2018 Issue 3 // Volume 116

THE BRIDGE

The Magazine of IEEE-Eta Kappa Nu

Bridging Academic Excellence to Lifetime Excellence: Three Engineers' Roadmap to Success

The Secret of Success

Creating the Builders of Tomorrow

Alan Mingo's Leadership Journey

Into the Second Century of Eta Kappa Nu

IEEE

IEEE-HKN AWARD PROGRAM

As the Honor Society of IEEE, IEEE-Eta Kappa Nu provides opportunities to promote and encourage outstanding students, educators and members.

Visit our new website to view the awards programs, awards committees, list of past winners, nomination criteria and deadlines.

ALTON B. ZERBY AND CARL T. KOERNER OUTSTANDING STUDENT AWARD (OSA)

Presented annually to a senior who has proven outstanding scholastic excellence and high moral character, and has demonstrated exemplary service to classmates, university, community, and country.
(Deadline: 30 June)

C. HOLMES MACDONALD OUTSTANDING TEACHING AWARD (OTA)

Presented annually to electrical engineering professors who have demonstrated, early in their careers, special dedication and creativity in their teaching, as well as a balance between pressure for research and publications.
(Deadline: Monday after 30 April)

DISTINGUISHED SERVICE AWARD

Recognizes members who have devoted years of service and lifetime contributions to Eta Kappa Nu (or IEEE-HKN), resulting in significant benefits to all of the Society's members.
(Deadline: Monday after 30 April)

OUTSTANDING CHAPTER AWARD (OCA)

Recognizes chapters for excellence in activities and service at the department, university and community levels. The award is based on the content contained in their Annual Chapter Report for the preceding academic year.
(Deadline: Monday after 30 September)

OUTSTANDING YOUNG PROFESSIONAL AWARD (OYP)

Presented annually to an exceptional young engineer who has demonstrated significant contributions early in their professional career.
(Deadline: Monday after 30 April)

VLADIMIR KARAPETOFF OUTSTANDING TECHNICAL ACHIEVEMENT AWARD

Recognizes individuals who have distinguished themselves through an invention, development, or discovery in the field of electrical or computer engineering.
(Deadline: Monday after 30 April)

IEEE-Eta Kappa Nu Board of Governors

President
Steve E. Watkins

President-Elect
Karen Panetta

Past President
Timothy Kurzweg

Sean Bentley
Regions 1-2

Ronald Jensen
Regions 3-4

Rakesh Kumar
Regions 5-6

Enrique Tejera
Regions 7-10

Governors
James Conrad
Governor At-Large

John DeGraw
Governor At-Large

Kyle Lady
Governor At-Large

Edward Rezek
Governor At-Large

Michael Benson
Student Governor

Kathleen Lewis
Student Governor

Treasurer
Ron Jensen

Secretary
Marcus Huggans

Director
Nancy Ostin

IEEE-Eta Kappa Nu (IEEE-HKN) was founded by Maurice L. Carr at the University of Illinois at Urbana- Champaign on 28 October 1904, to encourage excellence in education for the benefit of the public. IEEE-HKN fosters excellence by recognizing those students and professionals who have conferred honor upon engineering education through distinguished scholarship, activities, leadership, and exemplary character as students in electrical or computer engineering, or by their professional attainments. THE BRIDGE is the official publication of IEEE-HKN. Ideas and opinions expressed in THE BRIDGE are those of the individuals and do not necessarily represent the views of IEEE-HKN, the Board of Governors, or the magazine staff.

Get in touch with Eta Kappa Nu **Twitter:** ieee_etakappanu **Facebook:** IEEE-HKN

THE BRIDGE

The Magazine of IEEE-Eta Kappa Nu

ISSUE 3, 2018 | Bridging Academic Excellence to Lifetime Excellence Three Engineers Roadmap to Success

MARCUS HUGGANS, GUEST EDITOR

Features

6
The Secret of Success
by: Jim Watson

12
Creating the Builders of Tomorrow
by: Shameeka Emanuel

16
My Leadership Journey
by: Alan Mingo

Departments

20
SOCIETY SPOTLIGHT
IEEE Technology and Engineering Management Society (TEMS)

21
HISTORY SPOTLIGHT
Jack Kilby

22
IEEE-USA: CAREER FUNDAMENTALS
Skills for Today and Tomorrow: Insights from Industry and Education

24
IEEE FOUNDATION: SUPPORT HKN
If you believe that what goes up must come down, consider the following…

26
ETA KAPPA NU HISTORY
Into the Second Century of Eta Kappa Nu

28
NEW CHAPTER
WELCOME MU TAU CHAPTER
From Politencnico Di Torino to Waseda University and Back

30
BETA OMEGA CHAPTER
The Beta Omega Chapter Find Success in their Tutorial YouTube Channel!

MEMBER PROFILES

32
PROFESSIONAL PROFILE
Candy Robinson

34
STUDENT PROFILE
Michelle Christina Blum

36
HKN AND MY CAREER
Amy Jones
Brian M. Chandler
John E. Daly,
Steve Watkins
Stuti Ghiya
Theresa Cavrak

Editor-in-Chief: Sahra Sedigh Sarvestani and Stephen Williams
Editorial Board Members:
Daniel Aguiar, Mohamed El-Hawary, Emily Hernandez, Marcus Huggans, Emmanuel Oyekanlu

Managing Editor: Nancy Ostin
Advertising Sales l Business Development Manager: Mark David

IEEE-HKN INTERNATIONAL HEADQUARTERS
Editorial inquiries: IEEE- Eta Kappa Nu, 445 Hoes Lane, Piscataway, NJ 08854, USA
US Toll Free: +1 800 406 2590 | Outside US: +1 732 465 5846
Email: info@hkn.org | www.hkn.org

Subscription address and email changes: IEEE Contact Center
US Toll Free: +1 800 678 4333 | Outside US: +1 732 981 0060 | Fax: +1 732 562 6380 | Email: contactcenter@ieee.org

Nancy Ostin
Director
Gamma Theta Chapter
n.ostin@ieee.org

There are many extraordinary things about Eta Kappa Nu

10. The history and symbolism
9. The core principles: Scholarship – Attitude - Character
8. THE BRIDGE
7. The Student Leadership Conference
6. Founders Day
5. IEEE-HKN committee members
4. The HKN Board of Governors
3. IEEE-HKN Faculty Advisors
2. IEEE-HKN Students
1. Dr. Steve Watkins, 2018 President

The best part of my job is that I get to work with all of you!

As Dr. Steve Watkins is finishing up his year as President of IEEE-HKN I need to take this opportunity to thank him for his leadership, vision, hard work and friendship.

When I first joined Eta Kappa Nu as your Director, there was no one to train me or orient me on IEEE-HKN. What did I do? I started calling our Faculty Advisors to introduce myself and ask about IEEE-HKN (the good, the bad, and yes, the ugly). This would turn out to be one of the best choices I could have ever made. When I called Gamma Theta and spoke to Dr. Steve Watkins, his passion and rich background with Eta Kappa Nu was obvious. His offer to help and provide information has been was invaluable; he became my mentor. As Editor in Chief of THE BRIDGE (2013-2017) we worked closely on the publication, (receiving 5 APEX Awards), and also worked together on many committees and projects of IEEE-HKN. You can imagine the excitement we shared looking forward to 2018 when he would be the IEEE-HKN President.

This has been a great fantastic year! We should all feel excited and happy about the progress HKN has made and what the future is sure to bring. Thank you, Dr. Watkins; my mentor, my friend, and fellow Gamma Theta*.

**Gamma Theta inducted me as a Professional Member in 2016. This was one of the proudest moments of my professional career.*

Regards,

Nancy Ostin

Induction Certificate and Signature Book

Marcus Huggans
Guest Editor
Gamma Theta Chapter

Hello IEEE-HKN Friends,

It is hard to believe that over 20 years ago I was inducted into HKN, Gamma Theta Chapter, at the University of Missouri-Rolla, now the Missouri University of Science & Technology. This achievement was a great culmination of dedication to excellence in the classroom and the community, but I didn't know that it was just the beginning. I hold my membership in HKN in as high regard as any other academic honor I have received in engineering. HKN has provided a platform for me to stay connected to my advisor and peers and to create new friendships that have helped professionally and socially!

Now, 20 years after induction, I have had many opportunities which will allow me to reflect and report back to the IEEE-HKN community. Being in HKN gives us the privilege to work with the best and brightest minds across the country while we are students as well as professionals. I have had the opportunity to work with extremely talented engineers at 3M, AT&T Bell Labs, FBI, and Texas Instruments. However, I find that a successful career requires so much more than being a talented engineer. Thus, the impetus for these articles.

The articles to follow in this edition will include something for just about everyone in our field regardless of career level. We have an article for beginning engineers, so they can become superstars at work from the start. In addition, we offer great tips for the mid-to-senior level engineers moving from individual contributor to project manager. Also, we have an article for those that want to become a senior level executive that discusses relationships that may be crucial for achieving these ranks. Finally, a little sage advice for those engineers that have retired but still have the willingness to give back. You will see as you move through this edition that your job is never done once you begin the journey as an engineer. IEEE-HKN will always be there for you, and we will always need you too!

I'm grateful and humbled to be the guest editor for this edition. Additionally, it gives me great joy to bring you articles from young progressive professionals to retired yet thriving engineers. Please take time to read them and reflect on the great advice given. Life is short, and careers can be shorter with too many faux pas. Our IEEE-HKN Bridge authors will generously give you a glimpse of what has made them successful in their careers. Enjoy this issue and win in your career and in life.

Dr. Marcus A. Huggans completed his engineering studies at the University of Missouri-Rolla now known as the Missouri University of Science and Technology (MST). He received a B.S.E.E. and M.S. & Ph.D. Engineering Management degrees. Huggans is an alumnus of The National GEM Fellowship Program (GEM) and has extensive experience in the STEM field with over twenty-five years of working in the industry, academia, and non-profits. He has worked for 3M Company, AT&T Bell Laboratories, FBI, and Texas Instruments Inc., Missouri S&T, and GEM. At GEM, Dr. Huggans writes, recruits, and conducts graduate programming to encourage under-represented minority students to pursue their graduate degrees in science, technology, engineering, and applied mathematics (STEM) fields as Senior Director of External Relations. He has been the Finance Chair for IEEE-ITSC and was appointed to serve on the IEEE-HKN Editorial Committee and Secretary for the Board of Governors. In 2016, Dr. Huggans was inducted into the MST's Electrical and Computer Engineering Academy and has been an invited speaker to many diversity conferences, National Science Foundation, and multiple universities as well as corporations/national laboratories.

The Secret of Success

by: Jim Watson

Engineering is more than a career; it is a way of life. As engineers, we use tools to apply technology and to achieve high levels of success. One of our most important tools is balance – balance of developing technical and non-technical skills and balance of time allocation for family, friends, peers, community, profession, and career.

Although we tend to consider our career starting when we complete engineering degrees at the university level, we actually have three careers: academic, professional and retirement.

Our academic career starts early as we develop special interests in mathematics and science topics in secondary school classes. Technical skill development continues as we expand our knowledge and skills at the university level. This includes using engineering tools to apply technology to solve problems and create positive changes in the world.

Success in our academic career is the foundation for greater success and accomplishments in our professional working career. If we learn how to learn during our university experience, we then have tools to understand and effectively apply new and emerging technologies.

Our third career, retirement, is often not considered until shortly before it begins. This is a mistake, because many engineers can make positive contributions to their family, profession, and community in retirement when this is planned just like the other two careers.

Our Academic Career

Our freshman experience, when entering an engineering university, is an exciting adventure as we make the transition from a rather structured secondary education to the challenge of learning in a more flexible environment. From the beginning, we are faced with many options and choices.

While we are given direction for which classes to take, how we decide to prepare and participate in these classes is our decision. Also, it is our choice how we manage our time and interact with instructors and other students.

Because most courses focus on learning new information relating to technology, it is easy to consider the technical side of engineering as most important. While this is a major foundation of our academic career, it is only part of the skill set we need for success. Because technology changes rapidly, to be able to cope with this change requires developing the skill of learning how to learn.

Figure 1: HKN/IEEE Partnership Conference Chairmen

So what is involved in that learning process? First, we need to be proactive and apply many different tools to take advantage of opportunities. This includes preparing for class by reading textbooks, identifying and writing down what we do not understand, and using this to ask appropriate questions in class.

A second major activity is to be a member of one or more study groups. By sharing ideas relating to the solution of problems we enhance two important tools; speaking and listening. The thought process of discussing different approaches to solving homework assignments helps us to think logically and then to express this so others can understand and use the information. Effective communication is just as important as our technical skills. Think about it – if we possess all the knowledge in the world it is of little value unless we can communicate this to others in a way they can understand and use the information.

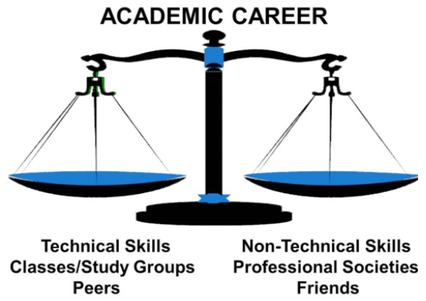


Figure 2: Academic Career Balance

The third, and perhaps the most important activity we can select, is to be an active member of one or more professional societies and organizations. As freshmen, we have the opportunity to learn from upper classmates and also from practicing engineers when we take advantage of resources provided by professional organizations. Before we are eligible for membership in HKN, we can participate in partnership events between HKN and IEEE. An excellent example was the 1,000th IEEE Student Professional Awareness Conference held on April 11, 2012 that was a partnership event between HKN and IEEE Student Branch at Cleveland State University.

Active involvement in IEEE and other professional organizations increases our technical and non-technical skills and typically results in expanded learning and higher grades. This, in turn, is a major qualification to be eligible for membership in HKN. Members of HKN can continue to enhance both technical and non-technical skills by mentoring and tutoring other students.

As we progress from freshman to senior and graduate school, we use laboratories to develop technical skills. When we participate in professional organization activities, in addition to learning new technical information, we develop important professional and non-technical skills. Higher levels of success in our academic careers are a direct result of a balance of both technical and non-technical skills.

And this introduces the theme of this article. Balance is our most important engineering tool. As students, we reach our highest levels of success when we balance our time between preparation and participating in classes, laboratories, senior design projects, professional organizations, recreation, family, and personal time.

> "There is no such thing as job security. Jobs are controlled by others and that typically removes most forms of security. However, engineers can develop career security. So, to be successful, you need to plan and control your career."

This quote is from an experienced engineer, Larry Dwon. It is based on his more than 60 years of outstanding engineering practice and is an important message for each of us in engineering.

The most successful way to establish career security is to be proactive and plan and control our personal careers. As students, we have the ability to use important engineering concepts to develop a career plan. This is based on a logical and structured process as follows:

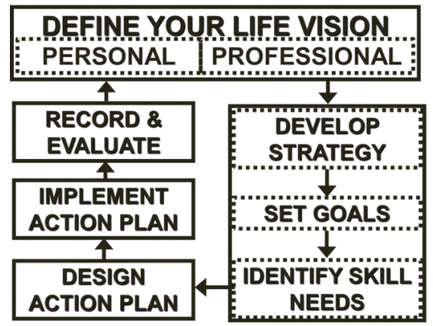


Figure 3: Career Plan Outline

PERSONAL VISION

Start by defining what is important to you, personally. If you could design a perfect life for yourself, what would it include? Do you want to accomplish many things and have personal growth? Is religious faith an important part of your life? Would you like many friends, enjoy a variety of recreational activities, be healthy, and have fun?

How important is your family? Are they less important than your career, equal to your career, more important than your career, or the most important part of life?

How would you like to be involved in your local and professional communities? Do you want to ignore them, be informed to a limited degree, be somewhat involved, or be a leader? When you leave this world, how would you like to be remembered

PROFESSIONAL VISION

What is your major professional focus? Is it to be a generalist or a specialist? Are you interested in basic research to provide a foundation for product development? Or would you rather develop initial designs and use computer modeling?

Can you use creativity to apply general concepts to specific products? Are you interested in testing new product ideas and verifying design specifications? Would you like to be involved in the production of new products or in product sales? Are you interested in management, consulting, academia, or owning your own company?

What do you want to accomplish. Is it respect, financial security, authority, expertise, or personal satisfaction of a job well done? Your answers to these questions provide direction to the development of the professional vision in your career plan.

STRATEGY

Use your personal and professional vision statements as a foundation to develop a strategy to achieve desired results. This includes setting goals and identifying skill needs.

GOALS

Goals should be specific, achievable, measurable, and relate directly to your personal and professional visions. Three types of goals should be considered and established – long-term, mid-term, and short-term.

Long-term goals focus on several years in the future. Mid-term goals should relate primarily to your professional career. Short-term goals focus on your academic career, are easier to establish and achieve, and should support mid and long-term goals and your visions.

SKILL NEEDS

The next step is to review your inventory of skills and identify skills that you need to develop or improve. Defining skill needs is an integral part of planning and preparing for potential opportunities. Achieving your goals is more than just being lucky. People who appear to be lucky usually are pro-active and not reactive. They prepare for future opportunities by developing appropriate skills that relate to personal and professional visions.

During your academic career, select courses that help you develop technical skills identified in your career plan. Strive to achieve maximum benefits from each course. Start by asking "What technical skills can I enhance by my active participation in this course? How will this support my strategy and visions? What extra things can I do to maximize the value of this course?"

There are also many opportunities to enhance non-technical skills during your formal education experience by active participation in classes and study groups. Because engineering has a major focus on people, you need to develop effective communication and other "people" skills. This includes working with people who are from diverse backgrounds and environments and who have ideas that may be different from your own.

Professional organizations are inexpensive "laboratories" and offer outstanding opportunities to practice non-technical skills including communication, teamwork, project management, organization, time management, ethics, and accountability. These skills can be included in future resumes and discussed in job interviews.

A reasonable amount of time invested in professional organizations will help you achieve higher grades. This is an excellent approach to developing skills and demonstrating successful results that prepare you for membership in HKN. The key to achieving the most from professional organizations is to join early, balance your time, and be involved in activities and leadership opportunities.

Although we tend to focus on technical skill needs, non-technical skills have a greater impact on career success. So, identify important non-technical skills that you need to improve to achieve your visions.

ACTION PLAN

An action plan provides details of what, when, and how you can take control of your career. A goal is something you want to accomplish and an action plan is what you will do to make that happen.

Start with a focus on short-term goals and skills that can be developed in the present semester and school year. Outline specific activities and define details of how and what you will do and put target dates to each activity. Action plans should be achievable and measurable and should include a process to document results.

Select your first technical skill need and write an action item to achieve it. For example, if you need to improve your math skills, use options of additional self-study, forming a special math study group, or using a tutor.

Review non-technical skills you have defined for improvement. A good opportunity to build teamwork and interpersonal skills is to focus on these when working as part of a study group or laboratory team. This is an excellent method of preparing for team assignments in your professional career

DOCUMENTATION

When you complete a task, you might be so happy that it is done that you forget to recording results. This is a big mistake. An extra value of completing each step of an action plan is when you record results. This provides excellent resources that can be used in many ways as you progress in your career.

Documented successful activities can be added to your personal portfolio as a source to create superior resumes. Superior resumes generate more interest when used in job fairs, result in more invitations for job interviews, can be an important foundation for discussions during interviews, and typically result in more and better job offers.

Continue expanding your portfolio to include experiences and accomplishments in your working professional career. Detailed results of accomplishments provide useful information to refine your career plan, consider future career changes, evaluate new areas of interest, and help to identify and develop new skills to be ready for unexpected opportunities.

EVALUATION

Your action plan should include a systematic process of evaluating results. Success is good, but you may learn more from failure. In developing your career plan, include some reasonable risks. This helps to move ahead of your competition and to achieve more of your visions.

Don't be afraid to fail. You will likely fail from time to time like everyone else. Failure is not a bad thing, as long as it is not too severe. Failure is not falling down – it is not getting back up after falling. Review the process that led to failure and learn how you can use this experience to enhance your career. Look back to learn from the past, but then focus more on the future and how your experience can help you be more successful.

Our Professional Career

Balance is also a valuable engineering tool in our working and professional career. Results will be much more successful when we balance technical skills with non-technical skills. Leadership, team building, and other shared activities result in greater project success when we understand different ideas and work effectively with others.

Figure 4: Professional Career Balance

When we continue active membership in professional organizations, we can continue to enhance technical skills with resources available as part of our membership. When these resources are applied in our professional career and results communicated to employer management, this often leads to new and expanding opportunities for advancement.

Professional organizations are also an excellent resource to establish and expand personal networks. Discussions within networks help us identify new opportunities, enhance appropriate skills, and then apply for future career changes with more success.

Typically, early in our professional career, we tend to focus heavily on our work responsibilities. While this may help initiate success in our career, if we forget to balance time with family and friends, this can create problems and lower our overall life success. So, a balance of work and family is a highly desirable goal and should be considered early in our professional career.

Balancing careers and family activities enhances our life experiences and involves us in the most important aspects of life. We can also take advantage of opportunities to help our communities benefit from our active involvement. Engineers have the ability to be leaders and help secondary schools and local government understand and apply technology for the common good.

Our Retirement Career

A balanced academic experience leads to a successful professional career. Success in professional careers sets the stage for a retirement career that offers the best opportunities to enjoy special years and also to share experiences with family, community, and our profession.

Because we have more control of our time in retirement, we also have more options to spend time with our family and for continuing positive impacts on our world. This can be accomplished by applying our technical and professional skills in a variety of ways and enjoying the opportunity to remain active.

Figure 5: Retirement Career Balance

This is an appropriate time to give back to our profession and help the next generation achieve engineering excellence. Albert Einstein said "We make a living by what we get and we make a life by what we give." Volunteer activities through professional organizations and support of scholarships sponsored by HKN helps students and can be personally rewarding.

Retired engineers have skills and experience that can be a great resource for local government relating to technology application and regulation. This can be as volunteers in providing technical support or more formally by being a member of a public identity such as city council.

Many opportunities for our involvement can be found in secondary schools. Science and mathematics teachers will welcome engineers to share career related experiences with their students. We can offer expertise in conducting contests such as robotics and other science related activities. This is an excellent way to have a positive impact on potential future engineering students.

Engineering universities are a second source of opportunities to offer support and a "real world" viewpoint in activities with students. We can help seniors by encouraging them to balance team building, ethics, leadership, time management, and communication skill development with their application of technical skills in capstone designing projects.

Another helpful contribution is to review resumes and hold mock interviews. This can be coordinated with university career centers as HKN sponsored events. This also encourages students to enhance their skills and grades to be qualified for HKN membership.

In our retirement career, we have more time to be involved in local IEEE Sections and Societies. Our leadership skills are valuable to enable these organizations to be more successful to increase major contributions to local practicing engineers and engineering students. This is an effective way to support our profession, and also makes it possible for us to remain active and enjoy the value of life-long personal networks.

In our retirement career, we have skills that can be offered to organizations involved in helping small business owners and entrepreneurs. An excellent example is Service Corps of Retired Executives – SCORE. SCORE is the nation's largest network of volunteer, expert business mentors, with more than 10,000 volunteers in 300 chapters. As a resource partner of the U.S. Small Business Administration (SBA), SCORE has helped more than 10 million entrepreneurs through mentoring, workshops and educational resources since 1964.

Summary

So, what is the secret of success? How can we reach our maximum potential level of career and life achievements? In a word – balance. When planned in a balanced process, we can prepare to take advantage of unexpected opportunities by being proactive and not reactive. This can be developed by volunteering and being actively involved in our family, community, and profession and by planning and controlling all three of our careers.

Jim Watson received a Bachelor's Degree in Electrical Engineering from Purdue University and is a graduate of the Executive Management Program at the University of Michigan. He is a Registered Professional Engineer, an IEEE Life-Senior Member, and a Student Professional Awareness Program National Speaker.

Following a 36-year career with Ohio Edison Company, Jim established Watson Associates to provide programs to incorporate non-technical skill development within existing engineering technical classes.

Jim became an IEEE National Speaker in 1982 and joined Larry Dwon on the Student Awareness Task Force to develop Student Professional Awareness Conferences. Jim has delivered more than 2,200 presentations in the United States, Canada, Europe, and Asia to a total audience of over 110,000. This includes 70,000 students at 197 different universities who attended 474 IEEE Student conferences and workshops and 904 additional student meetings.

Jim received numerous awards in recognition for his volunteer activities including Robert S. Walleigh Distinguished Contributions to Engineering Professionalism, the highest IEEE-USA award for volunteer activities.

In 2011, IEEE-USA established the "IEEE-USA Jim Watson Student Professional Awareness Award" to recognize key individuals for their contributions to Student Professional Awareness Achievement Activities. Dr. Steven Watkins, President of HKN, was the 2016 recipient of this award.

Jim is co-author, with Dr. Charles Alexander, of "Engineering Skills for Career Success." designed for students to enhance non-technical skills.

Creating the Builders of Tomorrow

by: Shameeka Emanuel

"Don't let anyone rob you of your imagination, your creativity, or your curiosity. It's your place in the world; it's your life. Go on and do all you can with it, and make it the life you want to live."
– Mae Jemison, American Engineer, Physician, and Astronaut

I remember the conversation like it was yesterday. "You are too good to go to that school! You are throwing your life away!" my English teacher said, tears streaming down her face. Seeing this visceral reaction to my college decision was shocking. She wholeheartedly believed her proclamation, but I am so thankful that I followed my own instinct and trusted in what I knew I needed to grow.

High School at a Glance —Preamble of a Journey…

I was a graduating high school senior ready to change the world, and my first step was to select a university. Because I showed great promise in math and science, I was encouraged to pursue a STEM degree. I was also determined to choose a STEM major because my guidance counselor told me that I could possibly receive a full-scholarship if I declared as a STEM major. With careful consideration as well as the fact I had no other means to pay for a higher education, I chose computer science (CS) as my field of study.

Excited to start my journey, I applied to: The University of Florida, Georgia Institute of Technology, and Howard University. To my surprise, I was accepted at all three, but Howard was my dream school—and the one that gave me a full-scholarship. My family and I were overjoyed to have the opportunity to attend my first choice and have all of my expenses covered.

My teachers anxiously awaited to hear my decision. One by one, I told them and the reaction was always very strange. My Honors English teacher's response—"You are too good to go to that school! You are throwing your life away!"— made me take pause and evaluate if I was making the best decision for me. Less than 2% of my senior class took honors and advanced placement courses and hardly any of us were African Americans, making me an anomaly inside and outside the classroom. Meanwhile, in 1999, Howard's graduating engineering class was almost 50% women, and it was a historically Black institution, meaning it was well ahead of most other engineering schools when it came to underrepresented groups in tech. Today, Howard is a leader in STEM fields. The National Science Foundation has ranked Howard as the top producer of African-American undergraduates who later earn science and engineering doctoral degrees. I hungered to be in an environment where I could be my authentic self for at least four years. Howard was the best place for me!

Undergraduate Years – The REAL Howard University!

I headed to Howard in the fall of 1999 on a Greyhound bus. My uncle drove down from New York City to help me settle in as a new college student. My first class was Introduction to CS, and my first task was figuring out how to turn on the computer. That is when I realized that maybe having a computer at home would have been helpful. I had only used computers at school, and they were always on. This is when I learned that the monitor was in fact not the computer (clearly, I was ahead of my time) and that there was a tower under my desk that was the actual control unit. I knew that this was going to be a wild ride right away.

I somehow made it through my first semester, but it did not meet my own standards as I was only able to achieve a 3.0 GPA. I decided that I chose the wrong major and maybe I should transfer out of engineering. The 18-year-old me believed that if I did not earn an A, I did not grasp the subject matter and needed to pivot elsewhere. So I put together a lovely speech so that I did not get nervous when I told my advisor about my decision. After I finished talking, he laughed me out of his office, which seems harsh but it led to me to persist in my major.

Over the next three years, I pushed myself by taking electives outside of the CS major, and I solidified internships starting in my freshman year because I understood the importance of having work experience. It was scary, as I did not have any peers that had ventured into that territory to consult with, but I went on to intern at 3M for three summers and complete the first crossover project in the CS department at Howard University. As part of the project, I used an FPGA board and VHDL to simulate the classic Simon game. The educational intent was to show that if students really grasped structures of programming languages, they could pick up any language with ease. My other intent was to flex a different muscle group; in taking all those electives in the electrical engineering department, I realized that I probably should have been there instead of CS.

Graduate Decisions: A Dream Deferred

"Sorry we just don't have any funding for you," said the voice on the phone. I was living in a nightmare as I dealt with my dream graduate school. I wanted to study computer engineering at the University of Southern California (USC). I had applied to several graduate schools, but I stopped looking for acceptance letters once I received the letter of admissions from USC in January 2003. After the frenzy of graduation was over, I took another look at my acceptance package and realized that there was no fellowship attached and the cost was going to be astronomical. I immediately started calling people at USC who I felt could rectify this situation. When I finally reached someone who handled funding for the Electrical and Computer Engineering Department, they were very transparent with me about the fact that it was so late that they did not have any funding left to give. I was hurt, embarrassed, and depressed.

I called the Howard professor who made me fall in love with hardware to tell him the news. He immediately called a colleague at North Carolina State University (NC State), another school I was accepted to, to inquire about funding. Just like that, I was a teaching assistant at NC State.

As a Teaching Assistant, I discovered my love for making complex things simple for others to understand. I was so invested in my job that I had to institute longer office hours, and my own studies suffered. I fell just short of the 3.2 GPA that was required to keep my TA position. Thankfully, the professor I assisted valued my work, and he advocated for me to continue. NC State gave me another chance, and I earned a 3.8 GPA the following semester.

Enter the National GEM Consortium – If at first you don't succeed, try, try again…

In the fall of 2002, while at Howard University, I applied for the GEM Fellowship, which taps the sponsoring university and employer for full tuition, fees, and an annual stipend. Unfortunately, I was not selected the first time I applied, but the next time around, my internship with Intel Corporation made me a much better candidate. I was named an Intel GEM Fellow in 2004, which made me a part of Intel's Diversity Scholar Program's future network. At that time, it was a program in name only, but supplemental programs were eventually developed to promote inclusion.

Scholarships and fellowships for students are based in part on Tinto's framework for student retention in college—the more time students spend on campus the more they can be socially and academically integrated, which makes them feel like they belong. Studies also show that financial strain and the need to work or incur debt are a drain on a student's ability to persist in their education. The reason I could dedicate my second year at NC State to research and coursework was because I no longer had that financial strain. Because of the GEM Fellowship, I was able to make meaningful connections and I learned invaluable lessons about computer architecture at NC State.

#HardwareLife

In the summer of 2004, I was finishing up my Intel internship with a post-silicon validation team in Hillsboro, Oregon. The team took me out for a farewell

lunch as I prepared to return to Raleigh, North Carolina, and finish my degree. My manager was bubbling with joy as he stood up to speak.

"We didn't WANT to hire you, but we are really glad we did!" I couldn't believe that I'd heard him correctly. Apparently, the team wanted to hire another candidate, but "the powers that be" asked them to take me instead. Because they didn't expect much from me, the entire team thought I walked on water by the time I left. They loved me so much that they made me a full-time offer on the spot. This was unheard of back then. I was honored and dismayed at the same time. I said that I needed time to think about this amazing opportunity and I reminded my colleagues that I was from South Carolina and making this transition would be hard for me.

In the coming months, I received three other offers from Intel, and I chose to be a part of the Rotation Engineering Program (REP), which only drafted the top new college hires. Through REP, I gained meaningful experience and relationships. I was a technical assistant to the first and, at that time, only African American Intel Fellow, which is akin to a vice president position at other companies. I really got to see how collaboration happens from day one. He taught me about how the industry is shaped and that it is possible to reach high heights.

After leaving REP, I chose to direct-place into a design team. I was able to work on four different Xeon server products in various capacities. My love for computer architecture was an asset for my team and for me. I worked my way onto the memory controller team where I focused on Reliability, Availability and Serviceability (RAS) features which is a major customer need. I was happy, but when I examined the team around me, I noticed that no one looked like me or was able to provide guidance with regard to my career progression as a Black woman. How was I going to navigate "The Matrix" alone?

A Diversity and Inclusion-Education Hybrid Maven is Born

As I reflected on that revelation, I wondered what I could do to help others that would come after me. I knew that I wanted to pivot from hardware design to a diversity and inclusion (D&I) focus, but I did not really know how to go about it. I started volunteering to support the D&I team by helping to facilitate workshops and providing insight into the experience of working on a design team at Intel. All the while, I was transparent about my goal of joining the D&I team.

In the fall of 2013, I was rounding out my eighth year at Intel and preparing to welcome my third child. I received a call from someone who was like a second mother to the Intel Diversity Scholars. She said, "I'm retiring, and I think you would be a great candidate for my role." I was apprehensive about putting my name in the hat with a baby due at the end of the year. Because I value my relationships, I told her why I was unsure about applying. Once again, I was laughed at, so I applied. On the day that I got the job, I had a one week old and was so exhausted that my manager thought I'd been asleep when he called to give me the news. I stepped into my new role three months later, following my maternity leave.

I'm Back and I'm Brand-New —Watch Me NOW!

I hit the ground running and expanded the Intel Diversity Scholars program significantly, tripling the number of external partnerships and quadrupling the funding budget by illustrating the return on investment over the last 20-plus years of the program. Intel was benefiting from this strategic program; I just had to make it clear. Not only did the company benefit from exposure to top talent via external partnerships with scholarship and fellowship agencies, but the Scholar program produced talent that reached the VP level. And, our relationships drew talent that we didn't even fund! I was having a blast helping to solve the affordability problem that plagues post-secondary education.

I was three years into my Intel Diversity Scholar Program expansion when I got a call from Amazon. They were building a new program designed to increase accessibility and affordability of CS education. I was excited to work on another issue that is a huge barrier to underrepresented involvement in this field. I joined the Amazon Future Engineer Team as a senior product manager focused on products that aimed to increase access to learning opportunities. The pathway provides learn-to-work opportunities for diverse and underserved student populations through three key components: 1) Sponsored AP CS courses (AFE Student), 2) College scholarships (AFE Scholar), and 3) Underclassman internships (AFE Intern).

Research done by Code.org shows that lack of access to adequate STEM education starts early in the K-12 education system with only 40% of United States schools teaching CS and just 10 states adopting K-12 CS standards. There is a drop from 32% of girls being involved in CS from 13-17 years old to only 4% as freshmen in college. Today, women represent just 26% of Advanced Placement CS exam takers, and underrepresented minorities (URM)—defined as African American, Hispanic, Native American, Native Hawaiian, and Pacific Islander—make up only 20%. Our future workforce will be extremely limited if we do not ensure more students have access to CS education. Today, a CS (or software-related) major can earn 40% more than the average college graduate over their lifetime. We chose to have Advanced Placement (AP©) Computer Science as the focal point of our pathway because studies show that students are 7-10 times more likely to pursue a degree in software when they have early exposure.

The Next Chapter

I really enjoyed working to disrupt the K-12 space at Amazon, but I missed having the student interaction that I had when I worked with the Intel Diversity Scholars. Amazon stretched my design thinking with its "Working Backwards" approach, but I needed to get back to the collegiate level.

To that end, I'm joining the Google Family. As part of my duties, I will expand the Tech Exchange Program, formally known as Howard West. In its first year, 26 Howard University students worked on Google's Mountain View, California, campus, completing an intensive 12-week course on coding. Google is now opening the program to more students from Howard and other historically black colleges and universities (HBCUs) and Hispanic-Serving Institutions (HSIs) for a full academic year. Embedding these students in the Googleplex to soak up the ways of Silicon Valley is the company's latest effort to reverse years of hiring patterns that have created a homogeneous workforce. I'm proud that I get to lead that effort.

How It Comes Together

My journey had a lot of bumps, twists, and turns, but they helped make me the leader I am today. Other people's good intentions almost put me on another path, but I am glad that I reflected on Mae Jemison's words and trusted myself. I am happy to be working to we achieve equity in education, opportunities, and pay because our future depends on it.

Shameeka Emanuel is the Lead for Google's Tech Exchange Program, where she works to expand the program and achieve Equity in Tech. She previously served as the senior product manager for the Amazon Future Engineer team, launching products that increase exposure to computer science education in the K-12 space while promoting diversity and inclusion in tech. Prior to joining Amazon, Shameeka worked for more than a decade at Intel Corporation, where she held a variety of positions. During that time, she worked to validate four processors in the Xeon Server Family in various capacities (pre-silicon and post-silicon). Her last role at Intel was Diversity Scholar Program Manager in the Global Talent Organization, College Division. In 2016, she was the chair of the Student Relations Technical Advisory Board for Semiconductor Research Corporation and the Northwest Regional Chair for the National GEM Consortium's Alumni Association Executive Board. She is currently the president of The National GEM Consortium's Alumni Association Executive Board. Shameeka is married with three children. In her spare time, she enjoys spending time with family and friends, playing the trumpet, singing, and dancing. Shameeka earned her Bachelor of Science degree in Systems and Computer Science from Howard University, and her Master of Science degree in Computer Engineering from North Carolina State University. The viewpoints expressed in this article are hers and do not represent those of her employer.

My Leadership Journey

by: Alan Mingo

"Don't accept any of those summer job offers, let me call a colleague at IBM instead."

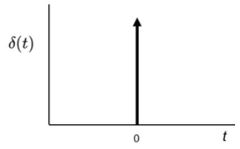
That was the response I received from Professor Mike Wozny, one of my faculty advisors at Rensselaer Polytechnic Institute (RPI) during the spring of my sophomore year after I approached him seeking advice as to which intern offer I should accept for the upcoming summer term. True to his word, he picked up the phone and called Bill Beausoleil, a research Fellow at the IBM Poughkeepsie, New York Systems Development Lab. By the end of their conversation, I had a summer job, and thus began my 36-year tenure with IBM. It has been a fantastic journey from that summer internship to becoming a Vice President in our Global Business Services (GBS) division. I want to share some highlights of my leadership journey along with some key lessons that I've learned along the way.

The Value of Relationships

My IBM career began with a single phone call between two professionals, one in academia and one in industry, who trusted each other's judgement. That initial discussion was my first lesson in the importance of relationships in my professional career and how they have the power to open doors. In every subsequent assignment or role I've held, I've focused on establishing strong relationships, based on a foundation of trust, with my peers, superiors, teammates and clients. After my first summer job, I returned to work for IBM for two additional summer internships. During my senior year at RPI, I was selected as an IBM GEM Fellow, a highly-competitive award recognizing the best and brightest STEM talent in the US. GEM is a network of leading corporations, government laboratories, top universities, and top research institutions that enables qualified students from underrepresented communities to pursue graduate education in applied science and engineering. The GEM Fellowship allowed me to pursue a graduate degree tuition-free, and afforded me a job offer upon completion of my graduate education. In 1985, with a Master of Engineering in Computer Engineering from RPI in hand, I started working in the IBM Poughkeepsie Development Lab for Bill Beausoleil, the same IBM Fellow that Mike Wozny had called three years earlier.

The "Impulse Function"

I held several systems development roles in the early years of my career. Each time I started a new assignment, I exerted great effort to dive into the role and quickly climb the learning curve. In my mind, this sudden burst of energy was like the impulse function that I had learned about while studying linear systems. I devoured every piece of background reading I could find, and I spoke with as many colleagues and key stakeholders as possible to understand the critical success factors for each project. The most important stakeholders were always my "clients," whether they were the lead engineer who would receive my chip or board design, another group within IBM, or an external client. The impulse function approach has been critical to my advancement during my career at IBM.



Excellence and Integrity in Action

My first management role came five years after I started at the IBM Poughkeepsie lab. One of the most influential contributors to the success of a new manager is his/her immediate manager. At IBM, we

This picture is courtesy of Henry Brandt, IBM Corporation

were called first-line managers, and our immediate managers were called second-line managers. My second-line manager was Julius Jones, an amazing engineering manager who had a personality as big as his heart. Julius took me under his wing and instilled in me the importance of excellence in everything you do. He taught me that all work products should be delivered with excellence, whether a voicemail message, email, memo, presentation, chip design or an engineering report. When inevitable mistakes are made, excellence means owning the mistake and providing a solution or path forward.

Julius also demonstrated Integrity in everything that he did. Our work on IBM's complex large systems were multi-year endeavors spanning multiple teams. Failure to meet a design milestone date could have cascading effects on the project schedule, for instance, missing an expected launch date five or more years in the future. Given the critical business importance of these systems to IBM, launch dates were closely scrutinized by senior management. If any team fell behind in its development schedule, there was always a temptation to assume they could recover by some sort of miracle in the remaining five to seven years of the project. When our portion of the project experienced technical issues that impacted the schedule, Julius was always the first to take the unpopular news forward. His resolve to operate with integrity and have the tough conversations, even if it meant harm to his career, has stayed with me to this day.

Learning from Failure

"I have not failed. I've just found 10,000 ways that won't work." - THOMAS EDISON

Several years later I had moved to Austin, Texas, and was working as a Hardware Product Development Manager for a new desktop computer to be launched by our Power Personal Systems Division. This was my first small system launch after leaving our large systems group. My team developed working prototypes of the new system, and worked closely with the operating system, manufacturing, and sales teams to prepare it for launch. The development of the system was going well, and we were on target to meet the expected launch date. A few weeks before the scheduled product announcement, senior management became concerned that the product would not perform as well in the market as we had anticipated, and the project was cancelled.

My team and I were devastated. I shared the rationale for the decision with the team and helped them understand that it was the right decision given the market indicators. We began the task of winding down the project and processing the patents and other intellectual property that had been developed. Although this was a difficult experience, we applied everything that we had learned from the cancelled project into our next system that was ultimately heralded as one of IBM's best-selling small workstations, the IBM RS/6000 43P Model 150.

If You're Comfortable it's Time to do Something Else

My first executive position was as Director of Aptiva Development in IBM's Consumer Division in Raleigh, North Carolina, seven years after I had first become a manager. I had become successful in systems development with roles in large systems, technical workstations, and now PCs. While I enjoyed my work in systems, I felt it was time to do something different.

Fortunately, I did not have to go far to start another career. In 1999, I decided to step out of my comfort zone and work in IBM's consulting and services business. This was, in many ways, like going to work for an entirely different company even though it was still IBM.

While I was able to leverage my development expertise in the delivery of Application Management Services to IBM's clients, the new and challenging

part of the role for me was working at client sites and engaging with them on a day-to-day basis.

I certainly experienced some rough patches early in my career as a services executive, but all of the lessons I've discussed here - the value of relationships, the impulse function approach to new roles, excellence and integrity in everything you do, learning from failure and stretching beyond your comfort zone - helped to shape my approach to all of my client relationships.

Reach Back and Pull Through

One final lesson that I'd like to share is the importance of mentoring and giving back.

For more than 33 years, I have benefited from the advice and counsel of many different professionals who have invested their valuable time in me. I am fortunate to have a strong network of leaders, peers, and subordinates to whom I can turn for support with any business issue or career decision. These relationships are very dear to me and I make it a priority to keep in touch with each of my mentors throughout the year.

Similarly, serving as a mentor to other professionals has been one of the most enjoyable aspects of my career. I have been a mentor to my superiors, peers, and junior practitioners early in their careers. I encourage every new young professional that I meet to reach out to me as a mentor. I always find that I learn as much (or more) from our young professionals as they learn from me. It is rewarding to help a person make a connection to someone within my own network. It is even more rewarding when my contact can help them. I am proud to say that over the years I have successfully helped five individuals become executives at IBM.

In June of this year I ended a rewarding seven years serving on the Executive Board of The National GEM Consortium, an over 40-year-old non-profit organization focused on creating scientific impact by combining the support of industry and academia to propel the best and brightest in underserved populations to pursue their Masters and PhDs in STEM-related fields and thus create higher performing diverse workforces. I worked with employers and universities to help increase the number of underrepresented minorities earning graduate degrees in STEM fields. GEM enabled me to earn my graduate degree over 30 years ago. It has been a pleasure to give back by working with leaders from industry and academia who are so passionate about the mission of this organization.

As I continue my IBM career, I am excited about what challenging opportunities lie ahead. Whatever those may be, I am confident that the lessons I've shared here will continue to contribute to my success. I hope that they can contribute to yours as well.

Alan C. Mingo is currently Vice President, North America Quality and Delivery Excellence at IBM. He leads several cross-industry initiatives to improve quality and delivery excellence in IBM's Global Business Services unit in North America.

Mr. Mingo has over 33 years of Systems Development and IT Services experience. He brings a track record of success in complex program management, global systems/application migration, process transformation and financial management in several industries including Health, General Business, Automotive and Wholesale Distribution. Throughout his career, Mr. Mingo has demonstrated an ability to drive application and product development, manage complex integration projects, and improve operational efficiencies at the account and practice level, while driving strong P&L performance and deeper client relationships.

Mr. Mingo received Bachelor of Science and Master of Engineering degrees in Computer Engineering from Rensselaer Polytechnic Institute in 1984 and 1985 respectively. He serves as a member of the Industry Advisory Board for the Department of Electrical, Computer and Systems Engineering at Rensselaer. Mr. Mingo also served on the Executive Committee of the National GEM Consortium as the Vice President, Strategy & Policy, Employers.

Alan is married with three children and lives in Canton, Connecticut.

The Videos Are In!

VIEW THE PATHWAYS TO INDUSTRIES PROGRAM TODAY

Were you one of the lucky ones who got to attend the HKN pilot Pathways to Industries Program?
Was there something that you wished you could share with your friends and colleagues?
Or were you unable to attend, and just want to see what all the hype is about?

WELL NOW YOU CAN!

IEEE-HKN has been working hard with IEEE.tv to bring this pilot conference to you for online viewing! We were able to record the presentations and now have them available on our HKN website and on the IEEE.tv site to be viewed on your scheduled! The videos in this HKN Workshop Series are made possible through support from IEEE-USA and ECEDHA, the Electrical and Computer Engineering Department Heads Association.

The videos provided include:

- HKN: Flying with Confidence — Navigating the First Steps of Your Career
- HKN: OK, I'm About to Graduate. Now What?
- HKN: Industry Connections Panel
- HKN: What Does a Career in Financial Services Look Like?
- HKN: The Next Big Thing Panel

What is the Pathways to Industries Program all about?

The transition from grad school to industry isn't discussed as often as academic careers, despite happening in larger numbers than those who stay in academia. We invited graduate students to join us for a session of our pilot HKN Pathways Program, where we focused on this transition. In partnership with ECEDHA, we brought together students and professionals to discuss personal career paths, share hard-earned insights, and offer practical advice for young professionals.

ECEDHA | IEEE-USA

IEEE Technology and Engineering Management Society (TEMS)

The IEEE Technology and Engineering Management Society (TEMS, www.ieee-tems.org) was formed to focus on areas of technology and engineering management. This field specializes in the different areas of product development including design, testing, manufacturing, marketing, enablement, support, and other areas such as financing and policy. Societal involvement explores the skills needed in taking an idea and realizing a successful product or service.

TEMS focuses on providing publications, conferences, resources and activities that help you develop your abilities to lead your company or organization's effort to implement successful products and services. TEMS interest areas match yours: moving from a concept to product, the migration from engineer to leader/manager, organizational development, and the mastery of the challenges of product/service creation and launch, and all associated management and support systems creation and launch. TEMS provides you with on-the-job results to drive both your personal growth and professional advancement.

LEADER is a bimonthly electronic magazine that informs you of TEMS activities and issues you may encounter in your work-life activities. Engineering Management Review is a "journal of practice" that publishes papers that serve those who hold strategic leadership responsibilities and upward-bound engineers with an interest in management as a profession. This includes scoping technology and engineering directions, as well as practice experiences and case studies. The IEEE Transactions on Engineering Management is a quarterly journal providing forward-thinking papers and the latest engineering and technology management research of value to academic professionals and practitioners.

TEMS organizes multiple conferences and workshops around the world, including its flagship event TEMSCON (www.temscon.org), that provide a platform to bring together the practitioner and academic communities. The TEMSCON series are unique in their focus to bring industry and research together. In time, there will be three or more TEMSCON events each year. TEMS also has several other partner events focusing on business and technical management areas.

IEEE TEMS
Technology & Engineering Management Society

INVITATION TO JOIN

Joining TEMS allows you to engage in the direction of TEMS with conferences, TACs, and leadership discussions. The best option is to be an IEEE member with TEMS as one of your societies.

Jack Kilby

1923-2005

ASSOCIATED ORGANIZATIONS
Texas Instruments

FIELDS OF STUDY
Circuitry

AWARDS
Nobel Prize in Physics, National Medal of Technology, National Medal of Science, Eta Kappa Nu (HKN)
Eminent Member, IEEE Medal of Honor

Jack Kilby built the first computer using integrated circuits at Texas Instruments in 1961. Six years later he and two co-workers invented the first pocket calculator to show how useful integrated circuits would be in daily life, not just powerful government or military applications.

Jack Kilby was born in 1923 in Missouri to Hubert and Vina Freitag Kilby. His father was an executive with the Kansas Power Company. Kilby traveled with his father during vacations and learned that cost was an important variable in engineering solutions, a lesson he kept with him all his life. Aware that he wanted to be an engineer by the time he was in high school, he studied engineering at the University of Illinois. His college studies were interrupted by military service during World War II, when he worked in an army radio repair shop in India. After returning to the United States, he graduated from college and married Barbara Annegers in 1948.

While working at Centralab in Milwaukee designing circuits, Kilby also earned a master's degree in electrical engineering. Like other electrical engineers at the time, he was frustrated by how long it took to make electrical connections between parts made of different materials. Kilby began to think about making all of the individual components of a circuit out of a single block of material. When he first started working at Texas Instruments in 1958, the company had a policy of a company vacation in July, when everyone with vacation time took it. As a new employee, Kilby had no vacation time coming. He used the time alone to think about more efficient engineering of the miniaturized circuits he had been hired to develop. He designed an integrated circuit out of a single unit of silicon. Other engineers were also working on integrated circuits, and Kilby shared the honors of co-invention of the microchip with Robert Noyce of Fairchild Semiconductor.

By the time Kilby left Texas Instruments in 1970 to become an independent inventor, he was widely recognized for his engineering knowledge and creative inventions. In 1978 he became a professor at Texas A & M, retiring in 1984. Kilby holds more than 60 patents on various inventions. In 1982 Kilby was elected to the National Inventors Hall of Fame. He received the National Medal of Science in 1970, the prestigious IEEE Medal of Honor in 1986, the National Medal of Technology in 1990, and the Nobel Prize in Physics in 2000. Kilby's work and contributions inspired the IEEE to name one of their most prestigious awards after Kilby: the IEEE Jack S. Kilby Signal Processing Medal. The award is given to those who, like Kilby, make outstanding contributions to the field. Jack Kilby was recognized in 2006 as an Eminent Member of IEEE-HKN.

Kilby Solid State Circuit

"Quoted by permission from the Engineering & Technology History Wiki www.ethw.org "

Skills for Today and Tomorrow: Insights from the Future Skills Forum

by: Peggy G. Hutcheson

With rapidly changing technology and shifting organizational needs, how can engineers and technology professionals be prepared for a long and successful career? This question led IEEE-USA's Employment and Career Services Committee to organize a "Future Skills Forum," featuring panels of engineering professors and employers, to gain their insights about how to prepare for an uncertain future. Following are some of the insights from the Forum.

Pay Attention to the Fundamentals

As one professor (and IEEE fellow) put it, "You can't know too much math." Whether you want to work in academia or industry, you must be fully skilled in the fundamentals. Once armed with these math and physics fundamentals, you can learn to look at the same thing (or the same problems) from different perspectives. What changes is how you implement the fundamentals as you work on different problems or tackle new technologies.

Be Flexible

Traditional roles in many organizations are disappearing, and everyone is expected to do whatever is needed at that time to get the job done. Engineers and engineering schools get into trouble by compartmentalizing disciplines. Especially so in start-ups or in rapidly changing organizations, but almost everywhere now the focus must be on accomplishing the goal, not on what an individual prefers to do.

Be Curious

Everyone is responsible for developing the habit of lifelong learning. Remaining curious about everything that is around you can feed this need to learn. "I wonder" and "what if" might lead to your most valuable insights. Also, remember to talk with your customers. Everyone has customers, even if you do not actually come into contact with those who are purchasing the goods and services offered by your employer. Your customer is the next person down the line who uses what you are working on. Hearing from customers provides a healthy focus and direction for learning. Foster your own curiosity. As one professor expressed it, "you can teach factoring, but not curiosity."

Skepticism is Often a Gift

Questioning why something works, why it is done a certain way, or what would be the impact if some aspect of the project or product were changed might seem daunting. Yet, being skeptical can offer tangible rewards in productivity and quality. Skepticism differs from negativity because it involves questioning openly, rather than judging.

Strike a Balance between Breadth and Depth

At some point, every professional must make a decision between breadth and depth of skills and knowledge. There is no magic formula, but each engineer will find that his or her passion and the unique circumstances will formulate an answer. Obviously, a Ph.D. researcher will have more depth, while a Chief Technology Officer or an entrepreneur may benefit from having more breadth. Most technical jobs are somewhere between these extremes, so many options exist for varying degrees of technical breadth versus depth.

Pay Attention to Personal Characteristics and Qualities, Not Just Skills

Whether it is in graduate school or working at a start-up or an established firm, being a self-starter is important. Knowing yourself and what motivates you can help smooth difficult times on the job, and guide you to more rewarding moments. Taking inventory of your personal capabilities is an excellent exercise to promote this self-knowledge. Still, being motivated and knowing yourself are only part of the equation. Accountability is another important element. Accountability begins with being accountable to yourself, then to others. Tenacity is a fourth quality that is important in developing a successful career. If you are too easily discouraged, you may find that you settle for a spot that is comfortable for a while, but lacks longer-term fulfillment.

Sometimes the Most Important Skills Are Not Technical Skills

Career skills are soft in the sense that they are good interpersonal skills, but they are hard skills in that they are often more difficult to master than many technical abilities. If you consider the analogy of career skills to what is needed for building a house, the technical skills provide the fundamentals – the foundation, infrastructure and frame – while other skills provide the interior design for floors, closets, cabinets, colors, appliances, and fixtures. Gaining and refining skills in giving presentations, influencing, decision making, and conflict management may help tremendously as you pursue your career goals. Basic communication skills – verbal and non-verbal – enhance any other abilities an engineer may have.

Education and Industry Representatives See Ways to Work More Effectively Together

With closer collaboration between educators and industry, it is possible to better match students and internships, match students with jobs, and prepare students with job skills such as understanding profits and loss (P&L) and other related metrics. Other important business skills include being able to read a balance sheet, project management, and recognizing the importance of organizational culture.

Panelists offered some final tips for maintaining successful and rewarding careers:

- Pay attention to what and how you communicate
- Find one area to improve and work on that
- Do not avoid the "boring" aspects of work
- Be determined
- Have fun – think of things (especially challenges) as a game
- Maintain a sense of curiosity
- Network – maintain contacts from school and work, and stay in touch

Thank you to Dr. Sylvia Thomas for her work in organizing the Futures Forum and to panelists: Dr. K. C. Chen, Dr. Selcuk Kose, Dr. Ralph Fehr, Dr. Ashwin Parthasarathy, Dr. Yasin Yilmaz, Al Ramirez, and Paul Kostek.

Peggy G. Hutcheson, Ph.D., has reinvented herself from being a working journalist, to corporate manager, and then entrepreneur and academic. Dr. Hutcheson is best known for her expertise in connecting employees to changing work roles through organizational and individual career development. In her work she consults, trains and manages large and small client projects for businesses, non-profits and government agencies. She has published numerous articles, e-books and essays on career development topics including Restoring Career Development: Developing and Managing Talent, and many others. She is currently on the faculty at Kennesaw State University. Dr. Hutcheson has served in a number of volunteer roles in IEEE-USA. Currently she is a member of the IEEE-USA Communications Committee and the IEEE-USA Employment and Career Services Committee, where she is a past committee chair.

If you believe that what goes up must come down, consider the following…

The stock market continues to perform at historic levels, defying all expectation. History and common sense tell us that this streak won't last forever. Might now be a good time to consider a stock gift to IEEE-Eta Kappa Nu?

HKN enjoys support from its students and alumni in a variety of ways. One great way for a member to show support for important programs is through a gift of stock. With the market enjoying a record high, it is likely that the value of your stocks are worth more today than when you originally acquired them. If you were to liquidate your holdings, you would face capital gains taxes of up to 20%, depending upon your tax bracket.

There is, however, a way to avoid that rather unpleasant circumstance. Appreciated securities, that you have held for at least a year, can be gifted resulting in two potential tax benefits:

- a federal income tax deduction based on the current fair market value of the securities, regardless of their original cost, and
- an exemption from paying capital gains taxes on any increase in value, those taxes you would pay if you were to sell the securities.

How difficult is it to make a gift of stock?

As with any planned gift, the IEEE Foundation urges you to consult your tax advisor and/or financial planner to ensure that your action makes sense given your circumstances. If you chose to make such a transfer, or if you simply have a question, don't hesitate to contact Rich Allen, Campaign Manager, IEEE Foundation at 732.465.5871 or via email at Richard.allen@ieee.org.

Inspiring the Future

Donate and Enable the Impact of IEEE *through IEEE Foundation*

EDUCATION • INNOVATION • PRESERVATION

Your generous donations to the IEEE-HKN Fund of the IEEE Foundation encourages and supports the celebration of character, attitude leadership and scholarship through the honor society IEEE-HKN.

IEEE Foundation

Donate Today through the IEEE Foundation:
www.ieeefoundation.org/IEEE_HKN

For more information about IEEE-HKN visit our website: **www.HKN.org**

Be an inspiration to the next generation of IEEE-HKN students.

IEEE-Eta Kappa Nu

IEEE

IEEE-HKN Founders Day
28 OCTOBER

HKN and You, a Recipe for Success

Over the last few years, IEEE-Eta Kappa Nu has been on a roll! If you look through this publication, you will see examples IEEE-HKN's impact on the lives of students and alumni. The power IEEE-HKN and its students have is inspiring!

Thank you! It is important to share that specific message because none of this is possible without your support.

Even today, IEEE-HKN remains the dynamic organization that you may remember from the days you walked to your EE building or campus center. A few impressive facts:

Each year, **3,000 STUDENTS** take the oath of scholarship, character and attitude. This is **200% GROWTH** since 2010.

SIX NEW INTERNATIONAL CHAPTERS were installed (with an average of 18 inductees per chapter), including the first chapter in Japan, at Wasdea University.

In 2017, IEEE-HKN students **VOLUNTEERED 2,894 HOURS** and held more than **31 LARGE-SCALE EVENTS.**

What is behind this impressive growth? The short version, IEEE-HKN is resonating with this generation. The longer version, enhanced training for student leaders and faculty advisors. This training is critical because it enables students and advisors to be excited to plan and execute IEEE-HKN initiatives. When students and advisors see what works and have the tools for success, they are able to exceed all expectations.

A tangible example comes from the Mu Nu Chapter at Politecnico di Torino, Italy. The Chapter was looking to create a series of events to engage students at the University. They recognized that the topic of ChatBots was trending among the student population. In response, they developed a series of events that spread the technical concepts behind ChatBots to the University Community. Through these events, the Chapter was able to engage more than 235 students. This is just one examples of what happens every day around the world.

As mentioned earlier, this success is because of your support.
This year, IEEE-HKN celebrates 114 years.
In celebration, consider donating $114 to commemorate the milestone and to support the students of today and tomorrow!
YOU CAN MAKE YOUR GIFT AT
IEEEFOUNDATION.ORG/IEEE_HKN

Into the Second Century of Eta Kappa Nu

by: Steve E. Watkins, Gamma Theta Chapter

Eta Kappa Nu (HKN) has been contributing to the profession of electrical engineering and related fields since 1904. Each October, this history of HKN is remembered and celebrated through Founders Day events. The worldwide community of chapters are encouraged to have HKN-themed activities and to engage in service activities. As the honor society for the discipline, HKN continues to promote excellence in the profession and in education with a historic emphasis on ideals of scholarship, character, and attitude. The collegiate chapters recognize high scholarship through membership and foster a culture of service and volunteerism in their host departments. As a lifelong designation, HKN membership provides an association for professional development and engagement.

Eta Kappa Nu was founded on October 28, 1904 as the national honor society for electrical engineering students at the University of Illinois at Urbana-Champaign. Maurice L. Carr had a vision for a honor association that would recognize scholarship while aiding members throughout their professional life. He was joined by nine other undergraduates, including Charles E. Armstrong and Edmund B. Wheeler, who formed the first chapter. A national structure and membership qualifications were developed based on the three ideals. This student-initiated effort spread across the Midwest with the next chapters chartered at Purdue University, Ohio State University, and Illinois Institute of Technology in 1905.

The first century began with two of the founders, M. L. Carr and E. B. Wheeler, serving as the first and second national presidents, respectively. The organization experienced sustained growth with new chapters at other U.S. educational institutions. Also, a membership path was created for professionals and an Eminent Member category was added for career accomplishments. Recognition opportunities were expanded with prominent awards for chapters, students, teachers, young professionals, and service contributions. Close relationships were developed with the professional societies of AIEE and IRE and then with IEEE. In particular, chapters of HKN and student branches of AIEE/IRE/IEEE organized joint activities. By the centennial in 2004, over 200 HKN chapters as well as several alumni chapters were in operation and the membership scope included both electrical and computer engineering.

Founders Plaque at the University of Illinois

The second century of Eta Kappa Nu has a continued emphasis on the original vision, but the program and structure have been modified. Its signature activities have been revised including special attention to service and student conferences. The formerly independent HKN and IEEE entered into a formal relationship; IEEE-Eta Kappa Nu became the honor society for IEEE. As an organization unit of IEEE, its headquarters moved to IEEE, Piscataway, New Jersey. The 2010 merger led to growth of chapters outside of the U.S. The international IEEE-HKN includes over 250 collegiate chapters that are affiliated with accredited education programs in electrical engineering, computer engineering, computer science, and other fields of IEEE interest.

The corporate IEEE-HKN supports these chapters and the profession with a variety of signature activities. Student and professional member inductions and the awards program promote educational and career excellence. An annual student conference addresses networking, leadership, and professional development objectives. An online magazine, THE BRIDGE, is the archival publication for students, alumni members, and others in the profession and industry. And, the annual Founders Day promotion is another expression of the ideals of scholarship, character, and attitude.

More information of the history of Eta Kappa Nu can be found at the Engineering and Technology History Wiki page https://ethw.org/Eta_Kappa_Nu

This page also has links to the History of Eta Kappa Nu by Larry Dwon from 1975. The founding of HKN is discussed in From the Shade of a Cottonwood Tree by Alton B. Zerby, Executive Secretary 1935-1958, which was reprinted in the Centennial 100(1) issue of THE BRIDGE in 2004. Other history is presented in the 111(3) issue of THE BRIDGE in 2015.

Steve E. Watkins is the 2018 President of IEEE-Eta Kappa Nu and was the 2013-17 Editor-in-Chief for THE BRIDGE. He was inducted by the Gamma Theta Chapter at Missouri University of Science and Technology. He is professor at Missouri S&T and has been a Faculty Advisor for the Gamma Theta Chapter since 1992.

Are You Eta Kappa Nu?

Show Your Eta Kappa Nu!

If it's not on your card, it's not in your IEEE membership record.
Let us know!

800-406-2590
info@hkn.org
www.hkn.org

From Politencnico Di Torino to Waseda University and Back

Mu Nu and Mu Tau students after the rehearsal

What can Tokyo and Turin have in common? Why are there two students from the Politencnico University of Turin in Japan?

Our adventure started one year ago, in July 2017, just 4 months after the installation of our Mu Nu Chapter. During COMPSAC 2017, the flagship conference of the IEEE Computer Society, we organized, under the guidance of the IEEE-HKN Director, Nancy Ostin, an HKN panel where different professional members could share their experiences. The Computer Society 2018 President, Prof. Hironori Kasahara, attended our session together with two of his students. This was the first time we met in person Ismail and Boma, the leaders of the future Waseda University's Mu Tau chapter. They were very interested in knowing more about HKN and to create a new chapter, the first one, in Japan. We cannot describe our excitement and how Nancy was so enthusiastic about this idea, and it is a matter of fact that this is the moment when we started mentoring them in this new challenge.

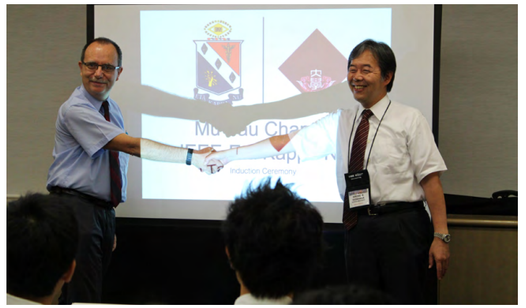
Pic of Boma, Silvia, Prof. Kasahara, Prof. Montuschi, Fabio, Ismail before Mu Nu's speech

It was a long and exciting process made by many emails, calls and days of work, but in the end, Ismail and Boma, with the help of the Mu Nu correspondent secretary, Francesco Perego, managed to have the new chapter approved by the IEEE-HKN board. On May 18, 2018, this news bounced from HKN headquarters in New Jersey to Japan and to Italy, finally reaching our mailbox. This new chapter installation would have taken place inside a special HKN session at COMPSAC 2018 organized by Professor Paolo Montuschi, and we were invited to attend! As soon as we finished reading the email, we immediately realized that we could not decline their invitation.

Thanks to the support of Professor Claudio Demartini, the Chair of Computer Engineering Department at Politecnico di Torino, Professor Sorel Reisman, the Standing Committee Chair of COMPSAC, and Professor Hironori Kasahara we managed to organize both our trip to Japan and our contribution to the HKN session.

New Mu Tau members celebrating their induction and the Installation of their chapter.

This is how we got to be in Tokyo. We arrived the 23rd of July and the same day, Boma and Ismail took us to taste the most iconic Tokyo dish, sushi. The day after we had a rehearsal of the ceremony, and on July 25 at 11 am everything was ready for the installation: scripts were printed, certificates were delivered and many guests had already arrived to the National Institute of Informatics, where the ceremony took place. Despite the emotion, the ceremony was flawless and the Mu Tau chapter was officially installed. As a part of the HKN session, we had the opportunity to give a talk after the ceremony, explaining how we solved the first issues that any chapter has to face starting its activities. In the end, after having taken official pictures with all the students and professionals present at the ceremony, we had lunch with all new chapter members. It was a great way to celebrate the moment.



Prof. Kasahara and Prof. Montuschi handshaking

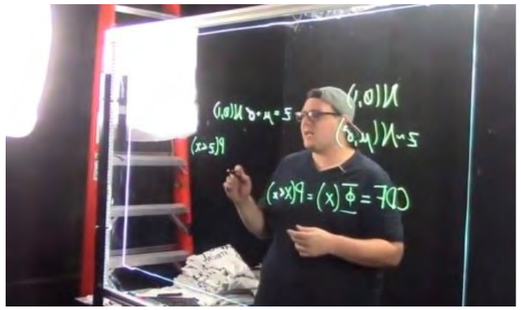
Lunch after Installation

Now the journey is over and thinking about what we have done and we have seen, we would like to thank all the new people we met during this experience. This is clearly not an arrival but a new starting point as well as an impacting milestone in our personal and professional career. We hope that the collaboration between our chapters will continue in the next years. We wish the new chapter all the best, and we are sure that they will be great, they will grow and they will organize outstanding activities.

Good luck Mu Tau and welcome to the HKN family—Silvia Vitali and Fabio Cermell!

The Beta Omega Chapter Finds Success in their Tutorial YouTube Channel!

Four years ago, the IEEE-HKN Beta Omega Chapter at the University of Connecticut had just restarted and was looking for ways to give back to the community. With many members who were already math tutors, they decided to hold tutoring sessions to benefit students just starting out in their engineering studies. However, they found that many students could not attend their tutoring sessions and there was a lack of tutoring resources online that presented the information in a clear, concise way. The chapter decided to take matters into their own hands and expand their tutoring services in an unconventional way: through a YouTube channel.



Finelli writes on the Lightboard during filming. Although the text looks backward, the image will be flipped for viewers through the use of a mirror and camera.

The goal of the channel, "UConn HKN," was to provide students with tutorial videos they could access anytime, and maybe give the chapter a bit more exposure. Initially, the chapter assumed the videos would be watched by UConn engineering students who were reviewing information from class or preparing for an exam. However, the chapter's graduate advisor, Andrew Finelli, soon found that this wasn't the case.

"Much to our surprise, we were being watched by people all over the U.S. and even across the globe," Finelli said. "You can imagine this was very exciting, but we tried to remain focused. We try to continue to produce videos with the targeted audience being students at the University of Connecticut, but we try to keep in mind that there are people outside the university that will be trying to learn from these as well!"

Almost a year after posting their first video, the university had just created a Lightboard through the Center for Excellence in Teaching and Learning (CETL). The chapter had inquired about resources that could help them improve their videos and the CETL invited them to help test out this new video-producing technology. The Lightboard technology allows student tutors to face the camera while writing on a transparent, glass board. A mirror and camera are then used so that the image is flipped and it appears as if the tutor is writing backward, but it is actually oriented properly for the viewer. This allows student tutors to not block their own writing, facing the camera and board at the same time. Graduate volunteer and video team member, Zachariah Sutton, described the Lightboard as "about the best video-making setup we could hope for."

Before using the Lightboard, student tutors would face a whiteboard in the videos and experienced a number of challenges such as contrast issues, awkward zooming, poor sound quality, and trying to find an empty classroom where their voices would not disturb classes. According to Finelli, their video quality has greatly improved since using the Lightboard studio, and they are able to schedule regular hours to film, allowing them to create more content for their channel.

Once they introduced this new technology to their videos, the channel started to take off. In October of 2016, about a year after uploading their first video using the Lightboard, their channel had reached over 700 subscribers. In May of 2017, they reached 1,849 subscribers. One year later, in May of 2018, their subscriber base passed 4,200—adding over 2,400 subscribers that year. However, one month later, in June of 2018, their subscriber base passed well over 5,200 subscribers—adding over 1,000 subscribers in just one month! They also have over 20 countries that have spent a significant amount of time watching their videos. The top two countries that account for the majority of their views are the United States (23%) and India (14%).

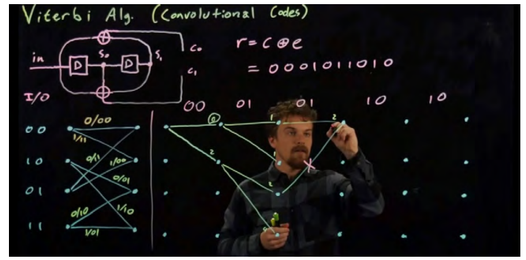
As their channel continues to grow rapidly, Finelli said their video team has been creating a plan for future topics to cover, to create an exhaustive catalog

Finelli leads an HKN tutoring session on a whiteboard, before the launch of their YouTube channel.

of videos for the introductory classes. After covering introductory classes, Finelli said they hope to move on to the more difficult material, as long as there is an interest.

"It is our responsibility as intelligent and successful people to pass on what we have learned to others," Finelli said. "The channel is one of many ways that our chapter tries to fulfill this responsibility and propagate the ideals of IEEE-HKN."

The chapter said they have received numerous first-hand accounts from students who have thanked the chapter for helping them pass classes, making



Graduate volunteer and video team member, Zac Sutton, uses the Lightboard to explain how to encode a data stream using a convolutional encoder and how to decode the received sequence using the Viterbi Algorithm in a popular video.

studying easier, and presenting the information in a clear way. The chapter hears from not only University of Connecticut students, but their channel has received comments from students thanking them from all over the world.

"Long before I was even a member of HKN, I used the YouTube page as another resource to help me through my courses," said Alexander Lavoie, current president of the Beta Omega chapter. "Now, I see students use the content me and my peers have created and I know it helps them because it helped me when I was in their shoes."

The Beta Omega chapter uses their YouTube channel to impact the lives of thousands and doesn't plan to stop anytime soon. They have added many more members to their video team and have teamed up with professors who want HKN to produce online content for their classes. As their resources increase, as well as the demand for more videos, the chapter said they plan to continue working hard to make their YouTube channel an even better resource for students at the University of Connecticut and around the world.

"I can certainly say we've made a positive impact," Finelli said. "There is something very fulfilling about hearing somebody used our videos and it helped them learn. They are always so grateful and it makes me very happy to know that we played a small part in helping them succeed."

PROFESSIONAL PROFILE:

Candy Robinson

Candy Robinson is currently a Software Engineering Manager for Lockheed Martin, assigned to the F-35 program. She worked as a hardware design and software engineer for Lawrence Livermore National Laboratory, the Superconducting Super Collider Laboratory, and for the Boeing Company. She has published papers at the IEEE Nuclear Science Symposium and for the SWE National Convention. She earned a BSEE degree from UT Austin, an MSCS degree from UC Davis, and an MBA in Engineering and Technology Management from the University of Dallas. She has served in numerous roles in the IEEE, including Region 5 Director in 2010-11. She is currently a member of the Fort Worth IEEE Section and the 2018 IEEE-USA President. She is also a Toastmaster and Life Member of the Society of Women Engineers. She belongs to the Dallas Trekkers walking club (an AVA club) and participates in a three-day walking event every year in West Texas. She has two engineering daughters, two sons, and five grandchildren.

How has Eta Kappa Nu (IEEE-HKN) impacted your life? Your career?

I was Region 5 Director when Eta Kappa Nu became an organizational unit within the IEEE. Chapters recognize high scholarship through membership and foster a culture of service and volunteerism. The guiding ideals for membership eligibility of scholarship, character, and attitude have remained unchanged since its founding in 1904. IEEE itself has this same strong culture of service and volunteerism, which has been a foundation for my own rewarding career. It is within this culture that I have honed soft skills such as managing teams, communicating effectively, and sharing ideas. For engineers to be their most effective and innovative, we must work collaboratively and respectfully with diverse communities. Eta Kappa Nu recognizes and lives these values.

What inspired you to choose the engineering field?

I excelled in mathematics and wanted to apply technology in practical ways to contribute positively to society. I also was looking for a challenging field, and one that would support myself and a future family. Engineering met these criteria and I have never regretted the choice.

What do you love about engineering?

It is challenging and ever-changing. I have had a lot of autonomy in the positions I have held. Engineers solve problems. It requires careful thought, innovative thinking, and collaborating with many different types of people.

Whom do you admire and why?

I admire several women who came before me – such as Admiral Grace Murray Hopper, physicist Mildred Dresselhaus, many others – for their intelligence, and their perseverance. Despite great odds, they insisted on using their God given gifts for the benefit of mankind.

In your opinion, what has been the greatest change in engineering since you were a student?

By far, the advances in technology that allow such enormous computer power and dense electronics has brought the greatest change in engineering since my student days. The Apple 1 was launched in my junior undergraduate year. My early career years included overlaying code on a DEC LSI-11 so that it could fit in memory. It frees the mind to focus more on the outputs and less on the minutia of getting things to work under far greater constraints. Chips were being produced that automatically provided many of the functions that before had to be built from discrete components in much larger spaces. What hasn't changed is the fun of creating and imagining what is next, and the joy in solving problems.

I wish I had known…

Often, young engineers feel that if they just work hard enough, they will be noticed, and their career will be taken care of. I wish I had known the importance of communicating more with others, creating a network, and obtaining mentors along the way. I started selecting mentors much later in my career. I would ask someone I admired to meet with me once a month for one hour and one calendar year. These mentors were always flattered to be asked, and they often provided me with perspectives I did not have, but that I needed to be more successful in my career.

Best advice for new graduates…

Do not neglect the soft skills. Practice good time management and learn to focus on the important items before you. Be respectful of others. Do not underestimate what you can do. I found the book 'Lean In' by Sheryl Sandberg to be quite good, as well as 'Crucial Conversations' training. The Toastmasters International organization is an excellent way to improve both leadership and communication skills, as well as getting involved in IEEE. And make sure you develop and maintain healthy habits regarding diet, exercise, sleep. For me, a strong faith foundation has also been fundamental in keeping my compass pointed in the right direction.

From your perspective, what's the next BIG advance in engineering?

That is a tough question. However, I do believe our biggest advances in engineering will rely on multi-disciplinary solutions – such as bioengineering – creating artificial tissues, organs, or organ components to replace damaged or absent parts of the body. There are some amazing advances in that area. I also believe that as much more emphasis is being placed on Alzheimer's research, critical progress will be made in the next decade or two. It will happen only by combining engineering and science technologies to find ways to prevent and/or cure those afflicted with this cruel disease. IEEE continues to blur boundaries across technical areas of interest and help create more diverse communities.

STUDENT PROFILE:

Michelle Christina Blum

Gamma Alpha Chapter

Michelle is a senior at Manhattan College, where she is majoring in computer engineering with a specialization in bioelectrical engineering, a concentration in applied mathematics, and a minor in business. After graduation, she hopes to pursue project management in a technical setting. To prepare for this, Michelle takes on many leadership roles at school, including: President of the IEEE-Eta Kappa Nu chapter, President of the Tau Beta Pi chapter, and President of the Engineering Ambassadors club. She has also interned with companies such as the IEEE, the Walt Disney Company, the Port Authority of NY/NJ, a non-profit called Engineering Tomorrow, and has engaged in research and program management at her school. Besides engineering, Michelle also loves photography, traveling, and cooking.

Cooking class with IEEE-HKN Vice President, Christopher Dubois.

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

Almost anyone will agree that pursuing engineering as a major is a difficult journey. Along the way, there will definitely be classes, assignments, and professors who may cause the student to doubt their chosen field. When I was invited to join IEEE-HKN, I immediately felt a greater sense of confidence in my ability to succeed in the computer engineering industry. The support, opportunities, and motivation to continue that the society provides can prevent even the most doubtful student from quitting. Being a member of the IEEE-HKN community will always remain a valuable part of my computer engineering experience.

Why did you choose to study the engineering field?

I have never been the type of person to have a single passion or interest that transcends all others. Additionally, I have always been capable of performing in many activities, as opposed to excelling at one or two in particular. As a result, when selecting a major for university, my main consideration was which field would pose a challenge. Engineering is known to be challenging and constantly changing/evolving. These descriptive words proved that within this field, I would never perform repetitive or boring tasks. Instead, I would always need to think of innovative solutions, and receive the satisfaction of seeing the ideas implemented and succeed.

What do you love about engineering?

Trial and error is a huge part of the engineering process. There is never a single or, most of the time, even a best solution to a posed problem. Engineering is all about collaboration to try and test different ideas. Oftentimes, engineers will need to test a "crazier" idea to arrive at the final solution. The freedom provided by this process is my favorite part of engineering.

What is your dream job?

I want to be a Technical Project Manager at a large software company. I love leadership roles and find myself to be quite organized and able to communicate well with others. Through my internship experiences, I have realized that I prefer larger companies over smaller, in-development ones. The software company component is so that I do not abandon my interest in the technology field. This interest was the motivating factor of my choice to pursue computer engineering. As I continue to learn the specifics of certain technologies during my time at university, my interest never fades. Combining leadership and technology in my career is very important to me, and I hope I am able to accomplish this next year with my first job.

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

My admiration is towards anyone who has mastered the work-life balance. Although I want to be successful in my career, I know that it will never lead to as much happiness as time spent with my best friends and family. Whichever company I choose to work for next year, the ability to maintain this balance will have been a huge deciding factor.

What is the next BIG advance in engineering?

The next BIG advances in engineering will probably take place in the artificial intelligence and machine learning fields. These fields have the potential to be applied within any engineering industry and can lead to greater efficiency and productivity in many human endeavors. A real-time translating device and self-driving cars are two products that are still being improved. Once these two products become mainstream, more people will realize the degree to which these fields can truly change the world.

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

There are some things within your major that you will be convinced you will never understand. As you continue into the major, you will realize that you have been implementing these concepts for years. The same will be true in career and in life: do not feel defeated, for you really will learn on the job and become an expert as time progresses and the range of your experience grows.

What advice would you give to other students entering college and considering studying your major?

If you do not think you will enjoy the material, do not enter the major. You cannot succeed in this major unless you are willing to put in the work. Not enjoying any of the material will not motivate you to put in the work, and this is not a major in which you can "slide by."

While working with the Port Authority of NY&NJ.

How has HKN helped me in my career?

Amy Jones
Gamma Theta Chapter

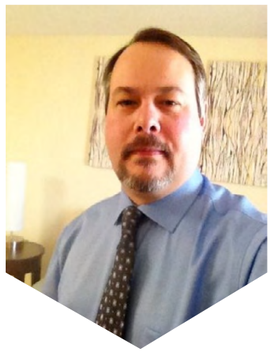
As an undergraduate member, HKN was an opportunity to connect with faculty and peers outside of class. Those relationships formed a key support network (in the form of many study groups) for me through the rest of my education. As an officer in my section, I had an opportunity to practice leadership skills and stretch myself – planning a student conference was one of the most challenging things I'd ever done. Now, as a professional, HKN is a community that offers me the chance to try out new things (like volunteering to write about our initiation process) and stay current in my field. I'm so glad to have these thriving connections that expand my network outside of my company and industry.

Senior Engineer, John Deere

Brian M. Chandler
Xi Chapter

Growing up, I remember two things hanging on the wall in my dad's office – his Bachelor of Electrical Engineering degree and his Eta Kappa Nu membership certificate. My dad told me about his experiences to earn both achievements and what they meant to him. My goal was to one day have both on my wall with my name on them. The standard of excellence for HKN motivated me throughout my academic endeavors and continues to motivate me during my engineering career. My own HKN certificate hangs in a place of honor on my wall along with my Electrical Engineering degree.

General Manager of Utilities, City of Troy, Alabama | Senior Engineer, John Deere



John E. Daly
Zeta Gamma Chapter

HKN has helped me build valuable networking relationships in the electrical engineering field and gave me a competitive edge in the career marketplace. I'm very excited to learn that some of my colleagues are members of HKN and I ask them what chapter they belong to and to share their experiences. HKN has also introduced me to valuable resources that advance my technical knowledge through IEEE periodicals, keeping me abreast of the most recent developments in my field of expertise.

Fortive, Inc.—Gilbarco Veeder-Root, Test Engineer, Reliability

Steve Watkins
Gamma Theta Chapter

As an undergraduate inductee, my chapter required the collection of signatures from upperclass members and ECE faculty. This networking opportunity expanded my peer community and served as an important connection to faculty. My plaque had signatures of the department chair, the HKN national vice-president, my future graduate advisor, and professional mentors. Chapter activities continued this professional engagement. My HKN relationships still are central to my professional life.

2018 HKN President, Professor, Department of Electrical and Computer Engineering, Missouri University of Science & Technology

Stuti Ghiya
Sigma Chapter

HKN emphasizes scholarship, character, and attitude. To be part of an organization that places importance on these three qualities reminds me that there is more to engineering than applying knowledge in the workplace. An engineer benefits from a strong character and the right attitude, in addition to a good technical foundation. Keeping these three values in mind helps me make better decisions, both on the job and for my career.

Systems Software Engineer, Texas Instruments

Theresa Cavrak
Xi Chapter

As an undergraduate member of both IEEE and HKN, I was always pleased to receive and read the IEEE publications that came to my mailbox each month. I enjoyed learning about the various technologies and industries that other IEEE members were involved in, and I recall even spending time reviewing details in the advertisements. One of the ads featured a large cellular phone company (at the time a new technology) looking to fill design positions with new graduates. After responding to this ad and having multiple interviews, I received an offer from this company, and while I did not take this position, I have always remembered the value I received from reading IEEE publications, including HKN's, cover-to-cover.

Senior Future Directions Specialist, IEEE