FOCUS

Planting Seeds of Carrots, Cucumbers and Community

Ohio State EPICS in IEEE Project Finds a Way to Work through Quarantine

Proud of their Farmbot, from the left, Dr. David Delaine, his PhD student Nathan Harris, Paula Penn-Nabrit, Charles Nabrit, Dr. Christopher Ratcliff and Damon Nabrit pose near its tracks.

After evaluating the service-learning courses in the College of Engineering at The Ohio State University, USA, several engineering professors realized a lack of involvement connecting Ohio State students with the local Columbus, OH community. "We all have the responsibility to try and support others to make the world a better place, whether it's around the corner or across the world," says Dr. David A. Delaine, Assistant Professor in the Department of Engineering Education at Ohio State. To put action behind their words, they reached out to the Charles Madison

Nabrit Memorial Garden (CMNMG), ten minutes down the road from Ohio State.

The CMNMG is located in the rear of The Church of Christ of the Apostolic Faith (CCAF), which was formed more than 110 years ago by the descendants of formerly enslaved Africans in America. The CMNMG's onsite Farmer's Market is the perfect place to provide fresh, organic produce at US$1 a pound to community members. When two faculty members from the College of Engineering Education at Ohio State asked how they could collaborate with the CMNMG to further their mission to fight urban food deserts, the

answer was purchasing a "Farmbot," a robot to both help with the CMNMG and serve as an educational focal point to further STEM interest in the community.

To carry out this project, IEEE members Dr. Delaine and Dr. Christopher Ratcliff, Lecturers in the Department of Engineering Education at Ohio State, submitted a proposal to EPICS in IEEE, a program which gives students the opportunity to use technical solutions to better their community, and were awarded a US$10,000 grant to purchase and install the Farmbot and a small solar array to power it at the CMNMG. Fifteen Ohio State University students and approximately 140 pre-university students from the local community worked on the project.

The Farmbot is a gantry-style robot, with two-by-fours installed above a 10 by 20 foot raised bed in the garden. Tracks on the two-by-fours make it possible for the robot to move in all three coordinates. The Farmbot, which has a camera installed, can pick up different tools and seeds using a vacuum suction, plant seeds, water plants and pick up the soil moisture meter. Coming soon is the ability to have the Farmbot weed the garden beds by using small teeth to dig and rotate in the dirt in order to disturb young weeds. As a completely open-sourced robot, the Farmbot could even be used to teach students how to write their own codes and create different parts for the Farmbot.

In 2019, before the COVID-19 pandemic, Ohio State built upon the success of the project and partnered with the CMNMG to

Camp participants take a rest in the garden while learning how the Farmbot and solar array function.

EPICS ᴵᴺ IEEE

CMNMG. Posters were designed to explain the Farmbot and Solar array to a broad audience of different ages and backgrounds. The Town Hall successfully brought together a diverse group including the CMNMG, members from CCAF, a Columbus City Council representative, children from the summer camp, physicians, students and professors from Ohio State, and musical artist "Farmer Brown Tha MC" from University of Kentucky. Very few times had such an intentionality been pursued to bring such a wide audience together in this community, and the result was meaningful, well-received, and a success.

During a time when building community is especially difficult due to COVID-19, creativity and intentionality is mandatory in staying connected. The Farmbot project enabled Ohio State to continue to plant seeds of carrots and cucumbers, but also seeds of community, by providing a robot to virtually "gather around" in the Town Hall meeting.

Learn more about how EPICS in IEEE empowers students and impacts communities at epics.ieee.org. ∎

run a FREE summer camp in the Columbus community, centered around the Farmbot and the small solar array powering the Farmbot. The founder of the CMNMG, Paula Penn-Nabrit, wanted to provide a free, summer day camp called "STEM-to-STEAM: It's All in the Garden" to teach the students in the community about STEM fields since many of them would not have otherwise been able to afford to attend an educational summer camp.

The camp gave students ages 4 to 15 the opportunity to not just learn about areas in STEM, but actually interact with a robot and build curiosity. Dr. Ratcliff said, "One of the primary motivations for the CMNMG, besides providing fresh food and fresh produce at an affordable price, is providing educational experiences for kids in the area." Students from Ohio State and University of Kentucky volunteered as camp counselors, and Nathan Harris, a doctoral student studying under Dr. Delaine, led sessions in explaining the functions on the Farmbot and solar array. Because of quarantine regulations, the summer camp at the CMNMG couldn't be held this year, to the disappointment of all the children who participated.

To make up for the loss, the volunteers at the CMNMG and the EPICS in IEEE group from Ohio State held a virtual Town Hall meeting at CCAF to keep in touch with the community needs and explain the functionality of the Farmbot and how it directly relates to the betterment of the

PES Scholar Demonstrates Benefits of IEEE Student Membership

Donor Support is Key in Educating and Energizing the Next Generation

"I know first-hand the benefits from receiving an award, and the generosity of donors who support IEEE," said Megan Culler in her blog about receiving the IEEE Power & Energy Society Outstanding Student Scholarship.

Megan was a two-time IEEE Power & Energy Society (PES) Scholarship Plus recipient, and received the Region 5 2018/19 IEEE PES John W. Estey Outstanding Scholar, a distinction awarded to the top PES scholar in IEEE regions 1 to 7. In 2019, she graduated from Texas A&M University (TAMU) where she was inducted into the IEEE-Eta Kappa Nu Gamma Mu Chapter in 2017. She is now pursuing her Master's Degree at the University of Illinois-Champaign/Urbana where she's an IEEE Graduate Student Member.

At TAMU, Megan served for three years on the leadership team of the IEEE Student Branch. "My first year on the team was as a recruitment officer," she recalls. "In that role, I thought about what students want and need, and how to bring value to their membership. That's when I made it my personal mission to involve as many of them as possible in student branch activities," said Megan. By the time she graduated in May 2019, her accomplishments spanned the length and breadth of IEEE Student Branch programs and activities at TAMU.

It's not surprising then, that when the first set of outstanding IEEE PES Student Members were selected to receive the PES Outstanding Student Scholarship, Megan was among five who were recognized. "This award really means a lot to me because I have been developing my role in IEEE and in PES for over four years. It is an incredible honor to be awarded a scholarship recognizing my academic and professional achievements by an international society for which I have a deep admiration," said Megan. Each PES Outstanding Student Scholar receives US$10,000 funded via an endowment administered by the IEEE Foundation.

Megan Culler is an inspiration to other IEEE student members as she tirelessly demonstrates how important being an active and involved IEEE member can be.

"We are very pleased to recognize these students as the inaugural recipients. These students represent the very best of the 10,000+ PES student members," announced Edvina Uzunovic, IEEE PES Vice President - Education. "They have taken leadership roles within the IEEE PES Student Branch Chapters, been active in supporting humanitarian projects, have maintained the highest academic achievement and have a strong desire to improve the Power & Energy industry." More information on this scholarship can be found at ieee-pes.org/ieee-power-energy-society-outstanding-student-scholarship.

With such distinctions, it's clear that Megan also deserved the accolades associated with receiving the 2019 IEEE-USA Jim Watson Student Professional Awareness Achievement Award. Its purpose is to recognize IEEE members who volunteer their time and share their professional experiences with students to help foster and encourage active, lifelong IEEE membership.

Although it is a relatively young award, first presented in 2011, this year is the first time IEEE-USA selected a student as the recipient. Motivated, enthusiastic student members can be valuable in creating an appreciation among their peers– demonstrating just how important being an active, involved IEEE student member can be. Read more about Megan in this article by Helen Horwitz in IEEE USA InSight: insight.ieeeusa.org/articles/watson-award-recipient-megan-culler/. Watch Megan accept this award during the IEEE-USA awards ceremony which was held virtually on 31 August here: ieeeusa.org/virtual-awards-ceremony.

Donor support is key in educating and encouraging the next generation of innovators and engineers through scholarships and other accolades. It's exciting to follow the success of IEEE student members throughout their academic and professional careers and to know that IEEE was there to nourish them. Learn more about this scholarship initiative and other Scholars at ee-scholarship.org. ∎

Pilot Project to Transform 500,000 Lives

A Focus on One Successful IEEE Smart Village Energy Entrepreneur

Jude Numfor, Managing Director REI-c, contributed to this article

IEEE Smart Village (ISV) is a unique program within IEEE. ISV provides seed money with the intent to empower people through sustainable energy, expanded educational opportunities and profitable enterprises. The hurdles to receive seed money from ISV for a large (US$200k range) project are significant and only a select few are approved. During its history (see article on page 5), ISV has supported several highly successful entrepreneurs around the world along with many more, smaller projects in the US$25k range. Jude Numfor, Founder (2011) and Managing Director of Renewable Energy Innovators – Cameroon (REI-c) is one of ISV's most successful energy entrepreneurs.

Jude Numfor was born in March 1986 in the remote, rural village of Mbem located in the mountainous, northwest region of Cameroon. He is the youngest of five boys.

REI's pioneering Sabongari Power Station (May 2013)

Jude at age 17, president of a German NGO-sponsored "Solar Club," constructing a solar oven he designed and experimented with in secondary school.

His father was a driver and mechanic for the Baptist Mission Health Center in the village and his mother was a subsistence farmer.

Jude is a self-taught, seasoned energy entrepreneur. He completed secondary school with eight ordinary level papers in 2004 and completed high school in 2006 with four advanced level papers. He has become an engineering prodigy in the areas of wireless communications, photovoltaic design and construction, and on-line educational programs including his most recent innovation, the EdApply App. In Jude's spare time, he has been a project consultant and facilitator for Torchbearer Foundation for Missions, Reconciliation and Development (another successful ISV energy entrepreneur), developed battery pack systems and provided consulting service to other ISV developers in Africa. Jude was just recently appointed to the ISV Governing Board.

Jude's REI-c company has just received approval for a $1million grant from USTDA (United States Trade and Development Agency) for a feasibility study to investigate the development of electrical systems for up to 134 villages, with possible expansion to another 600+ villages. To be eligible for the USTDA grant, ISV is providing financial and technical support to develop a 10 kW pilot project as part of the plan to electrify 760 villages across five regions in Cameroon. This 10 kW project will be used as a basis for expansion by REI-c into the initial 134 villages, and ultimately into 760 villages. This project will involve a partnership with the United States National Renewable Energy Lab (NREL).

The pilot plant will serve the electrical needs of 3,000 community members who do not have access to the electrical grid which is located 44 km away. Access to electricity will improve quality of life within the community, improving literacy among adults and the monthly baseline income, which is estimated at $100 per family.

The goal will be to leverage this pilot project to ultimately electrify 760 villages with a total of 21 megawatts of electricity for approximately 52,700 potential connections which will transform over 500,000 lives. The overall project involves five phases and the total project cost is estimated at US$100.4 million.

Learn more about how ISV supports the world's energy-impoverished communities at smartvillage.ieee.org. ∎

The IEEE Smart Village SunBlazer

Development of a Portable PV Power System

By John P. Nelson, P.E. President IEEE Smart Village

The IEEE Smart Village (ISV) mission combines the following three pillars:

- renewable energy
- educational opportunities and
- entrepreneurship development to empower energy-impoverished communities around the world.

ISV carefully vets business development projects that integrate ALL three ISV pillars to receive seed money. This concept was conceived in 2009 by Ray Larsen, an IEEE Life Fellow and member of the IEEE Nuclear and Plasma Sciences Society (NPSS). With the assistance of the IEEE Humanitarian Technology Challenge (HTC), Ray and Robin Podmore, IEEE Life Fellow and member of the IEEE Power & Energy Society (PES), developed the new Community Solutions Initiative (CSI), the predecessor to ISV.

The goal of CSI was to develop renewable, sustainable, community-operated systems to provide electricity to small, off-grid communities. In December 2010, Ray's team began development with Nextek Power Systems volunteers in Detroit MI, USA and Long Island NY, USA. A month later, the devastating 2010 earthquake hit Haiti and CSI's visibility within IEEE was quickly elevated as a way for IEEE to help address the devastation. In July 2010, a business plan

Deployment of Pilot Projects I and II in Haiti with Sirona Cares.

The installation team made up of the representatives from Sirona Cares and local community members pose with Ray Larsen (center) and the Sunblazer as they transport it to its new home. Photo Credit CSI member John Lorts.

was presented to the Haiti Ministry of Energy, Communication & Public Works. Ray's team also partnered with Russell Engineering in Half Moon Bay, CA, USA which suggested the generator be mounted on a trailer and also that it be dubbed, "SunBlazer."

Not until early November 2010 were funds secured to begin manufacture of a Phase 1 pilot program, with a US$125k price tag, to place a total of six SunBlazers into Haiti as quickly as possible. Ray and his team worked quickly to secure the needed funding for the project with the initial US$50K from IEEE Foundation and US$75K from NPSS, Ray's home Society. Due to the urgency of the situation and the herculean efforts of Rich Baseil of HTC to expedite orders, (Rich is now Executive Director of the IEEE Signal Processing Society), all contracts for construction and materials were invoiced before the end of 2010.

Six months later, in May 2011, the six SunBlazers with portable battery kits (PBKs) and 240 home lighting kits were shipped to Haiti.

All six SunBlazers arrived in mid-June 2011, each with varying amounts of minor damage.

The CSI team, working with Sirona Cares (the Haiti NGO Entrepreneur team that developed the franchise business model) staff and local Haiti community volunteers made repairs, provided technical and business training to the operators over a two-day period, and deployed the SunBlazers to six communities over the following six days. Once the designs were complete and the materials arrived on-site, it took only 8 days to bring light and basic services to six grateful and excited Haitian communities that were fully subscribed with a 100% waiting list.

During the next year, funds were raised for nine additional SunBlazers (Pilot II) again, with major funding from NPSS; they were built, shipped and deployed in July and August 2012.

Today's IEEE Smart Village program has developed to reach 11 countries and the SunBlazer has evolved to version IV, which was adopted by an African supplier in 2019. Version IV is a modular scalable generator designed to scale to 1MW systems, enabling it to serve many hundreds of villages. To learn more, check out IEEE Smart Village at smartvillage.ieee.org. ■

IEEE REACH Helps Teachers During the Current Education Environment

Free Resources Keep Online Learners Engaged

By Kelly McKenna, REACH Program Manager

Teachers are experiencing different scenarios related to instruction this year. Some are teaching remotely, while others are in socially-distanced classrooms. Some are teaching in a hybrid of the two.

Vicki Braswell, a ninth grade World History teacher at Piedmont High School in Monroe, NC, USA, is working in a blended environment this year, combining face-to-face instruction with remote learning. "Under the current challenging circumstances, we are attempting a hybrid learning environment," Vicki explained, "As I began to prepare for the school year, my enthusiasm for teaching was revived as I recalled I had all the wonderful resources available to me from IEEE REACH."

Vicki intends to use excerpted documents found in the REACH Inquiry Units, or lesson plans, and many of the short history videos for remote student instruction. "To keep our students engaged and curious during their one day of face-to-face instruction each week, I am excited to have the REACH hands-on activities," she expressed. "Having the activities already planned out is

IEEE REACH
Raising Engineering Awareness through the Conduit of History

extremely helpful for implementation and planning for student questions and potential issues." Previously having used the IEEE REACH Early Maritime Navigation and Printing Press videos, she is familiar with their impact in the classroom. In addition, Vicki is working with Science teachers in her school. She reported that, "The REACH resources allow for interdisciplinary cooperation and teamwork. My colleagues are equally psyched about including these hands-on activities in the classroom."

During these challenging times, when teachers might become a bit discouraged, the IEEE REACH resources offer an encouraging moral boost with its pre-planned lesson plans and resources as teachers recognize how the resources may assist them with any of the new instructional learning environments. Find all these great resources at reach.ieee.org. ∎

During the 2020 pandemic quarantine, World History Teacher, Mrs. Braswell gives a photographic "faculty salute" to the Piedmont High School graduating seniors.

World History teacher, Mrs. Braswell learns about IEEE REACH during the 2017 North Carolina Council for the Social Studies' annual conference.

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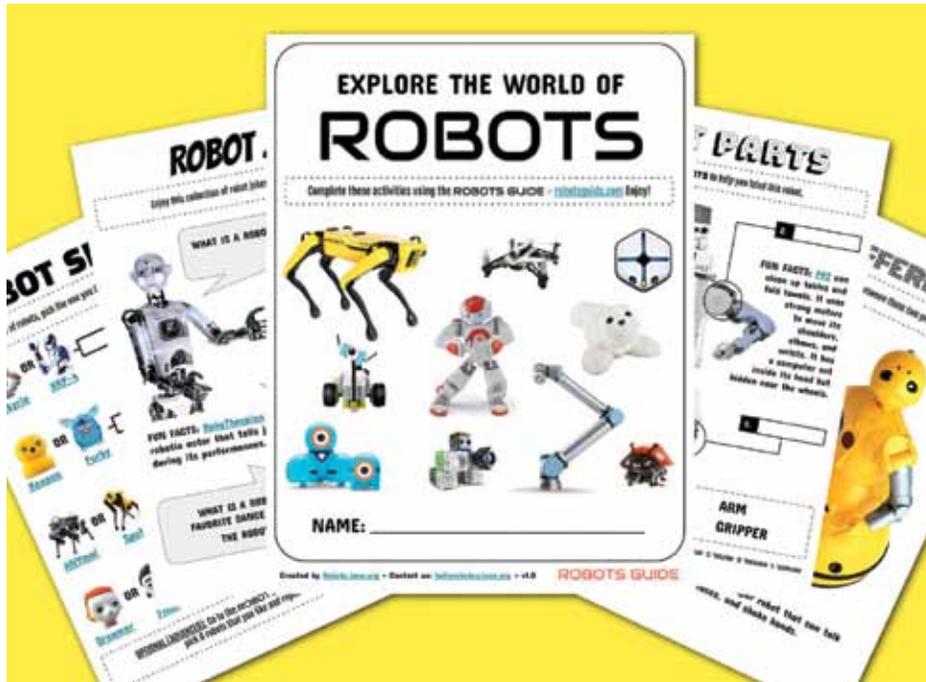
ILLUMINATE   EDUCATE   ENGAGE   ENERGIZE

Fun Activity Sheets Introduce Kids to the World of Robots

Bored kids at home? These free, printable worksheets will help kids learn about robots

Adapted from Erico Guizzo and Randi Klett Spectrum Online 21 Jul 2020

Robots! Robots! Robots! This collection of fun activity sheets for kids is a perfect introduction to the amazing world of robots.

The activities are meant to be intuitive and clear, with little direction needed so that it's easy for most kids to do the work independently. We think these activities can be enjoyed by kids age 6 to 12, though older kids and adults may want to explore some of them too!

The sheets can be printed out or done on a computer or tablet. Some activities require that kids use IEEE Spectrum's Robots Guide (robots.ieee.org) to learn more about some of the robots; other activities, however, don't require access to the site.

Find the activity sheets here: robots.ieee.org/learn/activities/robots-activity-sheets.pdf.

This material was created by IEEE Spectrum and is free to all thanks to donations made to the IEEE Spectrum Robots Guide Fund of the IEEE Foundation. The Robots Guide is regularly updated and the activity sheets are continually improved so be sure to visit often and have fun with robots! ∎


Bequest Enables History Award

The first full-length biography of a brilliant, self-taught inventor whose innovations in information and energy technology continue to shape our world has received the 2020 IEEE William and Joyce Middleton Electrical Engineering History Award from the IEEE History Committee.

In *The Man Who Saw Tomorrow*, Lillian Hoddeson and Peter Garrett tell the story of Stanford R. Ovshinsky, an unconventional genius who invented, among other things, the rechargeable nickel metal hydride batteries that have powered everything from portable electronics to hybrid cars, a system for mass-producing affordable thin-film solar panels and rewritable CDs and DVDs.

"To combine strong scholarship with an appeal to a broader audience is exactly what we hoped to achieve, so to be recognized for fulfilling that double aim is especially gratifying," said the book's authors in their acceptance letter to the History Center.

The Middleton Award, established in 2014 by a gift from the estates of long-time IEEE leader William W. Middleton and his wife Joyce F. Middleton, recognizes annually the author of a book (published within the previous three years) in the history of an IEEE-related technology that both exemplifies exceptional scholarship and reaches beyond academic communities toward a broad public audience. It carries a prize of US$2,000. ∎
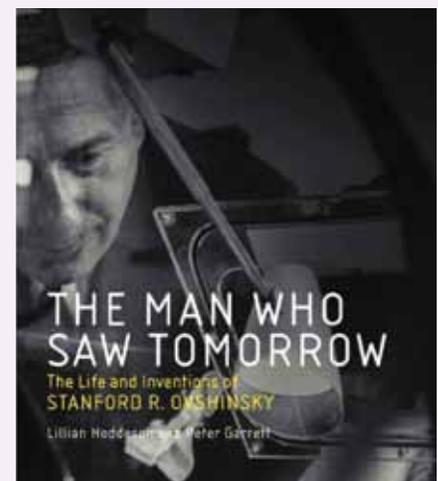
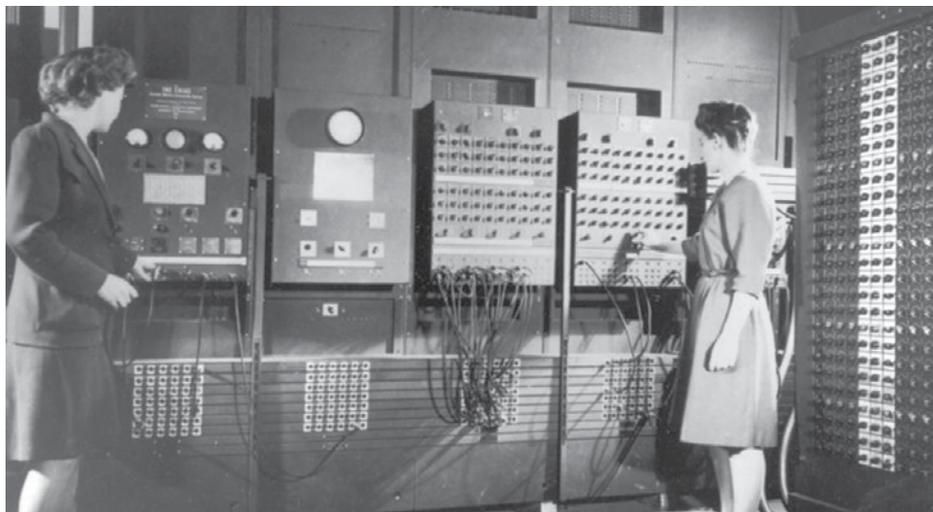

The Man Who Saw Tomorrow *is available to purchase on **smile.amazon.com** where, if you select IEEE Foundation to support, 0.5% of the purchase price will be donated to IEEE programs.*

Capturing Your Voices and Preserving Your History

The IEEE History Center's World-Class Oral History Collection

Adapted from the IEEE History Center Newsletter, Issue #113 (July 2020)

Jean Bartik was one of the original women programmers of the ENIAC computer. Bartik's work, in conjunction with a group of women programmers, would completely change the face of computing. Her Oral History is included in the ETHW.

Since its inception 40 years ago, the IEEE History Center has recognized and remembered IEEE members and their predecessors. Donor support enables IEEE members' contributions to society to be made public.

The IEEE History Center maintains the largest oral history collection devoted to the history of engineering. It conducts oral histories (ethw.org/Oral-History:List_of_all_Oral_Histories) to preserve the history of IEEE and related fields of technology and it helps capture the voices and experiences of its members, engineers and technologists. The Center has posted more than 800 full-transcript oral histories on the Engineering and Technology History Wiki (ETHW). These histories are organized into collections and are fully searchable.

In the category of oral histories documenting the history of women in engineering and computer sciences, the IEEE History Center collection is of vital importance, as well as the largest in the world. Janet Abbate collected oral histories for her dissertation and two books. The original oral histories from her works are available to other researchers through the ETHW (ethw.org) which the History Center maintains.

The women's oral history collection also includes an undergraduate student project supervised by IEEE member Mary Lanzerotti, Distinguished Female Leaders: Inspiring the Next Generation in STEM. In addition, the ETHW makes available oral histories conducted by associated engineering and technical societies that choose to post their material alongside ours, including ASME

Richard (Dick) and Nancy Gowen's generous gift to the IEEE History Center Fund of the IEEE Foundation enabled oral histories from three of the four original founders of GPS technology to be added to the History Center's "GPS Collection," on its ETHW which now contains the oral histories from all four fathers of GPS. Pictured here, from the left are Richard Schwartz, Bradford Parkinson, James Spilker and Hugo Fruehauf.

Presidents, AIME and its Member Societies, Marconi Fellows, the Society of Women Engineers and others.

Recently added collections include: Queen Elizabeth Prize for Engineering Recipients, Global Positioning System and IEEE Computer Society Presidents.

During the next year or so, the oral history collection strategy will focus on special projects including, "IEEE Past Presidents," "IEEE Medal and Award Recipients," and "IEEE Fellows." Before the end of the year, the IEEE History Center will start a new project funded by an anonymous donor to document the history of the IEEE Antennas and Propagation Society, and its technologies. You might be wondering why these documents are called "oral histories" rather than "interviews." An interview is a finished product that you might see in the newspaper, on TV, or in some other medium. It is meant to convey particular information. An oral history, in contrast, is a "primary source," raw data from which historians and researchers will, in combination with other primary and secondary sources, create historical narratives.

Historian Donald A. Ritchie informs us, "Oral history collects spoken memories and personal commentaries of historical significance." An oral history is a document created by the informal recording of a dialogue between interviewer and interviewee. A digital recording is made using a small video camera and a back-up voice recorder The transcript is edited by the interviewer to conform with the IEEE Social Media Operations and Best Practices Guide, flow, style and consistency, and by the interviewee to confirm that his or her words have been appropriately captured. Oral history transcripts are relatively unedited when compared to other forms of interview. The IEEE History Center thanks you for your support of our Oral History Project. Another way to record your history is by writing a First-Hand Account, which you can do on the ETHW at ethw.org/Create.

Recognizing Young Researchers

Dr. Akshay Rathore Receives 2020 IEEE Bimal Bose Award

Dr. Akshay Rathore, Associate Professor, Electrical and Computer Engineering Department at Concordia University in Montreal, Canada and Prominent Lecturer within the IEEE Industry Applications Society, was recently presented with the 2020 IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems. His receipt of this award was made possible thanks to such donations to the IEEE Foundation as the 2017/2018 Myron Zucker Student-Faculty Grant, for which Akshay was the project leader.

Established in 2014 by IEEE Life Fellow Dr. Bimal Bose, whose contributions to the growth of power electronics in IEEE spanned more than five decades, the IEEE Bimal Bose Award recognizes young researchers who make outstanding contributions to the field of Industrial Electronics applied to Power Electronics and Energy Systems. The Myron Zucker Student-Faculty Grant, established through the IEEE Foundation in 1996 by inventor, author, and patent-holder Myron Zucker, annually awards up to two grants of $25,000 for projects leading to publications from electrical engineering research and was awarded to Akshay's team at Concordia University in 2017/2018 for their work in "High-Density Wide-Band Gap Based Variable Frequency Power Factor Correction AC/DC Rectifier for More Electric Aircraft."

Within his department, Akshay said that the Myron Zucker Grant has since supported Ph.D. scholar Dr. Sivanagaraju Gangavarapu in developing experimental facilities for conducting research on power supplies for more electric aircrafts (MEAs) as well as activities by two other scholars set to graduate this year. "To my research group, this grant is a backbone of the transportation electrification program and the publication record, technology development, and training of scholars that it funds will help attract Natural Sciences and Engineering Research Council (NSERC) of Canada research grants in coming years," Akshay said. At the same time, "the financial support provided through the Myron Zucker Grant enabled research that helped contribute to my receipt of the Bimal Bose Award, which recognizes the culmination of my research efforts over the last 10 years."

According to Akshay, receipt of the Myron Zucker Grant and Bimal Bose Award are extremely meaningful to him professionally. "In addition to being highly competitive awards that add substantial value to my profile, I feel proud and honored that distinguished peer evaluators have recognized me for research contributions that benefit the power engineering community," he said.

Overall, "IEEE represents a professional home for engineering researchers and has both connected me to well-accomplished peers and offered me numerous opportunities to learn and grow over the years," concluded a grateful Akshay. "From holding AdCom/Executive board positions and facilitating events to engaging in such activities as IEEE conference committees, technical committees, and standing committees, IEEE has provided visibility to my work, enabled me to develop my skills, and helped me transform myself from student researcher to young professional and now mentor."

The recently-announced recipients of the 2020/2021 Myron Zucker Student-Faculty
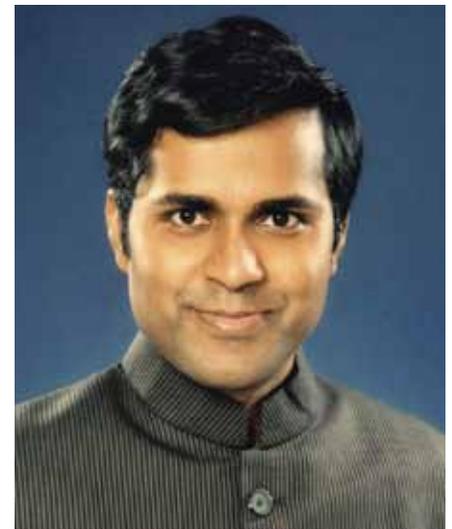
Dr. Akshay Rathore

Grant include the Department of Electrical and Computer Engineering at FAMU-Florida State University for their project on "Enhancing the Security of Distributed Cyber-Physical Energy Systems: A Bottom-Up Approach to Protect and Authenticate Grid Embedded Devices" and Tampere University in Finland for their project on "Robustness Enhancement of Model Predictive Control for Medium Voltage Drives (RMPC4MVD)." ∎
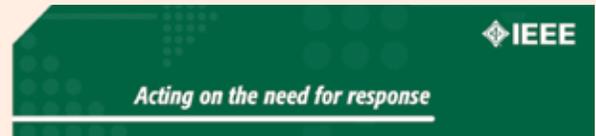
IEEE Programs Respond to COVID-19: You Can Help

These are unprecedented times, and IEEE Foundation is proud to help by enabling IEEE programs that improve access to technology, enhance technological literacy, and support technical education and the professional community. In April, The IEEE Foundation established the IEEE Foundation COVID-19 Response Fund to support IEEE programs and initiatives that are helping members weather the pandemic.

To date, individual donors and philanthropic organizations worldwide have contributed more than US$42,000 which has benefitted IEEE programs providing support throughout the pandemic. We thank you for your support.

Donations to the IEEE Foundation COVID-19 Response Fund may be made at bit.ly/IEEECOVIDFund.

Life Members Create 'Girls Make Tech with Heart'

Workshops that Make Learning Inevitable

"Girls Make Tech with Heart is my favorite annual event of the Buenaventura Section," explains Doug Askegard, Life Member. "When something is taught with a pure sense of joy, the learning becomes indelible. I am grateful to the IEEE Foundation for funding this program and enabling it to become what it is today."

This sentiment is shared by other Life Members and volunteers who have made 'Girls Make Tech with Heart' an experience to remember. Joy comes first in the list of goals, and all activities are designed to lift the spirit, not only in the participants, but also in the mentors and organizers. In that moment of happiness, concepts of engineering are inserted experientially. For the past three years, the underlying theme has been Aging Graciously with Technology.

Approximately 150 girls, ranging in age from 9 to 14, arrive from different parts of Ventura County in CA, USA on a Saturday, some venturing for the first time, to this free-of-charge STEM event consisting of 8 workshops involving emerging technologies: sensing electronics, audio recognition, Arduino programmable kits, robotic arms, smart fabrics, infrared imaging, and virtual reality technologies; all focused on being beneficial for assisted living.

Life Member Mohammad Tehrani works with girls on Robot Loving Sun, one of the workshops of Girls Make Tech with Heart. It involves the use of solar technology to drive robots made with recycling material such as empty cans or plastic bottles. Photo Credit: IEEE Buenaventura Section.

One of the workshops, called the Helping Hand, focuses on robotics in service of assisted living. The girls build robotic arms and use them in interactive games. Photo Credit: IEEE Buenaventura Section.

How Girls Make Tech with Heart Started

The idea for the annual event emerged from an IEEE talk presented by Nathalie Gosset in 2015 entitled "Technology in our Future - an Ally in Graceful Aging." It was carried live on the government access television channel of the Thousand Oaks, California Council on Aging. "Technology is essential to postponing problems that appear with cognitive decline in older age. It is unreasonable to assume that the person facing the problem will realize that things have changed. With thoughtful planning, quality of life can be extended and gracious aging supported," says Gosset.

This message resonated well with the environment in which the Buenaventura Section operates. More than half of the 638 IEEE members have 30 years or more of experience in engineering with 26 percent being Life Members. This creates an engineering cohort nurturing their technical relevance with an eagerness to be of value to the community. This is the ideal setting for member engagement to learn about, and make a difference in, the life of the aging population as well as to address one of the county's imperatives: to have more students enter technical professions in Ventura County to meet the demands of its industry. After a successful pilot event, the Buenaventura Section applied to the IEEE Foundation grant program to enable

the Girls Make Tech with Heart to be further developed and reach more girls in Ventura County.

Today, the program includes parents who are invited to the event and become engaged in a parallel, co-joint conference in an adjacent building. "Parents seem to have as much fun as the girls," states Gosset. They participate in their own STEM workshops and attend a talk on The Brain Development from Childhood to Adult Life and Approaches to Accelerate the Learning of STEM, Jobs of the Future that Await Your Daughters, Cybersecurity For Your Daughter, and Aging Graciously with Technology.

The mission of Girls Make Tech with Heart

The drive of Girls Make Tech with Heart is to:

- Connect engineering with a philanthropic pursuit that feels relevant to a middle school girl. Aging Graciously with Technology brings discussion about ways to diminish the isolation of the elderly, help adults with older parents to care for their parents more efficiently, and lower the dependence on costly services provided to home-bound senior citizens.

- Nurture the interest in Science, Technology, Engineering, and Math in middle school, high school, and college students by actively involving them in developing solutions for the generation of their grandparents.

- Develop a sense of empowerment in the girls and enable them to develop possible solutions for their aging grandparents.

Life Members are Proud of the Program Success

Aging Graciously with Technology program has been running since 2015 with great success. This program has been selected three times by the IEEE Foundation as a grant recipient. The Buenaventura Section received the prestigious 2019 EAB Section Professional Development award for this initiative. This is a great example of Life Member engagement with the youth and our future. ◼

Celebrating 10 Years Together
IEEE and Its Honor Society, Eta Kappa Nu

With their merger in 2010, IEEE Foundation, IEEE and its honor society, Eta Kappa Nu (IEEE-HKN), created a pathway for IEEE and IEEE-HKN to identify and develop future leaders in the IEEE fields of interest. Ten years, 48 new chapters, 26,000 inductees, and hundreds of thousands of community service hours later, IEEE-HKN is an engine for innovation and excellence.

"The leadership of IEEE realized the potential of this merger and many people worked tirelessly to make it happen," says Bruce Eisenstein, 2000 IEEE President, 2010 HKN President (pictured center), who has made a five-year giving pledge to IEEE-HKN. "We can look with pride at the result today."

A large part of the success and growth of IEEE-HKN, a beneficiary of the *REALIZE* THE FULL POTENTIAL OF IEEE Campaign, is the dedication of you: our volunteers and supporters.

With 265 chapters in 20 countries, the merger with the honor society has provided IEEE a way to reach and bring into its volunteer and leadership ranks the best and brightest students, industry professionals, and academics. HKN offers a strong feeder system for IEEE societies since it is populated with ready and willing volunteers for STEM outreach, tutoring, humanitarian efforts, and committee and board-level positions throughout IEEE. Some 23 IEEE presidents – and every one since the merger – are HKN members.

In turn, HKN gained the resources to grow and transform into a multi-faceted, vibrant, global society with a US$5 million endowment from IEEE. About half of IEEE-HKN's annual budget is funded from the endowment; the rest is funded through a one-time member induction fee and philanthropy.

As such, beginning on 1 September 2020 (the anniversary of the merger),
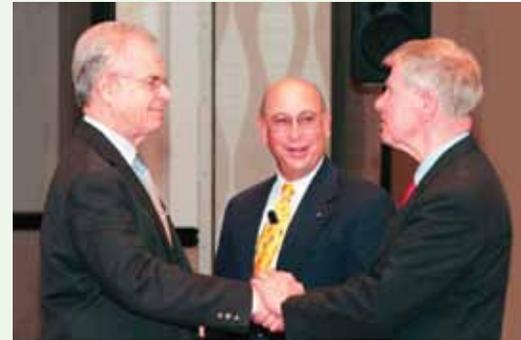
The merger of IEEE and Eta Kappa Nu went into effect on 1 September 2010. 2000 IEEE President, 2010 HKN President Bruce Eisenstein (center) looks on as 2009 IEEE President John Vig (left) and 1984 IEEE President and IEEE Foundation President Emeritus Richard Gowen shake hands in the photo taken to mark the signing of the agreement to merge.

IEEE-HKN embarked on a US$116,000 campaign (the honor society is 116 years old on October 28, 2020) to ensure the society can continue to support our members and nurture innovation.

S. K. Ramesh, 2016 IEEE-HKN President and current Chair of its Development Committee, says: "The merger happened because of the vision and foresight of champions like Bruce Eisenstein, Stephen Goodnick, and John Orr, who guided us through the formative years to make IEEE-HKN what it is today: A vibrant globally diverse organization that engages students and professionals, celebrates excellence in scholarship and service, transforms individuals, and brings IEEE's mission to life in communities worldwide."

Learn more about the IEEE-HKN merger from the IEEE History Center resources at ethw.org/Eta_Kappa_Nu_Merger_with_IEEE and the upcoming HKN Experience (virtual version of the Student Leadership Conference) starting on 28 October, which is HKN Founders Day, at hkn.ieee.org. Contact Director Nancy Ostin for more IEEE-Eta Kappa Nu information. ◼

Empower a Billion Lives

A Global Competition to Develop Scalable Solutions to Energy Poverty

Empower a Billion Lives (EBL), an IEEE Power Electronics-organized competition, concluded in late 2019 with the Global Final announcing winners and honorable mentions.

The competition started with more than 170 proposals, of which 82 teams went on to compete in a regional round, followed by field testing of their energy access solutions and advancement to the Global Finals in Baltimore, MD, USA. These energy access solutions had to provide a minimum of 200 watt-hours of energy service per day and be affordable to people who make under US$1.90 per day. This target criterion is critical to alleviating energy poverty that affects more than 3 billion people, with 1.1 billion having no access to energy services.

A check in to discover how some of our Teams have been deploying since the Global Final in October 2019 found that there have been many challenges related to COVID-19 and some of our regional winning teams and global winning teams have done extraordinary things.

On the very next day after the Global Final, the Grand Prize-winning team SoULS from IIT Bombay organized the Student Solar Ambassadors Workshop wherein almost 1 million students from all over the world assembled their own solar study lamp as a means of sensitization towards adverse effects of climate change and viability of solar solutions. The SoULS represents Solar Urja through Localization for Sustainability, the premise of which is Energy by Locals for Locals. Under the concept, the communities generate and consume their own energy needs, bringing Energy Swaraj based on Gandhi's Gram Swaraj. As a pilot to Energy Swaraj, local women were trained to assemble, distribute and repair the solar study light. The outcome of the pilot was benefiting 7.5 million families with a clean lighting source and training 9,000 women in technology-based livelihoods. As a further step towards Energy Swaraj (Energy by Locals for Locals) women were encouraged to open solar shops. Currently around 1000 women are running their solar shops and helping to fulfill the local energy needs.

The Solar Urja through Localization for Sustainability (SoULS) Initiative empowers local women with technology-based livelihoods. The SoULS Initiative has now undertaken to establish Energy Swaraj or Energy by Locals for Locals across the world.

The opportunity to localize solar energy solutions and enable women to acquire technical skills, run solar shops and operate a solar module manufacturing plant has been truly empowering women.

With the EBL Grand Prize of US$100,000, the SoULS team formed the not-for-profit Energy Swaraj Foundation (energyswaraj.org) to take this tried-and-tested concept of Energy Swaraj to millions. The model can provide energy access and energy sustainability while addressing climate change. The Foundation aims to provide off-grid solar energy solutions to 10 million families by enabling 100,000 local entrepreneurs through training, technology, supply chain, and market.

IEEE PELS EBL continues to interact with the regional and global winners to track deployments of energy access solutions around the world. To view the Global Finalists and Global Winners please go to empowerabillionlives.org. ◼

Renew Your Support as You Renew Your Membership

If you are an IEEE Member, you have a simple, secure and convenient way to make an impact by donating while renewing or confirming your IEEE Membership. If processing your membership online, you are able to make a donation during the final step of the renewal process; when you are in "My Cart." Click "Donate to IEEE" and choose your designation. The donation will be added to the cost of your renewal. Don't forget, the donation is tax-deductible in the US. Most importantly, your donation transforms the lives of individuals and communities at home and around the world. Thank you, in advance, for your support!

See the process in action via our new video tutorial at: bit.ly/IEEERenewalEx. ◼

A New "Milestone" for IEEE History Center

Celebrating 40 Years of Change and Continuity

By Michael Geselowitz, Senior Director, IEEE History Center

Members of the IEEE History Center staff join 2019 IEEE President José M. F. Moura at the dedication of "The Standardization of the Ohm, 1861 – 1867" Milestone at the University of Glasgow, Scotland, UK, on 17 September 2019.

This year is the 40th anniversary of the IEEE History Center. As soon as a professional staff joined the IEEE History Committee in 1980 to work on historical activities, two concepts emerged that would set the course for IEEE's historical activities for years to come.

First, it was realized that there was philanthropic interest in the history of technology. The Life Members Fund of the IEEE Foundation had supported earlier initiatives of the History Committee. Now, the History Committee would work with the IEEE Foundation to raise funds directly for historical activities, beginning one of the longest and most fruitful philanthropic partnerships between IEEE and the IEEE Foundation.

Second, IEEE needed a way to recognize historical achievements in its fields of interest. So, the "IEEE Milestones in Electrical Engineering Program" was established in 1983 with the first dedication in 1985. The process involved IEEE members in researching and preserving history, and an even broader number of members in celebrating and promoting that history.

After about 10 years, the History Committee asked the History Center staff to refocus their efforts on the still modest program. The name was changed to "IEEE Milestones in Electrical Engineering & Computing" to reflect the growing fields of interest of IEEE (it was later changed to just "IEEE Milestones" to reflect even greater diversity). The History Center promoted the program globally and encouraged recognition of more recent technologies (there is a 25-year rule, but most Milestones were far older). The Center also worked with local sections to find philanthropic support from local corporations and cultural institutions.

The number of dedications grew to six or seven a year, then to the current 12 or 13. Last year, the 200th IEEE Milestone was dedicated. IEEE Milestones now span every IEEE Region and every IEEE field of interest, and date from 1751 to 1989. The Milestone dedications have become events where local IEEE members and local communities and political leaders meet with global IEEE leaders to spread the word that innovation, spearheaded by IEEE, has prepared, and continues to prepare, a better tomorrow for humanity. ◼

2020 Ulrich L. Rohde Humanitarian Technical Field Project Award

Presented to Joint AP-S Teams from Thailand and Tanzania

Congratulations to the Thailand Chapter of the IEEE Antennas and Propagation Society (AP-S) at Rambhai Barni Rajabhat University in Chanthaburi, Thailand on its receipt of the 2020 Ulrich L. Rohde Humanitarian Technical Field Project Award. The team received the award for their project entitled "A Cost-Effective Sensor for Characterization of Soil Quality," which actually reflects a joint initiative between the IEEE AP-S Chapters in Thailand and Tanzania, two winning teams which have elected to combine their efforts and fund one joint project.

Established in 2017, the Ulrich L. Rohde Humanitarian Technical Field Project Award is presented annually to up to two top proposals submitted by members of the IEEE AP society worldwide which promote low-cost technological solutions that advance humanity. Recipients of the US$10,000 award (disbursed in two installments of US$5,000) will work to construct the winning project. The award was established by IEEE in the name of Ulrich L. Rohde, donor to the fund, and a longtime professor and expert in RF and microwave technologies as well as the current Chairman of Synergy Microwave Corporation in Paterson, NJ, USA.

As part of IEEE's recent emphasis on Humanitarian Technology Activities and subsequent creation of the Special Interest Group on Humanitarian Technology

Learn more about Ulrich L. Rohde (pictured), loyal donor and member of the IEEE Heritage Circle, from this recent video: ieeetv.ieee.org/ieeetv-specials/heritage-circle-rohde

(SIGHT), the Antennas and Propagation Society (AP-S) SIGHT group was formed to help solve existing humanitarian challenges worldwide, including crises related to food, water, communications/information access, and power/lighting.

In the agricultural arena, soil depletion occurs when the components which contribute to fertility are removed and the conditions which support soil fertility aren't maintained, leading to poor crop yields. The project(s) that have won the 2020 Ulrich L. Rohde Humanitarian Technical Field Project Award from Thailand-Tanzania propose to use a microwave sensor to help transmit and receive signals reflected from soil to monitor variations in the soil's fertilizer concentration and enable farmers to respond appropriately. ■

SAVE THE DATE:
1 December 2020

#IEEEGivingTuesday

Giving Tuesday is a global day of giving that harnesses our collective power to encourage philanthropy and to celebrate generosity worldwide.

Your support of IEEE programs will transform the knowledge and reach of IEEE into tangible, hands-on technology solutions. Thank you for your continued support of IEEE and the IEEE Foundation.

give.ieeefoundation.org/givingtuesday

IEEE Foundation: Spotlight Webinar Series

Claude Shannon Takes the Spotlight in an IEEE Foundation Webinar

Claude Shannon, The Father of Information Theory, took the spotlight in an IEEE Foundation webinar. A free screening of The Bit Player was followed by a live Q&A with the film's creator Mark A. Levinson on 15 Oct. The recording of the Q&A session will be available soon on IEEEtv. The Bit Player tells the story of an overlooked genius who revolutionized the world, but never lost his childlike curiosity. The film is a mix of contemporary interviews, archival film, animation and dialogue drawn from interviews conducted with Shannon himself. The Bit Player was commissioned and managed by the IEEE Information Society, supported by IEEE staff and donor funded. The Bit Player is available on Amazon Prime and you can purchase it using AmazonSmile and support other important IEEE Programs. This feature is available at smile.amazon.com on your web browser and can be activated in the Amazon Shopping app for iOS and Android phones. When you shop for anything at AmazonSmile, you'll find the same prices, selection and shopping experience as Amazon.com, with the added benefit that IEEE Foundation will receive 0.5% of your eligible purchases if you select us as your charity of choice. ■

The IEEE-USA Celebrates Passion and Commitment

When one of IEEE's most revered volunteers, 2007 IEEE-USA President John W. Meredith, died in 2018, colleagues paid tribute to his tireless commitment, his skill at building relationships, and his sincere interest in the concerns of others. Now, the first recipient of the new IEEE-USA award named in John's honor is described in almost the same terms.

IEEE Senior Member Mina Hanna was the first honoree to receive the John Meredith Professional Services Award which recognizes key individuals for outstanding IEEE-USA volunteer efforts and contributions. Mina, whom Maura Moran, his nominator, calls "bright, committed, and able to bring people together," accepted the honor during IEEE-USA's prestigious awards ceremony which was streamed live online on 31 August, featuring video appearances from the 2019 award recipients, nominators and board members. Watch the ceremony here: ieeeusa.org/virtual-awards-ceremony.

Join in celebrating John's memory and impact on IEEE by donating to the John Meredith Memorial Fund of the IEEE Foundation today: bit.ly/IEEEMeredith. This special fund supports IEEE programs that match John's passions: volunteerism, education, maritime and the history of technology. ∎

Mina Hanna: IEEE-USA's passionate advocate for thoughtful, ethical AI policies. Hanna is one of the youngest members IEEE-USA has given an award for professional contributions.
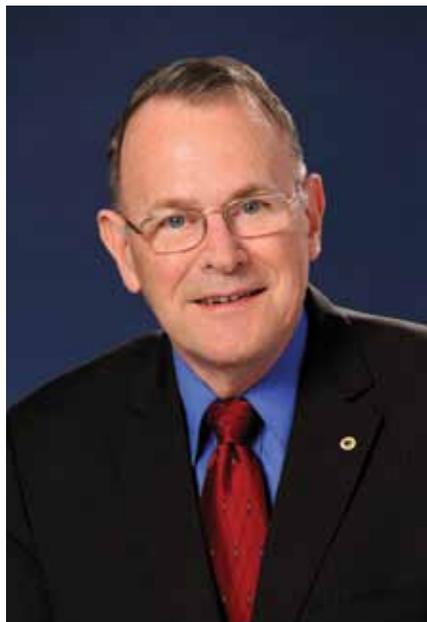
John Meredith: 19 April 1941 - 26 September 2018. He was a longtime volunteer who made positive impacts throughout IEEE and is remembered fondly by all.

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IEEE Foundation Earns a "Give with Confidence" Rating from Charity Navigator

IEEE Foundation is proud to announce that its strong financial health and ongoing accountability and transparency have earned a 100/100 rating from Charity Navigator's new Encompass Rating System version 1. This score designates the IEEE Foundation as an official "Give with Confidence" charity, indicating that our organization is using its donations effectively based on Charity Navigator's criteria.

This milestone achievement for the IEEE Foundation couldn't have happened without you and your support. Your trust in us is what makes the difference to us and the IEEE community. You can find our Charity Navigator Encompass rating here: charitynavigator.org/ein/237310664 and learn more about Charity Navigator and the Encompass Rating System at charitynavigator.org/encompass. ∎

IEEE Foundation

As the philanthropic partner of IEEE, the IEEE Foundation inspires an engaged community and leverages the generosity of donors to enable IEEE programs that enhance technology access, literacy, and education and supports the IEEE professional community. The IEEE Foundation works across IEEE to invest in more than 200 IEEE programs that bring the promise of technology, and the knowledge to use it, to the world. We categorize the IEEE programs supported by your donations under four main topics: Illuminate, Educate, Engage and Energize, though their benefits actually span multiple categories.

The IEEE Foundation, a tax-exempt 501(c)(3) organization in the United States. Charitable contributions to the IEEE Foundation are tax deductible to the fullest extent allowed by law in the United States. For other countries, please check with your local tax advisors. Together we *REALIZE* **THE FULL POTENTIAL OF IEEE**.

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