel	University of Florida	Epsilon Sigma
Amanda	Beck	University of Illinois at Urbana-Champaign	Alpha
Tony	Zhang	University of Maryland, College Park	Gamma Xi
Binh	Phan	University of Southern California	Upsilon
Summer	Church	University of Tennessee, Knoxville	Beta Phi
Jaclyn	Wilson	University of Washington	Iota Upsilon
Jeffrey	Miller	Virginia Commonwealth University	Kappa Chi

Catherine Ambrose, Kelly Higinbotham and Gabrielle Madden were selected as the top PES Scholars from their respective IEEE Regions and are all active within IEEE-Eta Kappa Nu Chapters at their respective schools.



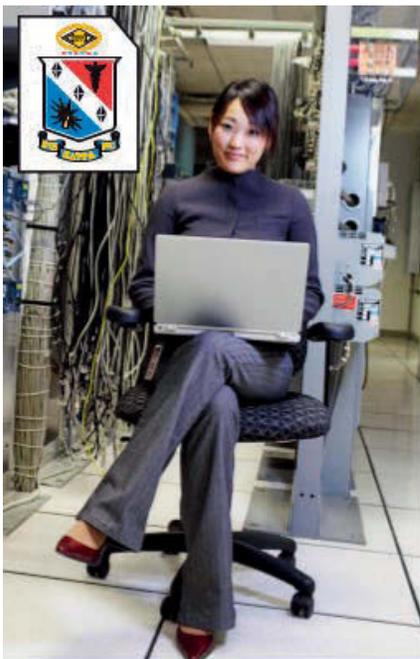
Summer Church, Beta Phi Chapter at the University of Tennessee is a 3x recipient of the IEEE PES Scholarship Plus Initiative. She will be graduating with an EE degree in May 2017.



Kelly Higenbotham, Beta Omega Chapter at the University of Connecticut was recognized as the top PES Scholar in IEEE Region 1. Professor Peng Zhang also recognized fellow PES Scholar, Ethan Freund.

Since 2011, 119 students who have been inducted into Eta Kappa Nu have also been recognized as PES Scholars, with 55 of these students indicating that they have full time jobs within the Power & Energy Industry.

The 2017 application period for IEEE PES Scholarship Plus Initiative is 1 March to 30 June. Recipients will be selected by October 2017 – if you will be full time undergraduate student in September 2017 please consider applying for the scholarship. Please visit the IEEE PES Scholarship Plus website to review eligibility requirements and learn more about the program.



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IEEE-Eta Kappa Nu



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IEEE Teacher In-Service Program (TISP) Training Workshop

by: Supavadee Aramvith

IEEE-HKN Mu Theta Chapter, Chulalongkorn University, Bangkok, Thailand

The focus of *IEEE's Teacher In-Service Program (TISP)* is helping pre-university educators bring exciting hands-on engineering lessons into their classrooms. Once trained, IEEE volunteers can connect with pre-university schools in their local communities to deliver professional development sessions to educators.

During the workshop, IEEE volunteers are able to share their ideas, technical skills, and experiences to explain engineering concepts. In addition, the educators and engineers can develop long lasting collaborations in order to promote technology, mathematics, and science disciplines to schools, as the local school is a key feature of the TISP program. TISP has three main objectives:

- Enhancing the level of technological literacy of pre-university educators;
- Establishing engineer/educator partnerships to promote applied inquiry-based learning;
- Exposing educators to career options for their students in engineering and other technical fields.

A TISP training workshop was held in Bangkok, Thailand on 6-7 August 2016. The event was co-organized by IEEE Region 10 Educational Activities Coordinator, Associate Professor, and Mu Theta Faculty Advisor, Dr. Supavadee Aramvith; IEEE Thailand Section Educational Activities Chair, Assistant Professor Dr. Wattana Kaewmanee; and IEEE Educational Activities Professional Staff. There were fifty-two participants, representing educators; ministry of education representatives and IEEE volunteers

from eight countries. The workshop was facilitated by Lynn Bowlby and Yvonne Pelham of IEEE Educational Activities Staff.

Sohaib Qamar Sheikh, a member of the IEEE Educational Activities Board opened the program with an overview of IEEE, its involvement in pre-university education, and the Teacher In-Service Program. The two lesson plans demonstrated during this workshop were *'Working with Wind Energy'* and *'Build Your Own Robot Arm'*. The participants were divided into teams of two. The objectives of the exercise were to work in teams, use time management; be creative; flexible; adaptable; broad-minded; and use analytical and critical thinking skills.

Additionally, the Director of Chalabhorn Science High School Center presented one education model in Thailand which is focused on Science, Technology, Engineering, and Mathematics (STEM). The six characteristics of great STEM lessons are provided as follows:

1. Focusing on real-world issues and problems: students could address real social, economic, and environmental problems and seek solutions.
2. Following the engineering design process: students have to define problems, conduct background research, develop multiple ideas for solutions, develop and create a prototype, then test, evaluate, and redesign them.



3. Immersing students in hands-on inquiry and opening-ended exploration: students' works could be hands-on, collaborative, and solved solutions. Students could also communicate to share ideas and redesign their prototypes as needed.
4. Involving students in productive teamwork: aiding students to work as a productive team using the same language, procedures, and expectations.
5. Applying rigorous math and science content your students are learning.
6. Allowing for all possible answers and reframe failure as a necessary part of learning.

At the conclusion of the presentations the participants were divided into breakout groups by geographic region to begin to form an action plan for providing professional development sessions to educators in their local areas. The action planning process is a very important step as it allows educators to share potential opportunities and threats to building a relationship with a school system. Following the workshop session, volunteers are tasked with connecting with their local pre-university school communities to provide professional development sessions to educators.

After participating in the workshop, volunteers have the tools and resources needed to work toward enhancing the technological literacy of local pre-university educators and to support them in the teaching science, technology, engineering, and mathematics subjects. The local pre-university educators who have participated in the workshop are able to integrate the hands-on



activities into their classroom curriculum. Furthermore, these workshops can potentially help communities by teaching young students how to use engineering and technology in daily life. Our goal is to encourage more students to study engineering and technology at the university level and perhaps pursue a career in an engineering field.

Reaching Out to Inspire the Future

by: **Elizabeth Kurzawa, Sr.**

Educational Outreach Program Manager, IEEE

The pre-university education arena offers a number of opportunities for IEEE-HKN members to share their knowledge and passion through outreach. Whether it's sparking that a-ha moment, bringing the wow factor, combatting misconceptions, or simply enabling young people to meet a real live technology professional or student; outreach can have a profound impact. IEEE receives numerous requests each year from pre-university teachers and students alike to connect with an engineering, computing or technology professional. This is where IEEE-HKN members and chapters can help.

There are opportunities in both formal and informal education for members to make a real difference. Formal educational opportunities can include anything from in-class activities, to school assemblies, to career day events. To connect with teachers and students in your area, it is often helpful to reach out to your local school district's administration office, science coordinator, or your parent teacher association (PTA). You may consider offering to conduct a hands-on activity, give a talk about your own career path, or showcase exciting new technology for students.

Informal educational opportunities might entail afterschool programs or clubs, weekend events, summer camps, competitions, science fairs, maker fairs, or community nights. Informal programs may be run by local colleges and universities, community-based organizations (e.g. Make STEAM), non-profits (e.g. Girl Scouts), or museums and science centers. These programs may afford opportunities to coach teams of students on projects, provide mentorship, serve as a technical judge, or run interactive activities.

There are also annual events that can serve as prime opportunities to conduct outreach activities. Engineers Week, which is an annual celebration of the contributions of engineers to our world, takes place in February. Discover.org lists Engineers Week activities in your area that may be in need of volunteers. Computer Science Education Week, which takes place each December, also hosts the Annual Hour of Code, which encourages everyone to try a one-hour coding activity during that time period. Code.org lists dozens of tutorials that can be used to teach students the basics of programming.

IEEE
TryComputing.org



TryEngineering

IEEE also offers several pre-university education resources that can provide outreach ideas and activities including the TryEngineering.org and TryComputing.org web sites. Tryengineering.org, available in several languages, is a free online resource about engineering and engineering careers for pre-university educators, parents, and students. The site features information on becoming an engineer, profiles of engineering professionals and undergraduate students, an accredited engineering degree program search tool, over 130 hands-on lesson plans, and online engineering games.

IEEE TryComputing.org is a free computing education web site for the pre-university community. This site offers a variety of resources about computing and associated careers. Visitors can learn how to prepare for undergraduate computing studies and search for accredited computing degree programs globally. They can also explore how computing careers can make a difference – and meet computing professionals, students, and heroes. IEEE TryComputing.org features a variety of lesson plans on computing topics, as well as tools and opportunities to support and encourage students in computing.

Whether you organize a chapter-wide outreach event or decide to volunteer on your own; no contribution is too great or too small. Outreach activities can encourage pre-university students to explore their interests, build their skills, or consider careers in IEEE's disciplines. Your dedication and enthusiasm might just inspire a future engineering, computing, or technology professional who will change our world.



Founders Day 2016

#HKNFoundersDay2016 was celebrated by over 60 chapters around the world, from our newest chapters in Thailand to Seattle. Chapters used this opportunity to promote IEEE-HKN through: community service; outreach; workshops; trivia; engineering olympics; pizza parties; ice cream socials; Bar-B-Q's; bowling and fun! For more photos of the activities and fun, visit the IEEE-Eta Kappa Nu Facebook page.

Iota Omega Chapter, Cal State Fullerton

For Founders Day, we finished building our 'Squishy Circuits' maze for a Girl Scout STEM outreach event for which we were a part. After completing our poster boards, we went to the EXPO event and manned two booths promoting IEEE-HKN and electrical and computer Engineering for girls from 8-14 years of age.



▲ HKN Students around the globe enjoy celebrating Founders Day



Lambda Eta Chapter, Bharati Vidyapeeth's College of Engineering

The spirit of Founder's Day was spread among students by the means of two educational events at Iota Omega, namely, an Ethical Hacking and Cyber Forensics Workshop, and a guest lecture on Robotic Operating Systems (ROS).

Interactive events helped the students to expand their knowledge and skill set; thus bringing them a step closer to academic excellence.

Iota Zeta Chapter, Cal State Chico

We held a street taco fundraiser to provide some initial funding for the Chapter as well as raise awareness for IEEE-HKN, the local Chapter, and its activities on campus! While selling tacos, we made a point to talk about the Honor Society, and provided information in regards to our tutoring center and workshops on campus.

Iota Epsilon, University of Hartford

Members of Iota Epsilon Chapter, IEEE Student Branch Members, and Electrical and Computer Engineering seniors got together with the faculty for a discussion of future departmental plans and to share pizza and soda. Among the topics discussed were future elective courses and the Capstone Design project.

Gamma Rho, South Dakota State University

The Gamma Rho Chapter had a festive party at a downtown sports bar and grill. We experimented with the static on balloons; sticking them to the ceiling without helium. Professors also told





us some of their stories about when they were in school, and the crazy things that happened. This was the first HKN event our newest inductees experienced as well.

Theta Mu Chapter, Stony Brook University

We celebrated Founder's Day by visiting HKN's history and then performing an Electrical Engineering Olympics. This included a circuit building station, an electrical theory question, and some other similar things.

Beta Nu Chapter, Rensselaer Polytechnic Institute

We hosted an ECSE (electrical, computer and systems engineering) themed trivia night. We tried to make the questions challenging. The winning group received a pair of raspberry pi's. Carrot cake, chips, and soda was served.

Mu Theta Chapter, Chulalongkorn University

As this is our first year as IEEE-HKN, we focused on the way to promote our Chapter. We had discussions of planned activities, team building, and a crepe party! For the first activity, we choose interesting articles from IEEE Spectrum Magazine or other sources that are beneficial to readers, and translated the content to our language for our public page by using the facebook website. We also created the public page named "IEEE-HKN Mu Theta Chapter." Second, humanitarian cooperation was considered. We gathered the team to be trained in Telecoms Sans Frontiers (TSF) in order to help countries affected by disasters by providing internet connections. Next...improving Thailand's education system via the Teacher In-Service Program (TISP) by cooperating with high school and training teachers to understand more about engineering and to be able to create activities for students.



▲ IEEE-HKN Hand of Jupiter: The mighty hand of Jupiter was selected as being symbolic of the founding chapter with a blade of lightning for each of the ten founding members. The field is blue, typifying the loyalty with which they performed their task.

IEEE-HKN Announces 2017 Board of Governors

IEEE-HKN is proud to announce the election of new President-Elect and Governors who took office on 1 January 2017.



President-Elect: **Steve E. Watkins** - Watkins is currently Editor-in-Chief of THE BRIDGE Magazine, faculty advisor of the Gamma Theta Chapter, and served on the HKN Board of Governors. According to Watkins, *"my goal is to contribute to the HKN community and to be a spokesman for the organization. Open communication among chapters, student members, alumni, and the board are necessary for the health of HKN."*



Governor Regions 1-2: **Karen Panetta** - Panetta's platform is *"strengthening of industry partnerships, volunteerism, and supporting entrepreneurship, diversity in the workforce and inspiring future generations of youth to view engineering and science as a means of achieving a healthy, successful living."*



Governor Regions 7-10: **Enrique Tejera** - Tejera has 37 years of experience as an IEEE volunteer and seeks *"the opportunity to work with members all around the world using the knowledge and experience to move ahead programs and new initiatives within IEEE-HKN."*



Governor-at-Large: **Kyle Lady** - Lady served as the IEEE-HKN Student Governor (2013-2014), and was co-chair of the 2016 Student Leadership Conference. Lady states *"as an HKN Governor, my focus would be on continuing to modernize HKN, to ensure both operating efficiency and continued relevance."*



Student Governor: **Michael Benson** - Benson is a Ph.D. candidate in the University of Michigan's Radiation Laboratory. Since initiating into Eta Kappa Nu, Benson has held a variety of leadership positions within the Beta-Epsilon Chapter, serving as an

officer of the chapter, and as an advisor for the past three years. He was also co-chair of the 2016 IEEE-HKN Student Leadership Conference. Benson has identified four key initiatives: "First to engage the student membership in a regular and meaningful way. Second, chapter development best practices. Third, as a Society, we need to improve our recruitment of new members and retention of existing members and fourth address is the role of alumni"

For background and more information on the IEEE-HKN Board of Governors, roles and responsibilities and activities of the Board, visit: www.hkn.org. If you are an alumni and would like to reconnect or volunteer for IEEE-HKN, contact info@hkn.org.

More about IEEE-Eta Kappa Nu

Founded as Eta Kappa Nu in 1904 at the University of Illinois, Urbana-Champaign, then changed to IEEE-Eta Kappa Nu (IEEE-HKN) following a merger with IEEE in 2010, IEEE-HKN is the academic Honor Society for those studying IEEE fields of interest, including electrical and computer engineering.

IEEE-HKN annually inducts more than 2,700 students, faculty and professionals and has more than 200,000 alumni. The Society has chapters at more than 250 colleges and universities in the United States and around the world. Membership for students is by invitation only to those that possess outstanding academic achievement, character, and attitude.

IEEE-HKN's mission is to be the catalyst for the development of the "Complete Technical Professional." Notable members include: co-founder of Google, Larry Page; co-founder of Apple Inc., Steve Wozniak; "Father of the Internet," Vint Cerf; and co-founder and Chairman Emeritus of Intel Corporation, Gordon Moore.

Contact IEEE-HKN for more information, or call 800-406-2590.

2016 IEEE-HKN Alton B. Zerby and Carl T. Koerner Outstanding Student Award

The *Alton B. Zerby and Carl T. Koerner Outstanding Student Award* recognizes outstanding scholastic excellence and high moral character, coupled with demonstrated exemplary service to classmates, university, community, and country. This award is administered by the IEEE-HKN Los Angeles Area Alumni Chapter.

The winner of the 2016 Alton B. Zerby and Carl T. Koerner Outstanding Student Award is Emily Hernandez. She is a member of the IEEE-HKN Gamma Theta Chapter at Missouri University of Science & Technology.

Emily Hernandez completed her undergraduate degree at Missouri University of Science & Technology (Missouri S&T). She graduated with a Bachelor of Science in Electrical Engineering and Minors in Mathematics and Cognitive Neuroscience, Summa Cum Laude. While at Missouri S&T Emily held leadership positions in the following organizations: Bridge Correspondent for Eta Kappa Nu; Electrical Division Lead and President of the Missouri S&T Robotics Design Team; Secretary of the Society of Hispanic Professional Engineers; Honors Academy Fellow of the Chancellor's Leadership Academy; member of the Society of Women Engineers (SWE); and a member of IEEE.



Emily's extensive volunteer activities include service events designed to attract minorities and women to careers in science, technology, engineering and math (STEM). She served as a Student Diversity Program Mentor and mentored a team for the "Girls Who Code" competition as a Peer Learning Assistant, and in the Learning Enhancement across Disciplines Program.

She is a published author of *Graphical Trust Models for Agent-Based Systems*, IEEE Potentials Magazine and co-author of *High Speed Serial Link Challenges using Multi-Level Signaling*, accepted for the EPEPS Conference, October 2015.

Emily is currently employed as a Design Engineer Intern at Garmin International, a Signal Integrity Undergraduate Intern at Intel Corporation, and Design Intern at Molex High Performance Cable. She has done undergraduate research in the Electromagnetic Compatibility Laboratory and as a Research Experience Fellow in the Computational Intelligence Laboratory at Missouri S&T. She has been accepted into the Graduate Student program at Stanford University.

Emily is a very well rounded, accomplished musician who played clarinet in the Symphonic Band, a scholar athlete on the intermural team for SWE and IEEE, and a member of the Salem Avenue Baptist Church Choir.

Miss Hernandez will receive her award at the 2017 Electrical and Computer Engineering Department Head Association (ECEDHA) conference to be held at the ECEDHA Annual Conference and ECExpo on 17-21 at the Hilton Sandestin Beach in Miramar Beach, FL. The IEEE-HKN Outstanding Chapter Awards will also be presented at the ECEDHA Conference.

IEEE-HKN would also like to recognize the following students who were named as Honorable Mention for this year's award.

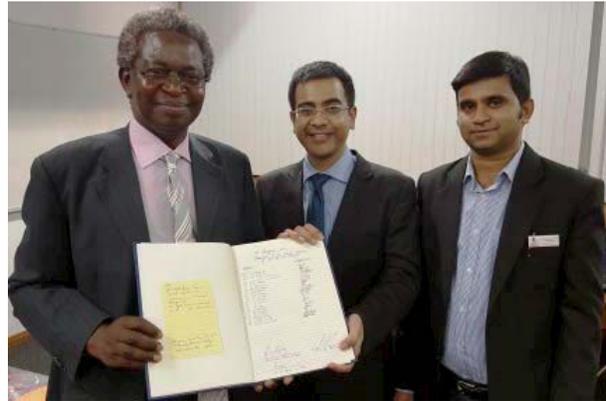
Honorable Mention:

Alicia Li Jen Keow, Epsilon Xi Chapter, Wichita State University
Haley Northrup, Epsilon Omicron Chapter, University of Delaware

Welcome to our New Chapters:

Congratulations to the IEEE-HKN Mu Eta Chapter at the University of KwaZulu-Natal (UKZN) in South Africa, installed on 22 August. Saurabh Sinha, former Vice President, Educational Activities and IEEE-HKN member, presided over the ceremony. 14 students and 5 faculty members were inducted.

Congratulations to the Mu Iota Chapter at the University of Seattle, installed on 21 October. This installation marks a milestone as Mu Iota is the 250th Chapter to be installed into the IEEE-HKN Honor Society!



Prof. Afullo, Prof. Sinha & Prof. Srivastava with signed Chapter Book

IEEE-HKN is proud to Welcome Back:

The Iota Zeta Chapter at California State University-Chico

The Gamma Tau Chapter at North Dakota State University.

Thank you to the faculty advisors, department chairs, and student members of these Chapters for their dedication to reactivate.



Gamma Tau - North Dakota State University

If you know of a chapter that would like to resume active status, we are eager to work with you. Please contact Nancy Ostin, Director, IEEE-HKN.

IEEE Mourns the Loss of Director Emeritus Eric Herz



IEEE Life Fellow, Eric Herz was General Manager and Executive Director of IEEE from 1979 to 1992. He was also a former President and an Eminent Member of IEEE–Eta Kappa Nu (HKN), IEEE’s Honor Society. Herz died on 5 December at the age of 89.

Education and Career:

Herz received a bachelor’s degree in EE (1952) from the Polytechnic Institute of Brooklyn (now Polytechnic Institute of New York University), in New York City. He received an honorary doctorate from Manhattan College, New York (1992). He was inducted into the Beta Beta Chapter in (DATE)

In his career he worked on many ground breaking technologies such as the military radio hyperbolic navigation system, a predecessor to MIT’s Loran (long range navigation) system, and served as lead engineer on a successful experimental system to detect and locate electromagnetic pulses from nuclear tests conducted in the Pacific Ocean. He oversaw the development and implementation of the telemetering data processing stations in San Diego and Cape Canaveral, Fla. The San Diego station was the largest of its kind, capable of converting launch and flight data from missile tests to readable engineering units within 24 hours. Other projects included a digital position location and communication system for the U.S. Army and avionics studies and proposals for space shuttle designs, he led the design and systems engineering of the Navy’s Tomahawk cruise missile, as well as the Air Launched Cruise Missile, the primary nuclear munition of the Air Force.

Eric Herz served on the Eta Kappa Nu Board of Governors from 2000-2005 and as the President 2003-2004. In 2009, he was named an Eminent Member, the Society’s highest membership classification, *“for contributions to the electrical and computer engineering profession through leadership roles in the Society, IEEE, and related organizations.”*

IEEE LEADERSHIP

Herz served as President, IEEE Aerospace and Electronic Systems Society (1972); joined IEEE Board of Directors (1976); served as Division III Director (1976-1977); Vice President, IEEE Technical Activities (1978); IEEE General

Manager and Executive Director (1979-1992); Director Emeritus (1993-2016). He also served on the board of IEEE’s philanthropic arm, IEEE Foundation (1979-1995). Herz was elevated to IEEE Fellow in 1983 *“for contributions to the development and management of information systems for testing aerospace vehicles and for valuable services to the Institute.”*

In 2005, the IEEE Board of Directors created the annual IEEE Eric Herz Outstanding Staff Member Award as a tribute to his dedication during his time as both an IEEE staff member and volunteer.

Memorial donations may be made in Eric’s name to the Eta Kappa Nu fund of the IEEE Foundation.

A LASTING IMPRESSION

Tributes have been pouring in from IEEE volunteers and staff members who worked alongside Herz over the years; a few of many follow:

“We have lost a major pillar of the IEEE—a portion of our very fabric,” IEEE President and CEO Barry Shoop said. *“Eric Herz dedicated his life to our profession and our professional society, setting a standard of excellence in his commitment to IEEE. He was an advisor, confidant, role model, and mentor to many, and I count myself lucky to have called him a friend.”*

“As IEEE’s General Manager and Executive Director for more than a decade, Eric demonstrated his dedication to our professional staff through his insights, his diligence, and his sage and welcome counsel,” says E. James (Jim) Prendergast, IEEE’s Executive Director and Chief Operating Officer. *“Eric made significant progress in building ties with industry, reinforcing the quality and breadth of our technical offerings, and developing relationships and alliances with engineering societies in Australia, China, Germany, and the United Kingdom, further facilitating IEEE’s growth and global volunteer involvement.”*

“Eric was very committed to HKN,” says Nancy Ostin, Director, IEEE-HKN. *“His love and passion for our students and our program, and his desire for HKN to thrive and grow, was evident in his words and actions. He was my mentor, and I was very fortunate to know him and learn from him. I am very proud to continue the traditions he cared so much about, and the program he loved.”*

Omega Chapter, California State University, Fullerton

On 17 November, Mr. Robert Gerhart from Northrop Grumman had an opportunity to address students from the IEEE-HKN Iota Omega Chapter of Cal State Fullerton. Mr. Gerhart received his B.S in Aerospace Engineering from Texas A&M. Mr. Gerhart has been with Northrop Grumman for 35 years and currently serves as the Team Leader/ Director for the Air Vehicle Integration IPT. During his tenure, Mr. Gerhart has worked on numerous aerospace projects, many of them classified.

The students were very interested in learning about what was happening in the aerospace industry and the opportunities for employment. Mr. Gerhart provided an overview briefing of Northrop Grumman’s programs and future plans. One area he emphasized was the role of EEs at Northrop, and where they might be needed.



Robert Gerhart with students at Cal State Fullerton

Mr. Gerhart informed them that they were graduating at a time when Northrop Grumman is doing a lot of hiring. He provided instructions on how and when to submit resumes and also provided information on internships. The students were surprised to learn that Northrop Grumman was currently selecting graduating seniors and interns, and not waiting until spring. Following the presentation, Mr. Gerhart answered questions for more than 45 minutes, including one about why he had made Northrop Grumman his home for 35 years. The students enjoyed the presentation and really appreciated Mr. Gerhart’s insights and guidance.

Gamma Epsilon Chapter, Rutgers University

On 2 November 2016, the Gamma Epsilon Chapter at Rutgers University hosted a professional panel on Careers. Panelists included: Rick Frost, Viavi Solutions, Frost IP; Malkia Henson, Verizon; Dineen Segerholm, Coriant; and Christina Segerholm, AT&T and TD Ameritrade.

Nancy Ostin, Director of IEEE-HKN was invited to the panel. Nancy noted the presentations were very informative and there were lively discussions about preparing for your Professional Career. The panelists provided great advice for young engineers and discussed building a network for success and finding the right mentor.

Kudos to officers Christina Segerholm and Neil Patel for a great program!



Chapter Attendees with Nancy Ostin, Director, IEEE-HKN (R)



Panel, L-R: Christina Segeholm, Dineen Segerholm, Malkia Henson and Rick Frost

IEEE Educational Activities Board (EAB) Awards

Highlights from the November 2016 IEEE EAB Awards Ceremony

IEEE-Eta Kappa Nu, IEEE's Honor Society, has numerous award programs designed to promote and encourage educational excellence in electrical and computer engineering. These awards recognize outstanding accomplishments by students, professors, and industry professionals who make significant contributions to society, and who exemplify a balance of scholarship, service, leadership, and character. IEEE-HKN encourages chapters and individuals to nominate all eligible candidates; for a full list of IEEE Educational Activities Board Awards, visit [EAB Awards](#). The deadline for 2017 IEEE EAB and IEEE-HKN Award nominations is 1 May 2017. Nominate a deserving candidate today!

At the IEEE EAB Awards Ceremony held on 18 November 2016 in New Brunswick, NJ, IEEE-HKN presented the following awards: Outstanding Young Professional Award (OYP) and the C. Holmes Macdonald Outstanding Teaching Award (OTA).

2016 IEEE-HKN Outstanding Young Professional Award - Salvatore Campione

Salvatore Campione received this award *"for contributions to the electromagnetic modeling of complex systems and structures from microwave to optical frequencies."*



Salvatore Campione received a Laurea Triennale degree (cum laude) and a Laurea Magistrale degree (cum laude) in electronic engineering from the Polytechnic of Turin, Italy (bachelor's 2007 and master's 2009, respectively). He also received a Master of Science degree in electrical and computer engineering from the University of Illinois at Chicago (2009), and a Doctor of Philosophy degree in electrical and computer engineering from the University of California Irvine, CA (2013). He joined Sandia National Laboratories, Albuquerque, NM as a Postdoctoral Appointee in 2014, and became a Senior Member of Technical Staff in 2016.

In 2013, Dr. Campione was named Marconi Society Paul Baran Young Scholar, recognizing his academic achievements and leadership in the field of communications and information science. He was awarded an IEEE Photonics Society Graduate Student Fellowship (2013); received the Outstanding Young Engineer Award of the IEEE Albuquerque Section (2015); and was selected as one of University of California Irvine's top 50 graduate and postdoctoral scholar alumni as an embodiment of the Bright Past (2016).

Salvatore Campione has published more than 50 peer-reviewed journal articles, more than 80 conference papers, three submitted patents, and two book chapters. His research interests include electromagnetic theory, antennas, metamaterials and their applications, plasmonics in nanostructures, and optical devices for energy and optoelectronic applications.

2016 IEEE-HKN Outstanding Teaching Award - R. Joe Stanley

R. Joe Stanley received this award *"for consistent excellence in undergraduate teaching, and for development and delivery of highly effective pre-college engineering outreach programs."*



Joe Stanley received the B.S. degree in electrical engineering (summa cum laude) from the University of Missouri, Columbia (1992); the M.S. in electrical engineering from the University of Missouri, Columbia (1994); the Ph.D. degree in computer engineering and computer science from the University of Missouri, Columbia (1998). He completed his graduate degree programs under fellowships from the National Library of Medicine and the National Cancer Institute.

Dr. Stanley has been a faculty member in the electrical and computer department at Missouri University of Science and Technology (formerly the University of Missouri, Rolla) since 1999. Currently an Associate Professor, Dr. Stanley has also served as the Chairman for computer engineering undergraduate studies since 2009. He has served as an Affiliate Professor for the Digital Electronics course with the Project Lead the Way Program (PLTW) since 2006. He has co-trained 122 high school teachers through the PLTW summer training program and has co-developed refresher training courses in Digital Electronics taken by over 50 high school teachers since 2015.

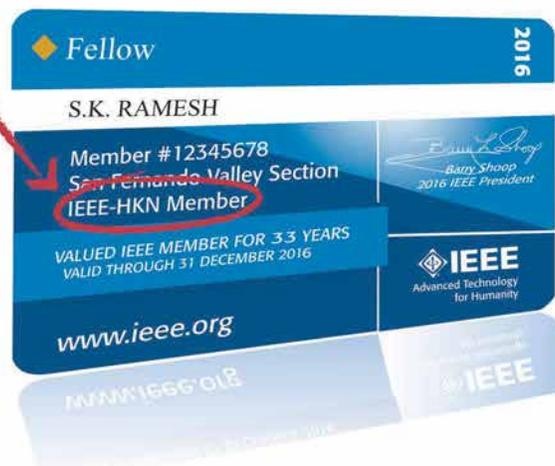
Joe is actively involved in educational research assessing the impact of PLTW on Missouri S&T student academic performance and career choices. His other research interests include image and signal processing,

data fusion, medical informatics, and computational intelligence. He has explored a wide range of research projects including automated karyotyping, skin lesion image analysis for cancer detection, digitized histology image analysis for cervical intraepithelial neoplasia discrimination, non-destructive evaluation of aging aircraft lap joints for structural health monitoring, metal detector signal analysis for landmine detection, atomic force microscope imaging tool development, and cervical and

lumbar spine x-ray image analysis for osteoarthritis assessment. He has published 46 refereed journal and 35 refereed conference papers in these research areas and has three patents.

Joe became a member of Eta Kappa Nu in 1999, and is a member of the Gamma Theta Chapter, Missouri University of Science and Technology.

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Show Your Eta Kappa Nu

Congratulations to our eleven Professional Members that were inducted into the Eta Chapter of the IEEE-HKN Board of Governors on 19 November, during the Educational Activities Board Meeting. Candidates for Professional Membership are recommended by an HKN member, based on their contributions and meritorious work in IEEE's fields of interest. Candidates are approved by the IEEE-HKN Board of Governors.

Congratulations to: Tarek El-Bawab, Donna Hudson, Kazuhiro Kosage, Rakesh Kumar, Michael Milligan, Jusef Modelski, Maura Moran, Elie Track, Jeffrey Voas, Bill Walsh, Ke Wu.



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Hello HKN! My name is Michael Benson and I'm excited and honored to serve as your IEEE-HKN Student Governor for the 2017 calendar year. I'm originally from Weston, MA and earned a B.S. in Electrical Engineering from Northeastern University. Currently, I'm a Ph.D. candidate studying electromagnetics and remote sensing of the environment at the University of Michigan... Go Blue!

If you're a chapter officer, you've likely already heard from me by now. If you haven't, please don't hesitate to contact me...some of our chapters don't have the most up-to-date contact information on file. (PSA: Chapters, please be sure to update your contact information regularly!)

One of my main objectives this year is to increase the communication and sharing of best practices between chapters. I'm hosting regular virtual meetings for chapter presidents and sharing the results of our discussions in the monthly HKN newsletter that is sent to each chapter. If you aren't getting a copy of the newsletter, please ask your chapter president to send you a copy!

I'm looking forward to working with each of you (alumni and undergraduates alike) to find creative ways to keep our members (YOU) involved past graduation. Our Society has a wealth of experience and we're barely scratching the surface of our potential at this point. I'd love to see alumni engage as chapter advisors, mentors, and yes, donors too. If this is something that you're passionate about too, please reach out to me!

Finally, and perhaps most importantly, I'm excited to be representing some of the best and brightest students in the world. Working with the other members of the Board, we're going to ensure that Eta Kappa Nu serves your needs, serves our communities, and is a true mark of distinction.



Michael Benson
Beta Epsilon Chapter,
University of Michigan
mbenson@ieee.org

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IEEE

A Planning Mindset

by: Stan Reif, IEEE Foundation

As Americans age, the so-called 'baby boomers' are retiring and the wealth that they have accumulated over the course of a lifetime is being transferred to their heirs. This transfer is considered the largest of its kind to date -- estimated at more than \$10 trillion dollars. This represents a unique opportunity for Eta Kappa Nu.

This massive transfer represents incredible opportunities to structure gifts that help lessen the tax burden. Nonprofits stand to benefit enormously from this phenomenon. It is important that nonprofits such as IEEE-HKN are prepared to take advantage of this opportunity.

If you've been even peripherally involved in philanthropy, you've likely heard the term planned giving. Yet few among us are well-versed in the basic components that make up this complex area of philanthropy.

Giving takes many forms...

A planned gift is typically defined as a gift that is made from accumulated wealth. These gifts, by design, are not intended to come from current income.

Though planned giving may result in tax benefits, most important is the donor's interest in advancing the mission

of the organization, in this case IEEE-HKN. Without this element, it is unlikely that a planned gift will come to fruition.

Though planned gifts are usually considered gifts that will be made at some point in the future, some are actually of an immediate nature. Gifts involving real estate or appreciated securities and distributions from IRA holdings would fall into this immediate category.

Other planned gifts are of a deferred nature. The most common of these type gifts are made via bequests. Annuities, charitable remainder trusts, unitrusts, wealth replacement trusts, etc., would be other examples of deferred planned gifts. Through these vehicles IEEE-HKN will benefit at some future time.

Periodically the IEEE Foundation, IEEE's philanthropic arm, provides information regarding planned giving which may be of interest to you or a loved one. Given the complex nature of some of these instruments, it is always recommended that you consult your own tax, finance and legal advisors. Should you have questions regarding the information provided herein or questions regarding planned gifts in general, the IEEE Foundation stands ready to assist.



Karen Bartleson

2017 IEEE President and CEO
Eta Chapter

Karen Bartleson has over 35 years of experience in the semiconductor industry, specifically in electronic design automation. Karen retired as Senior Director of Corporate Programs and Initiatives at Synopsys, an electronic design automation company, where her responsibilities included creating programs for technical standards development, software tool interoperability, and creating and maintaining strong relationships with universities and research institutions worldwide. Prior to Synopsys, Karen brought her exceptional professional and leadership skills to bear at United Technologies Microelectronics Center and Texas Instruments.

Karen served as President of the IEEE Standards Association in 2013 and 2014. During her tenure, she led the development of a new strategic plan, furthered the principles of the OpenStand market-driven standardization paradigm, and finalized IEEE's membership in the Global Standards Collaboration.

As a member of and leader within the IEEE Board of Directors in 2013 and 2014, she chaired and led the development of the strategic plan for the IEEE Internet Initiative Committee, whose charter is to raise IEEE's influence and profile in the areas of internet governance, cyber-security, and cyber-privacy policy development. She was also a member of the IEEE Strategy Committee, overseeing the development of the role of IEEE in global public policy.

Karen has published numerous articles about standards and universities and has authored the book "The Ten Commandments for Effective Standards: Practical Insights for Creating Technical Standards" (Synopsys Press, 2010). In 2003, she received the Marie R. Pistilli Women in Electronic Design Automation Achievement Award. She earned a B.S. in Engineering Science with a concentration in Electronic Engineering from California Polytechnic State University in 1980.

Why did you choose to study the engineering field (or the field you studied)?

Growing up, I didn't have any idea what "engineering" meant. To be honest, I'd never even heard the term. But I was fascinated by how things work. When my sister and I were in high school, we had identical hair dryers. Mine broke -- So I took hers apart so I could learn to fix my own. She was so mad at me -- but I fixed mine!

It wasn't until my sophomore year at California Polytechnic State University, after encountering members of the local chapter of The Society of Women Engineers, that I gave any serious consideration to a becoming an engineer. The more I learned about it, the more it appealed to me as it combined the elements of math, science, problem solving, and creating useful things for the world. I was hooked.

Initially, I didn't realize it was supposedly a man's field! When I switched my major and went to classes, I looked around and said to myself, "Hmm, why are there 35 guys in here -- and me?" The good news is that, with a few exceptions, everybody treated me with respect.

What do you love about the industry?

The idea of applying science and logic to solve problems and improve people's lives inspired me, and the opportunity to make a nice living while also making a positive difference in the world appealed to my fiscal side.

What don't you like about the industry?

Somehow, with every solution we find, a new problem arises.

Whom do you admire (professionally and/or personally) and why?

I admire Mahatma Gandhi. His perseverance in striving for his vision of human rights was extraordinary.

How has the engineering field changed since you entered it?

We've gone from computer chips with 8,000 gates to a billion. We have devices in our pockets that exceed the computing power and capabilities of massive mainframes. Internet access is largely considered a utility like water or electricity.

In what direction do you think that the engineering and other IEEE fields of interest are headed in the next 10 years?

IEEE fields, and engineering in general, are beginning to consider ethics like never before. With great and powerful technologies like artificial intelligence and autonomous machines comes great responsibility. In college, I wrote a research paper with the theme of "just because we can, does it mean we should?"

Within the next few years, Artificial Intelligence (AI) could be finding hidden patterns in medical data, diagnosing disease, and improving the mind-body interface for artificial body parts. It could be providing ambient assisted living support to our elderly. It could be streamlining our response to disasters, enabling swifter search and rescue efforts. Driverless cars, drones, and unmanned aircraft will transform the movement of things and people. AI could be doing all of these things, and many more.

Recent innovations and developments in AI-focused areas herald its full-fledged arrival via autonomous automobiles, cognitive computing, and collaborative robotics. However, there are countless ethical concerns that must be addressed. What safeguards should be in place to protect the massive amount of data and personal information needed to power AI? When can we expect shifts in responsibility within the workplace, what will those

shifts look like, and what will be the impacts for workers? How do we ensure compliance with safety standards? Who takes responsibility if AI malfunctions?

The answers to these questions will be found by bringing together leaders within the fields of ethics and AI; by sharing expertise, perspectives, and ideas at conferences and workshops; by engaging in international, consensus-based standards development; and by fostering collaboration at all levels of inquiry and initiative.

IEEE is the perfect convener for this kind of discussion. IEEE is uniquely positioned to be the bridge between the AI experts who understand the technologies, the policy makers who devise the regulatory environment, and the public who have varying levels of interaction and acceptance of AI. The conversation has already begun, and voices from government, academia, and the corporate and non-profit worlds are sharing their views on what can and should be done prior to massive global adoption of these new technologies.

What is the most important lesson you have learned during your time in the field?

One has to have courage. Courage to overcome technical, business, and personal challenges. One of my favorite things that my mom would say is "What's the worst that can happen?" It shows a lot of personal courage to take that risk and step outside of your comfort zone.

Ask for opportunities that will stretch you academically and professionally. Look for opportunities that will really showcase your technical strengths and highlight the value that you add to the team. Have the courage to take these opportunities. Don't be afraid.

Ask for opportunities that will stretch you academically and professionally. Look for opportunities that will really showcase your technical strengths and highlight the value that you add to the team. Have the courage to take these opportunities. Don't be afraid. No matter how talented you are, it doesn't matter unless supervisors or managers can see those talents and think of you as an invaluable employee, a game-changing manager, or the person whose name is synonymous with success.

What advice can you offer recent graduates entering the field?

Be respectful of each other and our environment. And have fun!

Through my work with IEEE, I have made interacting with and supporting our students and young professionals a primary priority. And I am very pleased to see how diversity and inclusion is second nature to our professions' next generation.

What is also essential for a fulfilling career is ensuring a balance in your life. Every once in a while, step away from your desk and learning something new

-- Do something, see something, read something, or listen to something or someone that has nothing to do with your work.

If you weren't in your current field, what would you be doing?

Initially, I had wanted to be a biomedical engineer. The idea of solving problems for people's health and creating devices like prosthetics that would improve their quality of living interested me. But the field was brand new; there really wasn't any major in biomedical engineering back then. Instead, I chose Engineering Science because it included a breadth of engineering fields such as civil, mechanical, electrical, electronic, and chemical. I then chose the one that was the most appealing to me -- electronics. Now that biomedical engineering is mainstream, I would be in that field.

Finish this sentence. "If I had more time, I would ..."

See more of the world. I love meeting people, learning about their culture, trying their cuisine, understanding their religion, and listening to their dreams for the future.

Dharvi Verma

Lambda Eta Chapter



STUDENT PROFILE

I'm **Dharvi Verma** and I'm an engineer. I recently graduated from Bharati Vidyapeeth's College of Engineering (BVCOE), New Delhi, where I majored in Computer Science. Data intrigues me, and my primary interests lay in Machine Learning and Data Science.

I've been an IEEE member since 2013, and was the Chairperson of BVCOE's IEEE Student Branch (2015-16), and was inducted into Eta Kappa Nu in 2014. I've been fortunate to have gotten a chance to make use of the plethora of resources that IEEE provides. Being part of the student community engaged in IEEE-based activities and seminars has given me an opportunity to interact with professors, industry professionals and engineers from all across the country and the world. Being associated with IEEE has helped me hone my leadership skills, stay abreast with new technological advancements, cultivate innovative and intuitive thinking, and so much more.



What has it meant to you to be inducted IEEE-HKN?

Being inducted into IEEE-HKN has been an honor for me. I was exposed to IEEE-HKN in the very first year of my undergrad as the Lambda Eta Chapter was already functioning when I started college (our Lambda Eta Chapter is the 1st IEEE-HKN student chapter of India). Being a part of IEEE-HKN has made it possible for me to interact with fellow students who share the same zeal towards IEEE-HKN. It has given me a chance to learn from my seniors, who were part of this Honor Society, through lectures, seminars, and interactive sessions. In my final year of undergrad, I was able to conduct a variety of activities in college, along with my team-mates, while holding the position as the Vice President of the Lambda Eta Chapter. All of these activities shared the vision of the Society, thus, IEEE-HKN has given me a platform to learn and also to promulgate its vision and mission in the student community.

Why did you choose to study the engineering field?

I was hooked on computers from a young age and was always curious to know more. After being introduced to programming in high school, I was sure that I wanted to pursue Computer Science Engineering. I want to solve problems and try to do it in the best possible way; maybe even in more creative ways. This is one of the reasons why I chose to study in this field, and hope that I can learn more and use my knowledge and understanding to make a contribution to the Society.

What do you love about engineering?

The fact that you can try anything and everything is what I really love about engineering. You can pick what you like in the vast domain of engineering, learn about it, and start working on solving complex problems and providing novel solutions as you go. There are no boundaries; there are so many fields and each field has many sub-fields, and

it goes on. The fields are interconnected in some way or the other which means that you get acquainted with a vast array of domains when you research and solve problems. Even the trickiest of problems can be solved by an algorithm.

What is your dream job?

I wish to work as a Data Scientist. My aim is to use technology to give back to the Society; I wish to use data to solve problems that can help better the conditions of our society. Understanding data is of paramount importance -- the better the insights we gain from data, the better equipped we are to solve problems. I also wish to work towards promoting the importance of Computer Science, especially in schools. Logical thinking is very important, and if we try to inculcate it in children using stories, I think it would be grand. I'm a huge fan of *Scratch*, a project of the Lifelong Kindergarten Group at the MIT Media Lab. I believe that platforms such as *Scratch* are the exact types of platforms we need to promote creative thinking to solve logical problems among youngsters. One day, I wish to contribute towards the education of underprivileged children, those who don't have access to the digital world as such, in the field of technology. Education is a way to empower the masses, and education in technology can also go a long way in that endeavor.

Whom do you admire (professionally and/or personally) and why?

I'm a huge admirer of Sheryl Sandberg, the Chief Operating Officer of

Facebook and author of *Lean In*. Her efforts towards shedding light on the gender gap that exists within the tech industry and promotion of initiatives to bridge this gap are instrumental. She is considered as one of the leaders of technology in the current age, and I believe that she is a huge inspiration for women in technology.

What is the next BIG advance in engineering?

I believe that Virtual Reality, even though it has been huge for a while now, is going to get even larger and better. Sensors are also going to be bigger soon, they're going to help build more applications.

What is the most important thing you've learned in school?

I've learned that being resolute is very important. To set out on any new endeavor, any new project, we must try to remain determined as we work through what may be a challenging venture. It's never easy, but as I've learned and observed in school, it's worth trying for. Industry is going to pose bigger challenges, and determination can help us survive them. I've also learned that making friends in school is also very important (I know this sounds cliché). School can be hard at times, and it's good to have a few people in school who listen to us, stand by our side, and help us work through obstacles!

What advice would you give to other students entering college

As wise women and men have said, it is not work if you love it. Undergrad education is all about learning a variety of things and then zeroing in on the things you loved the most, since engineering is a huge field.

and considering studying your major?

I would like to tell them to enjoy engineering as much as they can. As wise women and men have said, it is not work if you love it. Undergrad education is all about learning a variety of things and then zeroing in on the things you loved the most, since engineering is a huge field. Computer Science is thoroughly fun and pursuing it entails a lot of learning like every other major. I urge you to take up every challenge that engineering poses to you in your undergrad and try to work through it like a good engineer works through a complex lot of problems. You get to combine math, logic, statistics and programming, etc. and you get to work on interesting albeit tricky problems. Enjoy it! Also, volunteer! Being an IEEE volunteer is going to be a fun ride, get on it!



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COMPSAC is the IEEE Computer Society Signature Conference on Computers, Software, and Applications. It is a major international forum for academia, industry, and government to discuss research results and advancements, emerging problems, and future trends in computer and software technologies and applications. The technical program includes keynote addresses, research papers, industrial case studies, plenary and specialized panels, fast abstracts, a doctoral symposium, poster sessions, and a number of workshops and tutorials on emerging and important topics. The theme of the 41st COMPSAC is *Building Digital Autonomy for a Sustainable World*.

Our world changes constantly, driven by the desire to make our lives more convenient, safe and enjoyable. Once the lore of science-fiction, we now share our planet with billions of automated processes, functioning under the control of computer systems we have developed. As we enjoy the advantages they provide, we can't help but wonder: what will be the next major technical innovations and where might they lead us? We've seen conventional automobiles become self-driving cars, human-directed systems become adapted ones, and human services enhanced by robotic services. Clearly, the movement from physical to cyber-enhanced domains is rapid and increasing, calling upon ever-more exciting innovations in computers, software, and applications.

COMPSAC 2017 will provide a forum for in-depth presentations and discussions of the technical challenges, successes, and failures of moving from traditional, person-centered and directed activities and services to those that are the focus of autonomous systems. Sessions will include topics and issues related to autonomous computing, wearable computing, the internet-of-things, social networking, cross-domain data fusion, privacy, security and surveillance, cloud computing, big data, physiological computing, self-aware and self-expressive systems, adaptive learning and teaching, and emerging architectures and network issues that affect all these developing technology-driven innovations.

Authors are invited to submit original, unpublished research work, as well as industrial practice reports. Simultaneous submission to other publication venues is not permitted. In accordance with IEEE policy, submitted manuscripts will be checked for plagiarism; instances of alleged misconduct will be handled according to the IEEE Publication Services and Product Board Operations Manual. Detailed instructions for electronic paper submission, panel, workshop, and tutorial proposals, fast abstracts, industry papers, poster papers, doctoral symposium, and the review process are available at <https://www.computer.org/web/compsac2017>.

IMPORTANT DATES

Workshop Proposals Due:

15 October 2016

Workshop Proposal Notification:

15 November 2016

Main Conference Papers Due:

13 January 2017

Main Conference Notification:

27 March 2017

Workshop Papers Due:

10 April 2017

Workshop Paper Notification:

25 April 2017

Camera Ready and Registration Due:

9 May 2017

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