

EDS YOUNG PROFESSIONALS

CAN BAYRAM: REFLECTIONS FROM AN EDS YOUNG PROFESSIONAL



The Young Professional guest in this issue of the Newsletter is Can Bayram, Electron Devices Society's 2014 Early Career Award winner

and a faculty member at University of Illinois at Urbana-Champaign. His perceptions about EDS and views regarding professional development and career growth are reflected in the discussion. Here are the excerpts of the interview with Can Bayram made by Manoj Saxena, the Newsletter Associate Editor-in-Chief.

Manoj Saxena: What was the specific temptation, if any, which made you join IEEE EDS, the premier global society in the field of electron device engineering, at first?

Can Bayram: I joined EDS because my mentors have been EDS members. EDS being a major influencer in my research field (through its highly respected conferences and impactful journals) is the reason I have been a member since then.

MS: You won the prestigious EDS Early Career Award, an honor most of the young professionals aspire. How do you consider this recognition and what are your plans to further develop your research career?

CB: I am honored to have been recognized as the 2014 Early Career Award Winner. Early Career Awards are essential mechanisms for encouraging young professionals to conduct impactful research. This recognition not only celebrates our impact but also brings a spotlight to our future

work. After almost a decade of research and development, we are now exploring commercialization of our technologies, which could bring our awarded research into our daily lives.

MS: As a Young Professional, how do you position your interest in your own field with the activities and services you perform as an EDS member/volunteer?

CB: EDS membership benefits allow me to gain discounted conference registration, unique access to valuable and timely content (e.g. the newsletters and webinars), and networking. In reciprocity, I volunteer as the Chair of the IEEE EDS Optoelectronics Technical Committee and as an Editor in the IEEE Transactions on Electron Devices. As a service, I am giving, what EDS provides me (e.g. time and funds savings, technical and professional peer expertise), back to the EDS.

MS: What are your thoughts about the EDS membership and its paybacks? Whether the EDS membership benefited you at any time in your career growth? If so, how?

CB: I am a seasoned IEEE member for the last 17 years, and an EDS member during the last 13 years. I have been a student, young professional, regular, and, now, senior member. EDS is one of the few societies where each career level can find valuable technical, educational, and networking content. Given its large member size and diverse geographical and technical member database, it also provides many career growth and leadership opportunities in various forms such as organizing

conferences, topical meetings, and special issues.

MS: As an YP, how do you consider the EDS Society as a whole and what are the changes or developments you would like to see in evolving this professional body as a group devoted to humanity and its causes?

CB: Today, internet connectivity is rapidly becoming a basic utility for the world's population. Digitization of valuable EDS content will enable timely and scaled access, enabling opportunity for members to grow through online learning, remote employment, and networking. Increased engagement through social platforms, encouragement of regional activities, and traveling speaker events might help members and the public stay up to date with the EDS and its impact.

MS: What are your suggestions and recommendations for those young professionals who may aspire to join EDS?

CB: EDS will inspire you for what you can accomplish. Societies such as EDS offer many platforms for providing young professionals valuable insights on career options. Engaging early is not a requirement, but certainly has its benefits. I encourage young professionals to focus on their careers and let their work inspire many.

MS: As an EDS Young Professional and a young researcher in the field, how do you consider the prospects of scientific research in this field for the progress of Humanity as a whole?

CB: The NAE President John Anderson once said, “*Science is about discovery, engineering is about creating*.” Since the discovery of the electron in 1897 by Thomson, we have been exploring its unique properties and creating new methods to tailor them. The NAE’s Great Engineering Achievements of the 20th Century highlight how much we have progressed. Still, there is much to discover, and many engineering challenges to overcome. The NAE’s Grand Challenges for Engineering specifically cite making solar energy economical, enhancing virtual reality, reverse-engineering the brain, and developing the tools of scientific discovery. These specific challenges and others can only be overcome through scientists and engineers, working together.

Can Bayram is an Associate Professor in the Department of Electrical and Computer Engineering, a resident faculty at the Nick Holonyak, Jr Micro and Nanotechnology Laboratory, and an affiliate faculty of the Carle Illinois College of Medicine of University of Illinois at Urbana-Champaign, IL, USA. He is an expert in III-V materials and photonic and electronic devices. He has performed more than 3,000+ epitaxial growths with metalorganic chemical vapor deposition systems and fabricated detectors, light emitting diodes, solar cells, resonant tunneling diodes, and transistors in class 100 and 1000 cleanrooms totaling 20,000+ hrs equipment usage. His current research interests lie in the intersection of novel III-V materials, hetero-structures, and photonic

and electronic devices. Particularly, his research group explores III-V materials and novel devices, hetero-integration of III-Vs on unconventional platforms such as graphene, silicon and diamond, heat transport across/through semiconductors, efficiency drop mechanisms and remedies in AlInGaN emitters, and ultra-fast THz photonics/electronics. Prof. Bayram’s work has been recognized widely. He is the recipient of the International Union of Pure and Applied Physics Young Scientist Prize in Optics, IEEE Nanotechnology Council Early Career Award, an NSF CAREER Award, a CS Mantech Best Paper Award, an AFOSR Young Investigator Award, the IEEE Electron Devices Society Early Career Award, and many Best Paper Awards.

SHIMENG YU: REFLECTIONS FROM AN EDS YOUNG PROFESSIONAL



*Prof. Shimeng Yu
Georgia Institute of
Technology, Atlanta,
Georgia, USA 30332*

The Young Professional guest in this issue of the Newsletter is Shimeng Yu, Electron Devices Society’s 2017 Early Career Award winner and a faculty member at Georgia Institute of Technology, Atlanta. His perceptions about EDS and views regarding professional development and career growth are reflected in the discussion. Here are the excerpts of the interview with Shimeng Yu made by Manoj Saxena, the Newsletter Associate Editor-in-Chief

Manoj Saxena: What was the specific temptation, if any, which made you join EDS which is the largest professional organization in the globe, at first?

Shimeng Yu: I joined EDS as a student member in 2010 when I was pur-

suing the master’s degree at Stanford University. In that year, I had opportunities to present my research papers on resistive random-access-memory (RRAM) in the EDS sponsored conferences such as IEEE International Memory Workshop (IMW) and IEEE International Electron Devices Meeting (IEDM). Those were my initial experiences attending technical conferences, interacting with peer students, and learning from senior professionals. I was grateful to receive the EDS Masters Student Fellowship in 2010. This student fellowship deeply motivated me to further pursue the research in the semiconductor devices. Later I was fortunate to receive the EDS PhD Student Fellowship in 2012. My EDS journey started as a student member in those years.

MS: You won the prestigious EDS Early Career Award, an honor most of the young professionals aspire. How do you consider this recogni-

tion and what are your plans to further develop your research career?

SY: It was my great honor to receive the prestigious EDS Early Career Award in 2017, 4 years after I started my own research group. I regarded it as an appreciation by the community for my technical achievements as a junior faculty member. At that time, I had been fully engaged with EDS activities with dozens of publications in IEDM, IEEE Electron Device Letters and IEEE Transactions on Electron Devices. Meanwhile, I have extended my research from devices to circuits and systems as well. I believe a holistic approach to solve the fundamental challenges in the technology scaling is critical, therefore a design-technology co-optimization or even system-technology co-optimization is highly demanding in the future.

MS: As a Young Professional, how do you position your interest in your own field with the activities

and services you perform as an EDS member/volunteer?

SY: My volunteer roles in EDS include reviewers for EDS journals, and technical program committee member for EDS sponsored conferences such as IEDM, Symposium on VLSI technology and IEEE Electron Devices Technology and Manufacturing (EDTM). By serving the community, I could learn the latest research trends in the field and also I have an opportunity to shape the future research directions (by selecting/promoting good papers). I am glad to see many ideas that my research group pioneered have become popular among EDS colleagues later, including using RRAM for physical unclonable function and customizing 3D NAND for compute-in-memory. Furthermore, our open-source model and simulator (i.e. RRAM compact model and NeuroSim benchmark framework) are being widely used in both academia and industry today.

MS: What are your thoughts about the EDS membership and its paybacks? Whether the EDS membership benefited you at any time in your career growth? If so, how?

SY: The EDS membership is rewarding, and I have benefited a lot from the EDS Masters and PhD Fellowships as well as Early Career Award. It not only gives us the opportunities to earn these awards, but also provides us the access to the online educational resources. Recently, EDS has promoted a series of webinars to help a wider participation in virtual lectures during the pandemic, and I gave a presentation in one of the webinars about the recent progress on compute-in-memory technologies. Also, I enjoyed the new initiative that EDS launched on the podcast interview, and the first interview was with Prof. Chenming Hu, a well-respected pioneer in our field, who gave many useful advices to young professionals.

MS: As an YP, how do you consider the ED Society as a whole and what are the changes or developments

you would like to see in evolving this professional body as a group devoted to humanity and its causes?

SY: Frankly speaking, I see there is a declining interest among the new generations of students towards semiconductor devices (or in general hardware), simply because of the blooming in machine learning (or in general software). But we have to keep in mind that the technological foundation of new applications powered by AI today is still the integrated circuits and semiconductor devices. Also I would like to point out that many traditional Internet (or system) companies (Google, Facebook, Amazon, Microsoft, and even Tesla) are developing their own silicon program. My suggestion for our EDS educators and researchers is to embrace the wave of AI/machine learning and train the students with interdisciplinary skills. The opportunities are two-folded: 1) Devices for AI, meaning developing new device technologies that suit AI hardware acceleration (e.g. new multibit memories); 2) AI for devices, meaning applying AI techniques to improve device technologies optimization (e.g. materials screening, manufacturing process control).

MS: What are your suggestions and recommendations for those young professionals who may aspire to join EDS?

SY: Young professionals including graduate students and even undergraduate students are all welcome to join EDS and get the benefits of the educational resources as aforementioned. Attending premier EDS conferences, and subscribing EDS flagship journals are the first steps to success.

MS: As an EDS Young Professional and a young researcher in the field, how do you consider the prospects of scientific research in this field for the progress of Humanity as a whole?

SY: I feel that semiconductor technologies can do more especially in the context of the pandemic today.

For example, fast genomic sequencing requires domain-specific hardware accelerators for processing TB data. To analyze the virus from raw sequenced data to biologically interpretable output is critical to understand how COVID-19 has mutated and what that means for its spread and eventual treatment.

Shimeng Yu is an associate professor of electrical and computer engineering at the Georgia Institute of Technology. He received the B.S. degree in microelectronics from Peking University in 2009, and the M.S. degree and Ph.D. degree in electrical engineering from Stanford University in 2011 and 2013, respectively. From 2013 to 2018, he was an assistant professor at Arizona State University. Prof. Yu's research interests are the semiconductor devices and integrated circuits for energy-efficient computing systems. His expertise is on the emerging non-volatile memories (e.g., RRAM, ferroelectrics) for applications such as deep learning accelerators, in-memory computing, 3D integration, and hardware security. Among Prof. Yu's honors, he was a recipient of NSF Faculty Early Career Award in 2016, IEEE Electron Devices Society (EDS) Early Career Award in 2017, ACM Special Interests Group on Design Automation (SIGDA) Outstanding New Faculty Award in 2018, Semiconductor Research Corporation (SRC) Young Faculty Award in 2019, ACM/IEEE Design Automation Conference (DAC) Under-40 Innovators Award in 2020, and IEEE Circuits and Systems Society (CASS) Distinguished Lecturer for 2021-2022, etc. Prof. Yu served or is serving many premier conferences as technical program committee member, including IEEE International Electron Devices Meeting (IEDM), IEEE Symposium on VLSI Technology, ACM/IEEE Design Automation Conference (DAC), ACM/IEEE Design, Automation & Test in Europe (DATE), ACM/IEEE International Conference on Computer-Aided-Design (ICCAD), etc. He is a senior member of the IEEE. Lab website: <https://shimeng.ece.gatech.edu/>