IEEE

IEEE History Center

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Gregory Su, an Electrical and Computer Engineering graduate student at Carnegie Mellon University, inaugurates the Electricity and Electronics timeline game created by the IEEE History Center. [see story page 5]

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No content in this issue was generated by AI.

SIGNALS FROM THE DIRECTOR

Michael N. Geselowitz
Senior Director, IEEE History Center

Welcome to another year of IEEE's historical activities. As you can see from this issue, all of our activities to preserve and publicize the history of technology remain in full swing: IEEE Milestones, Oral Histories, the Engineering & Technology History Wiki, the IEEE REACH program, the IEEE Archives, and, especially, the IEEE Global Museum (see page 5). Also, expect to hear in future issues and communications about some special programs this year: The first ever IEEE History Summit in July; IEEE HISTECON 2025 in Bonn, Germany, in September (the IEEE History Center and the IEEE History Committee are technical cosponsors); and the second annual IEEE History Week in October.

2025 will also mark some interesting anniversaries in the history of technology, including the 75th anniversary of the junction transistor, the centenary of Bell Labs, and the 125th anniversary of Fessenden's famous

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HOW CAN THE HISTORY CENTER HELP YOU?
A Handy Guide to Some of Our Programs and Contacts

Engineering & Technology History Wiki: **https://ethw.org/Main_Page**

List of dedicated IEEE Milestones: **https://ethw.org/Milestones:List_of_Milestones**

How to Propose an IEEE Milestone:
https://ieeemilestones.ethw.org/Milestone_Guidelines_and_How_to_Propose_a_Milestone

Milestone proposals in process: **http://ieeemilestones.ethw.org/Milestones_Status_Report**

Oral History Collection: **https://ethw.org/Oral-History:List_of_all_Oral_Histories**

REACH Program (free online materials for teaching the history of technology): **https://reach.ieee.org/**

History Events Calendar: **https://www.ieee.org/about/history-center/events.html**

Support for scholars:

Fellowship in the History of Electrical and Computing Technologies:
https://www.ieee.org/about/history-center/fellowship.html

Pugh Young Scholar in Residence:
https://www.ieee.org/about/history-center/internship.html

Middleton History Prize (awarded to a book in the history of technology):
https://www.ieee.org/about/history-center/middleton-award.html

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WAYS YOU CAN HELP HISTORY

As you read this newsletter, you will see the many success stories of the IEEE History Center and the ways it nurtures the heritage of the profession. As successful as the Center is, it relies on the support and contributions—financial, intellectual, and time and effort—of many people. We ask you to help further our work by:

Proposing an IEEE Milestone—Milestones recognize significant achievements in technology **ieeemilestones.org**

Contributing a First-Hand History—Written and oral histories help us chronicle important innovators and innovations **http://ethw.org/create**

Authoring an article for the ETHW—The Engineering and Technology History Wiki (ETHW) is an authoritative collection of historical information about technology's contributions to society **ethw.org/create**

Supporting the History Center's mission with a donation.

However you can help, it is always deeply appreciated.

NEWSLETTER SUBMISSION BOX

The IEEE History Center Newsletter welcomes submissions of letters to the editor, as well as articles for its **Reminiscences** and **Relic Hunting** departments. "Reminiscences" are accounts of history of a technology from the point of view of someone who worked in the technical area or was closely connected to someone who did. They may be narrated either in the first person or third person. "Relic Hunting" are accounts of finding or tracking down tangible pieces of electrical history in interesting or unsuspected places (in situ and still operating is of particular interest). Length: 500–1210 words. Submit to **ieee-history@ieee.org**. Articles and letters to the editor may be edited for style or length.

Christmas broadcast. Expect to hear news of activities around those as well, especially in the area of Milestones.

Two other anniversaries of note. The History Center is able to support the History Committee and carry out our activities thanks to a talented and dedicated staff, the dedication indicated by, among other things, longevity. This quarter, IEEE recognized two of us for terms of service to the organization:

Archival and Digital Content Manager Nathan Brewer at fifteen years, and Research Coordinator Robert Colburn at an amazing forty years. My congratulations go out to them.

As always, all of the staff and our activities depend on you, our readers and donors, and we appreciate your ongoing support.

HISTORY COMMITTEE AND VOLUNTEER ACTIVITIES

HISTORY COMMITTEE CHAIR'S MESSAGE

By David Michelson, 2024-2025 IEEE History Committee Chair

As I begin my second year as Chair of the IEEE History Committee and *ex officio* member of the IEEE Foundation Board of Directors, I look forward to working with the fourteen other members of the Committee - John Vardalas, Vice Chair; Sadhana Attavar; David Bart; Amy Bix; Cynthia Burham; Maxine Cohen; Francesco Gerali; Tomohiro Hase; Dae-Gwon Jeong; Keith Moore; Bozenna Pasik-Duncan; Sergei Prokhorov; Antonio Savini; Mathini Sellathuri – and the seven dedicated people who staff the History Center – Michael Geselowitz, Robert Colburn, Mary Ann Hellrigel, Nathan Brewer, Alex Magoun, Kelly McKenna, and Daniel Mitchell – to both develop and strengthen our many existing programs such as Milestones, Fellowships and Prizes, REACH, and the new Global Museum and pursue some of the new initiatives that we began in 2024.

The overarching goal of these new initiatives is to help us play a leading role in the development of a broader IEEE History community that includes all those who play key roles in revealing the history of technology, including collectors, curators, archivists, public historians, academic historians, and practicing scientists and engineers. We will do so by:

Launching a new IEEE History website that will provide visitors with an outward-facing presentation of our programs and activities, and complement the historical content that resides on the Engineering and Technology History Wiki

(ETHW). It will also provide a technical foundation for future initiatives such as an online IEEE History Magazine and a virtual component of the IEEE Global Museum. Funded by the IEEE New Initiatives Committee, the site will go live during the first quarter of this year.

Launching online IEEE History training through the IEEE Individual Learning Network (ILN) that will acquaint proposers, advocates, reviewers, and others with the history and context of the program and the best practices that have evolved over the years, with an aim to helping to ensure that the program delivers ever more consistently and effectively going forward. We anticipate that the training will become available in the second quarter of this year.

Hosting the first IEEE History Summit this summer, and providing a venue for the IEEE History community to share best practices for preserving and sharing the heritage of both the Institute and the profession, and involve collectors, curators, archivists, public historians, academic historians, and practicing scientists and engineers in pursuing the IEEE History mandate.

Hosting the second IEEE History Week to coincide with IEEE Day in October, and once again giving both the Committee and the Center an opportunity to assemble our programs, share them with the broader IEEE community, and invite IEEE organizational units to participate in preserving and sharing their own heritage.

We look forward to working with the broader IEEE History community to bring these initiatives to fruition and making a lasting contribution to IEEE's efforts to preserve and share the heritage of both the Institute and the profession.

IEEE COMMUNICATIONS SOCIETY THAILAND CHAPTER CELEBRATES THAILAND TELECOMMUNICATIONS SESQUICENTENNIAL

In 1875, the installation of a telegraph line from Bangkok to the important port of Samut Prak Nam on the Gulf of Thailand in Samutprakarn Province marked Thailand's entry into telecommunications. Now, 150 years later, the IEEE Communications Society Thailand Chapter is leading a nationwide commemoration of this important anniversary, and

reflecting on the many great past achievements in the field, while also looking forward to a bright telecommunications future. You can learn more on their website: **https://www.quantum-thai.org/150th-thai-telecom-anniversary**

IEEE Senior member and PhD historian Allison Marsh has started an Instagram account @theengineerhistorian. Most weekdays she posts an advertisement or news piece in the history of electrical engineering. The ads are fun outtakes from her ongoing research at the Linda Hall Library where she is systematically going through the journals of the AIEE, IRE, and other engineering societies to identify women active in the early decades of the electrical engineering profession.

NEW ORAL HISTORIES ON THE ETHW

The Engineering and Technology History Wiki (ETHW) is determined to preserve, as source material for the future historians of technology, the personal memories of pioneers in the electrical, electronics, and computer fields, the technologists who transformed the world in the 20th and 21st centuries. One of our major programs for the preservation of these memories is our oral history program, and as the ETHW is a website governed by numerous cross-discipline engineering societies, the oral history collection on the ETHW is composed of oral histories from not only IEEE, but its partner societies, such as AIME, SWE and SPE. Six new oral histories have been posted to the ETHW, which include:

Moshe Kam - 2011 IEEE President, was the Robert Quinn Professor and Department Head of Electrical and Computer Engineering at Drexel University. His research interests include robotics and navigation, detection and estimation, wireless communications, and engineering education. In 2014, he became Dean of the Newark College of Engineering, a unit of the New Jersey Institute of Technology in Newark, New Jersey.

George E. King - Registered Professional Engineer in Texas and Oklahoma with more than fifty years upstream oilfield experience since starting with Amoco Production Research in 1971. King is the 2015 Distinguished Member 2012 Engineer of the Year from the Houston Region of Texas Society of Professional Engineers, the 2004 Society of Petroleum Engineers' Production Operations Award, and the Amoco Vice President's Award for Technology from Amoco in 1997.

Rosann Marosy - IEEE Fellows Activities Manager, Member and Geographic Activities retired on 30 June 2023 with more than twenty-three years of service at IEEE

Howard Michel - 2015 IEEE President, had an eighteen-year career with the United States Air Force, as a pilot, satellite launch director, research engineer, and engineering manager. After leaving the military, Michel worked in both academia and industry. He was on the faculty of the University of Dayton in Ohio and the University of Massachusetts at Dartmouth (September 2005 – May 2016), where he taught electrical and computer engineering. Then Michel worked in Shenzhen City, Guangdong, China as the founding Chief Technology Officer, UBTECH Education (Shenzhen) Co., Ltd., (November 2016 - October 2018), and with UBETECH Robotics as a Senior Vice President and later Senior Advisor, (January 2018 – April 2021). Consultant with HEM Consulting for the U.S. Department of Defense and private industry in the areas of embedded systems, avionics, instrumentation, and systems engineering (January 2004 – November 2016). In addition, he was

Chief Executive Officer of the National Association for Amateur Radio (ARRL), from October 2018 to January 2020.

Ronald L. Parratt - President of the American Exploration and Mining Association, Executive Chairman of Renaissance Gold Inc. Parratt has more than 35 years of exploration experience for precious metals, including service with Santa Fe Pacific Gold, Homestake Mining Company, and AuEx Ventures. During his years of precious metals experience, Parratt had direct involvement in the discovery of the Rabbit Creek (now Twin Creeks), Lone Tree, Trenton Canyon, Gold Hill, and Long Canyon gold deposits, all in Nevada.

Leo Wrobel - Pioneer in emergency telecommunications, after leaving AT&T, he was Director, Network Planning and Engineering for Lomas and Nettleton for two years (1984 – 1986). Then he worked at Dallas-based Premiere Network Services, Inc., nearly twenty years, first as Principal Consultant, (May 1986 to October 1997), and then as Chair and CEO October 1997 to July 2005). In 2004, he founded The Leo A. Wrobel Companies. Since 2014, he has been Chair and CEO of FailSafe Communications, Inc. which offers systems designed to improve emergency response, safeguard e-commerce and save lives.

To read these and other oral histories, visit the oral history page at: **http://ethw.org/oh**
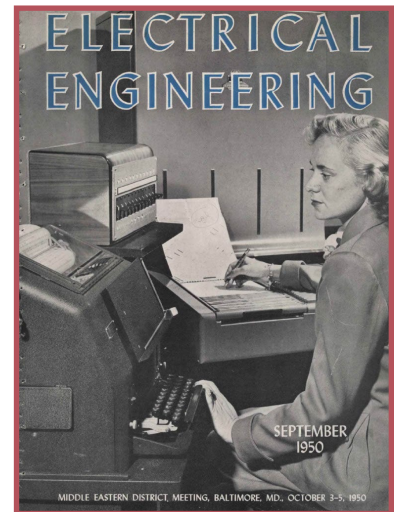
GLOBAL MUSEUM UPDATE

The last few months have seen several important Global Museum projects come to fruition, not least the launch of our flagship traveling exhibit *Unseen Signals: E. Howard Armstrong's Radio Revolution*. (see also page 12) Curated by History Center historians Alexander B. Magoun and Daniel Jon Mitchell, the exhibit opened on 1 November 2024 at the National Museum of Industrial History (NMIH) in Bethlehem, PA, USA with a VIP reception. See the "Unseen Signals Exhibit" article for full details. New Jersey residents will be excited to learn that we have confirmed the Infoage Science and History Museums in Wall, NJ, USA as the next venue, from 24 May through 28 December 2025.

Dr. Mitchell was also kept busy with preparing a special anniversary exhibit *Our Mobile World* for the IEEE Vehicular Technology Society (VTS) that commemorated the coincidence of two major milestones: the 75th anniversary of its foundation as the Professional Group on Vehicular and Railroad Communications of the IRE in 1949, and the 100th installment of the Vehicular Technology Conference (VTC).

VTS (or its Group precursor) was founded at a time when the two-way vehicular communications technology pioneered in police radio was spreading to other public safety agencies and power utilities, and when WWI portable "handie-talkie" technology was being adapted for industry and civil defense. After that, the Society evolved in two major phases: during the 1960s and 1970s with the development of vehicular electronics—first with solid state devices and then integrated circuits—and then during the late 1980s and early 1990s with the commercial rise of cellular telephony.

Our Mobile World presented key events in all these fields and featured a ten-question interactive timeline game spanning a century of related inventions. The chapter on the EV revival,

and automated and connected vehicles, is yet to be written.

The timeline game emerged as a spinoff of a similar game created in partnership with IEEE Strategic Marketing for the 2024 Consumer Electronics Show (CES). After last year's success, we were invited to collaborate on a refresh of the history displays at CES 2025, held in Las Vegas, NV, USA, from 7 January to 10 January 2025, to make them more interactive and engaging. We'll share photos and a report in the next newsletter. And in that spirit, we are delighted to reveal that both timeline games will be hosted on the new IEEE History Center website—which, as you read this, may very well have already been launched.

Your contributions to the **IEEE History Center Fund** preserve the heritage of the profession and its contributions to humanity.

We invite you to find out more about the Center and its programs at
http://www.ieee.org/about/history_center and more about
the Engineering & Technology History Wiki (**www.ethw.org**)

IEEE ORAL HISTORY UPDATE

During 2024 and thus far in 2025, the IEEE History Center posted the transcripts of twenty-five life story oral histories recorded with IEEE Past Presidents, esteemed IEEE members, volunteers, and award recipients, as well as prominent engineers, scientists, and entrepreneurs in IEEE's fields of interest.

The IEEE History Center helped commemorate IEEE's 140th anniversary by recording oral histories of IEEE Past Presidents and thus far added the transcripts of Moshe Kam (2011), Roberto de Marca (2014), Howard Michel (2015), Barry Shoop (2016), Karen Bartleson (2017) Jim Jefferies (2108), and José M. F. Moura (2019), IEEE Past Presidents. Recently, Oral History Manager Mary Ann Hellrigel also recorded the oral history of Alex Acero, IEEE Fellow, an active IEEE and IEEE Foundation volunteer, and senior director at Apple, as part of the commemorations for the 75th anniversary of the IEEE Signal Processing Society, **https://ethw.org/Oral-History:Alex_Acero**

The IEEE History Center continues to capture the voices of prominent women, including IEEE Life Fellow Linda Katehi (**https://ethw.org/Oral-History:Linda_Katehi**), and IEEE Senior Member, Kathleen Amm (**https://ethw.org/Oral-History:Kathleen_Amm**). In addition, Janet Abbate, noted historian of computer and women's history, preserved the life story of the late Joyce Currie Little, a member of the IEEE Computer Society (**https://ethw.org/Oral-History:Joyce_Little**) who worked in the aerospace industry.

The IEEE peer-to-peer oral history program continues with the efforts of IEEE Life Members, Maxine Cohen and T. Scott Atkinson. Cohen recorded Atkinson's oral history and in turn,

IEEE Past President Karen Bartleson's oral history is one of those of seven past presidents added to the History Center's collection.

Atkinson recorded the oral history of Dale Hatfield (**https://ethw.org/Oral-History:Dale_Hatfield**). Both transcripts are in the IEEE Communication Society's oral history collection.

IEEE Region 8 oral history collection was established to document the Region's history and it added the life stories of Kurt Richter and Peer Martin Larsen **https://ethw.org/Oral-History:IEEE_Region_8_Oral_Histories**.

The IEEE Staff collection expanded with the addition of Joyce Bedi, former IEEE History Center staff; Rosann Marosy, Fellows Activities Manager; and Chris Brantley, retired IEEE-USA Managing Director **https://ethw.org/Oral-History:IEEE_Staff**.

REFERENCE REQUESTS: ONE OF THE MANY WAYS THE IEEE HISTORY CENTER SERVES THE PROFESSION

One of the services that the IEEE History Center provides to members, scholars, documentary filmmakers and radio broadcasters, podcasters, the public, and sometimes to government staffers is answering questions on a number of topics that staff are very familiar with.

Recently, Outreach Historian Dr. Alexander Magoun has worked with scholarly researchers in all phases of their careers. These encounters have included mentoring a high school student studying black engineers in her hometown at RCA's Missile and Surface Radar Division; connecting a musicology doctoral student at the University of Bern to AT&T and other archival sources on wired broadcasting; assisting an economics Ph.D. student at Stanford University with IEEE and other sources helpful to studying the role of Fred Terman's electrical engineering program in the growth of Silicon Valley; and introducing a French historian of early television to archival holdings on facsimile pioneer Arthur Korn at Stevens Institute of Technology.

By assisting documentary film and broadcast makers, the IEEE History Center serves as a 'force multiplier' in that those platforms bring the history of IEEE's technologies to broader audiences. A WNYC Radiolog program on Claude Shannon's information technology work requested the use of the IEEE History Center's oral history recording for its program.

Books and articles are another means to raise the visibility of the profession's contributions to society. Professor Lee Vinsel (author of *The Innovation Delusion and Moving Violations: Automobiles, Experts and Regulations in the United States*) consulted Magoun for guidance about books on geopolitics and technological innovation as part of another scholar's project on the geopolitics of artificial intelligence.

In addition, the History Center archivist, Nathan Brewer, and institutional historian, Mary Ann Hellrigel, answer questions from many IEEE staff and volunteers on institutional history, especially the formation and history of organizational units.

The IEEE History Center continues to serve as a network node, in former director Ronald Kline's terminology, for all things in IEEE-related history. Staff connect volunteers, historians, staff, collectors, journalists, and sometimes government staff with resources that they are familiar with from their training, research, travels, readings, and conversations.

IEEE REACH AT IEEE NIGERCON 2025

The History Center's free, online open educational resources program for the pre-university classroom, IEEE REACH, aims to be as easy to use for educators as possible. All of the material can be downloaded in case there are local bandwidth limitations. The hands-on activities that accompany every unit are designed to be inexpensive and possible to use without complicated equipment or great technical expertise. For example, the hands-on activity for the UAV (Drones) unit has the students construct a model village in a shoe box and then use their cell phone cameras to simulate how drones might provide information in a disaster.

In Africa in November, the Drones unit was taken to a new level (pun intended). IEEE REACH already has experience working in Africa through a Memorandum of Understanding between IEEE and UNESCO to build engineering capacity in Africa. IEEE NIGERCON, sponsored by the IEEE Nigeria Section, is a premier annual event for professionals, researchers, and enthusiasts in the field of computer science and engineering. From 26 – 28 November 2024, the latest installment was hosted by Afe Babalola University in Ekiti, Nigeria, with several IEEE societies among the technical cosponsors. In one of the sessions on the first day of the conference, History Center Senior Director Michael Geselowitz remotely presented IEEE REACH in one of the sessions

Then, on the second day, local university students were invited to participate in a drone competition on one of the host university's playing fields, co-sponsored by the IEEE History Center and the IEEE Computer Society. The competition was organized by John Oyewole Funso-Adebayo, an officer of the Nigeria Section. Thirty students were divided into five groups of six, and were asked, with real drones, to compete on the following:

1. Health: dispatch a light Medicare at a distance in emergency cases after 911 call is received.
2. Education: fly a drone to an altitude to take pictures for geography and climate change.
3. Agriculture: fly a drone for harvest assessment of crops and fumigation.
4. Transportation: fly a drone to determine the shortest path back home during traffic jam.
5. Surveillance/Security: fly a drone to give details of crime areas and alerts to security.

By all accounts the students had a great time, and learned how the historical context supplied by REACH also informs current uses of technology. Furthermore, the exercise demonstrated how the REACH program has appeal beyond the high school classroom, and beyond traditional education in developed countries. IEEE REACH looks forward to further activity in Africa in 2025.

TECH HISTORY ON THE WEB: STAFF FAVORITES

SURFING THE WEB FOR MARCH

Around the world, small groups of dedicated technical volunteers collect, restore, and demonstrate obsolete IEEE-related technologies. An exemplary model is *Technikwelt Solothurn* in Switzerland, **https://enter.ch/en/**, where visitors of all ages can engage with or experience analog and digital technologies ranging from Switzerland's first radio station, Champ-de-l'Air, to Curta calculators, Apple computers, Gameboys, and a DeLorean automobile.

Electronic archaeology: Sometimes a single person works on projects at home, supported by parts suppliers, machinists, and other restorers/reconstructors on various forums. Dr. Hugo Holden, an ophthalmologist in Queensland, Australia, has documented his projects on **https://www.worldphaco.com/**

over the past twenty five years. His work has earned respect from groups ranging from the Vintage Computer Federation to the Early Television Foundation. Some readers might be interested in his effort to analyze and reconstruct the radio transmitter and "manipulator" used on Sputnik I: **https://worldphaco.com/uploads/THE%20SPUTNIKSTORY.pdf**. More information on the Soviet vacuum tube used is posted in the CIA's reading room: **https://www.cia.gov/readingroom/docs/CIA-RDP80-00809A000600330733-1.pdf**. This 1950 translation was declassified in 2011.

Engineering in India: A regular subject of debate among historians is the source of the contributors to a technology, profession, institution, or subject of study in any given location.

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Was it locally created or was it transferred from elsewhere and reconstituted? Do the contributors upset the status quo, or maintain it? Funded by France's Agence Nationale de la Recherche, *ENGIND* is a stimulating blog on this subject as it relates to engineers and India over the last 175 years: **https://engind.hypotheses.org/2177#more-2177**.

Cryptography: Discovered while researching Edwin Howard Armstrong's services for U.S. Radio Intelligence in World War I, Betsy Rohally Smoot's website, **www.betsyrohalysmoot.com/**, offers invaluable access to her scholarship and techniques for navigating the U.S. National Archives collections. Her prize-winning biography, *Parker Hitt: The Father of American Military Cryptology,* is reviewed along with her smoothly written and richly researched history of U.S. cryptography during the so-called Great War, **https://ww1radiointel.com/**.

Television: Dr. André Lange of France is another individual aided by helpful volunteers, donors, and sellers around the world. He has spent more than twenty five years of time, thought, and money building *Histoire de la Télévision* ("et de quelques autres médias"), a website of reliable information and primary sources for others to use or admire. Retired from the European Audiovisual Observatory, Lange continues to edit and expand it. His original focus on the real and fantastic efforts to make television a reality in the 19th century have extended well into in the 20th. Among his articles, reviews, and commentaries you'll find collections of digitized serials about television, and other electronic media in English, French, German, Italian, Russian, and Spanish: **https://www.histv.net/magazines-de-television**. Links to similar online collections of Asian, South American, or African publications would be welcome.

Computers: Do you need talk to someone who is not judgmental? Perhaps it's time to meet with the original MAD-SLIP version of Joseph Weizenbaum's ELIZA. Discovered in MIT Archives, "she" has been restored on a reconstruction of MIT's Compatible Time-Sharing System (CTSS), running on an emulated IBM 7094: **https://sites.google.com/view/elizagen-org/blog/eliza-reanimated**.

Computers on-screen: *Starring the Computer* catalogs and rates the presence of real computers (No HAL 9000 here) in movies and television shows by year and brand: **https://starringthecomputer.com/**. The recognition of computers in non-English language productions is thin (the Mazovia 1016, Olivetti Quaderno 33, and Robotrons being among the exceptions) and the founder, James Carter, would benefit from the addition of computer appearances in other movies and programs outside the U.S. and U.K. Can *Newsletter* readers help him?

Computer-aided design: CAD pioneer turned journalist David E. Weisberg spent five years writing and refining the twenty two chapters and 650 pages that comprise his history of the first sixty years of computer-aided design, *The Engineering Design Revolution: the People, Companies and Computer Systems that Changed Forever the Practice of Engineering:* **www.shapr3d.com/blog/history-of-cad**. Thoroughly referenced, based on interviews and a unique set of industry newsletters, and organized largely by company, it is available free online courtesy of the late Mr. Weisberg's family and Shapr3D.

Amateur radio: The *Internet Archive's* "Digital Library of Amateur Radio & Communications" is three years old but already holds 128,000 items. Start at **https://archive.org/details/dlarc?tab=collection** and groove on teletype manuals, radio club archives (Is yours included? Why not?), former U.S. naval radio installations, the Baofeng Tech library, and visions of a radio world that never happened. If you want to look at something more focused, the Internet Archive has added the "Chuck Vesei Shortwave Radio Artifacts" collection: **https://archive.org/details/vesei-shortwave**. This comprises ninety nine cool, mid-1980s, cards, calendars, QSL pennants, and more from around the late Cold War radio world that Charles Vesei KD8YSU listened to on his Uniden CR-201. Got stuff you'd like to see preserved? Review the DLARC Want List: **https://archive.org/details/dlarc-wantlist**.

Shortwave radio: Jerry Berg has been DXing for more than fifty years and documenting the history of his avocation for nearly as long. Besides his informative and carefully documented books, together with John Herkheimer he maintains a website of interest to all interested in the evolution of long-distance wireless communications: **www.ontheshortwaves.com/index.html**.

Radio in Australia: The National Film and Sound Archive of Australia has posted its complete site for Radio—100, **www.nfsa.gov.au/collection/curated/radio-100**, a multimedia commemoration of 100 years of radio broadcasting in the country. Five chapters and their sub-sections sample the changing technologies of transmission and reception with historical commentaries, memoirs, and primary documents and photographs, accompanied by recordings of the content that the technology, society, and politics enabled.

Radio in Uruguay: Horacio A. Nigro Geolkiewsky CX3BZ has been adding steadily to his "Notes on Radio," *La Galena del Sur*, with brief histories and fascinating images for historians and wireless enthusiasts of radio, television, and wireless communications in Uruguay, **https://lagalenadelsur.com/**.

Radio in Rhode Island: New England Wireless and Steam Museum board member Len Arzoomanian has been complementing his personal collection of Rhode Island, U.S.A., radio history with a thoughtfully crafted and organized website: **www.rhodeislandradio.org/index.shtml**. He provides histories and documentation of the state's people, companies, and radio stations in a format that could provide a model to other collectors or historians of a region, state, city, or province.

NEW CONTRIBUTION TO ASIAN COMPUTING HISTORY
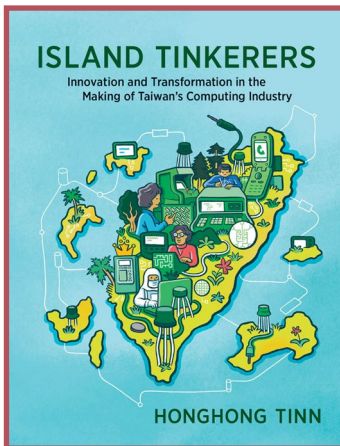
TINN, HONGHONG, *Island Tinkerers: Innovation and Transformation in the Making of Taiwan's Computing Industry*, MIT Press, Cambridge, Massachusetts, USA, 2025.

In a world where a few great powers exert political, economic, military, technological, and social influences, how do the far more numerous smaller nation-states protect and advance their interests? Honghong Tinn, an assistant professor of the history of technology in the Department of Electrical and Computer Engineering at the University of Minnesota, Twin Cities, explains how the inhabitants of Taiwan, the Republic of China, took an island with no computing infrastructure in the 1950s to world leadership in the production of laptops, computer components, and cutting-edge microchips sixty years later. Over ten chapters and nearly 300 pages (there are 90 pages of references), her narrative and analysis highlight the roles of tinkerers; their social, educational, political, and business networks; and their transitions to entrepreneurship in the expanding industry. For Tinn, Taiwanese tinkering is more than cut-and-try efforts. Practically a national culture, it involved "acts of imitation, emulation, experimentation, and innovation" on imported technology with the intention of establishing a domestic industry, despite political and commercial opposition from its patron, the United States, and its multinational corporations.

Taiwan developed not simply because of its people's formal and informal STEM skills. Its educational, technical, business, and political representatives exploited the country's position in the Cold War; asserted themselves with United Nations officials over the purpose of international support, argued with the U.S. military over the extent of Taiwanese research and development, and negotiated with multinational corporations over the country's strategic role of making and selling cheaper personal computers.

Tinn aligns Taiwan's circumstances and responses to other small Asian states. But its approach is not so different from Israel's or Finland's: invest in STEM education and concentrate on particular industries (more research is needed on the extent of tinkering in those countries). Further, she provides numerous examples of how Taiwan's tinkerers, including the women exploited on the production lines, adapted western technologies to local needs—and for foreign purchase—by drawing on the material techniques of engineering, and universal principles of physics and chemistry.

Informal overlapped with formal tinkering as university faculty at National Chiao Tung University believed, rightly, that local technicians could maintain their new IBM mainframe in the 1960s; students built electronic calculators and minicomputers as theses or on their own in the 1970s; production engineers experimented with imitative and innovative designs for compatible personal computers and their operating systems in the 1980s. Domestic production and free enterprise stimulated a generation of engineers-entrepreneurs, predecessors of the 40 industry leaders that Invidia CEO and Taiwanese-American Jensen Huang feted in January 2025. The difference with Hugo Gernsback's pre-World War II acolytes and 21st century makers and hackers, if not Japan's post-war tinkerers, was the recognition of the importance to national survival, as well as standard of living, of a sophisticated digital electronics industry.

Island Tinkerers helps us understand how impoverished east Asian countries developed some of the world's most sophisticated and prosperous economies. Tinn recognizes the inevitable role of the sovereign state, but builds on others' accounts of how Japan's tinkerers, engineers, and entrepreneurs propelled that country's success. Here Professor Tinn makes a similar case for Taiwan, but with a broader definition of tinkering and a longer span of time. As she observes in her Epilogue, every nation's experience differs, but common traits for successful industrialization include a commitment to engineering education at home and abroad, which in turn involves maintaining social networks, commitment to a particular product or industry, and physical engagement in or outside the classroom with the materials and components of construction. Sovereign interests and foreign investment play roles in industrial development, but Tinn highlights the complementary and necessary role of engineers among the "mid-level professionals" who implement or revise policies.

Too often, businesspeople and economists take for granted the commercialization of the black box of technology. Tinn's invaluable corrective is based on extensive research in U.S., U.N., and Republic of China archives; corporate records archived at the Charles Babbage Institute; her and others' oral histories with U.S. and Taiwanese participants; and contemporary university, newspaper, and business journal articles. The photographs from Taiwanese collections are largely new to western readers and amplify her emphases in the text.

Reviewed by Alexander B. Magoun, Ph.D., Outreach Historian

BOOKS FROM THE
IEEE HISTORY CENTER PRESS
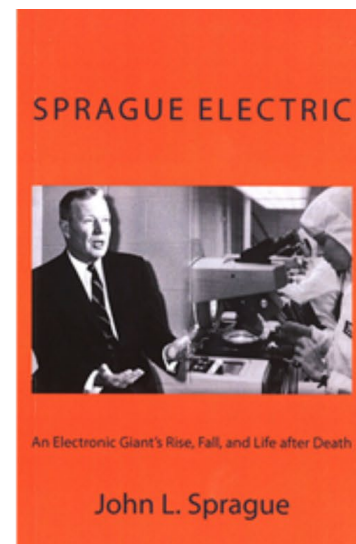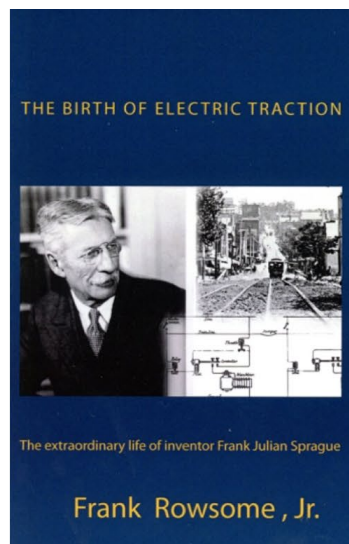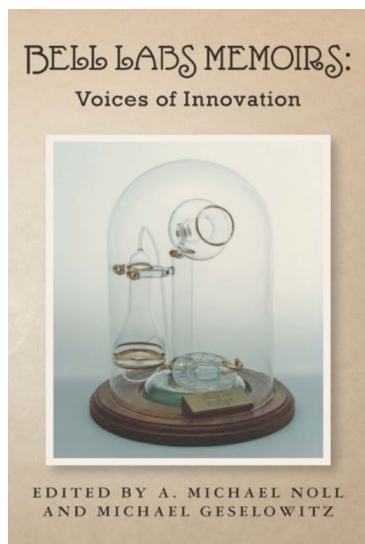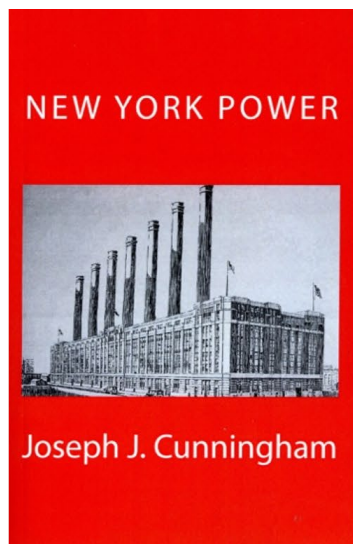
NEW YORK POWER

by Joseph J. Cunningham
tells the story of the electrification of one of the densest electrical load areas in the world. Electrification began during the 1880s, but many innovations were required to supply urban service at a cost that would make possible large-scale consumption.
https://www.amazon.com/New-York-Power-Joseph-Cunningham/dp/1484826515

BELL LABS MEMOIRS:
VOICES OF INNOVATION

The innovative spirit and creative energy of Bell Labs during the directorship of William Baker are described by twelve people who worked there. Through their eyes and words, the culture of Bell Labs comes alive.
https://www.amazon.com/Bell-Labs-Memoirs-Voices-Innovation/dp/1463677979

THE BIRTH OF ELECTRIC TRACTION:
THE EXTRAORDINARY LIFE OF INVENTOR
FRANK J. SPRAGUE

Sprague made enormous contributions in the areas of electric traction, control and safety, especially automatic signaling and brake control for railroads. He was active in the planning and construction of New York City's subway system, and in the electrification of Grand Central Terminal.
https://www.amazon.com/Birth-Electric-Traction-extraordinary-inventor/dp/1490955348

SPRAGUE ELECTRIC

Sprague Electric Company's rise from a high-tech kitchen-table startup is representative of much of the U.S. electronics industry. Begun in 1926, it became a thriving manufacturer of components. More than 50,000 Sprague components rode aboard every *Apollo* mission, and more than 25,000 aboard every Space Shuttle. *Sprague Electric* provides a valuable business and technological history, a story of corporate success… and a cautionary tale of what to avoid.
https://www.amazon.com/Sprague-Electric-Electronics-Giants-after/dp/150338781X

IEEE History Center Press books are available from Amazon.com in hard copy and on Kindle

THE IEEE MILESTONES PROGRAM AT 40

By Jessica Arkel, IEEE Foundation

The IEEE Milestones Program honors significant technical achievements in all areas associated with IEEE: Engineering, Computer Sciences and Information Technology, Physical Sciences, Biological and Medical Sciences, Mathematics, Technical Communications, Education, Management, and Law and Policy. This program is one of the most visible ways IEEE educates the public about the technological achievements in its fields of interest. All IEEE Milestones recognize the technological innovation and excellence for the benefit of humanity found in unique products, services, seminal papers and patents – honoring the achievement rather than a place or a person.

The IEEE Milestones Program began with an April 1983 proposal by Dr. Friedel, the IEEE History Center's first director, for establishing a program for designating significant achievements in electrical engineering and computing. Previous to that, IEEE had collaborated with ASCE and ASME in joint Landmarks designated by those organizations.

In October 1984, the IEEE Board of Directors approved the first two IEEE Milestones (Hearts Content and Signal Hill).

To date, IEEE has dedicated more than 260 Milestones. (For a full list, visit **ethw.org**). Among the recently dedicated IEEE Milestones are: Google's PageRank Algorithm, Ethernet, TCP/Internet, the A-0 Compiler work by Grace Hopper, the semiconductor laser, 193-nm photolithography, and the IEEE 802 standard. IEEE Milestones have been dedicated in all ten IEEE regions, and dedications sometimes take place over multiple locations. In 2023, 40 plaques (20 in English, 20 in French) were placed in 20 locations across Canada for the Trans-Canada Microwave System. (This accounted for the casting and shipping of almost half a ton of bronze plaques.)

The Milestone Program is overseen by the IEEE History Committee, administered through the IEEE History Center, and partially funded with donations to the IEEE History Center Fund of the IEEE Foundation.

Interested in proposing a Milestone? Read more about the process here.

- Milestones are proposed by any IEEE member, and are sponsored by the IEEE section(s) where the plaque or plaques will be placed.
- Any IEEE organizational unit (societies, student branches, etc.) may cosponsor milestone proposals in their technical field.
- To be proposed as an IEEE Milestone, an achievement must be at least twenty five years old, have benefited humanity, and must have had widespread geographic importance.
- Each approved Milestone is recognized with a dedication ceremony and a carefully crafted bronze plaque.

Milestone dedication of the A-O Compiler and Initial Development of Automatic Programming, 1951-1952. Pictured: Vijay Kumar (Nemirovsky Family Dean of Penn Engr.), Laura Stubbs (Sr. Dir. of Penn Engr. Office of Diversity), Rear Admiral Michael Richman (US Navy Deputy Commander for Cyber Engr.), Kate McDevitt (Philadelphia Section Vice Chair), Kathleen Kramer (IEEE 2024 President-Elect), André DeHon (Prof. of Electrical & Systems Engr.)

GIVING AND SUPPORT FOR IEEE HISTORY CENTER PROGRAMS

"UNSEEN SIGNALS" EXHIBIT EXPLORES ARMSTRONG'S CONTRIBUTIONS TO MODERN RADIO AND ELECTRONIC CIRCUITRY

Now through 30 April 2025, at the National Museum of Industrial History (NMIH) in Bethlehem, PA, USA, the IEEE Global Museum is excited to present *Unseen Signals*, a traveling exhibit recognizing the work of Edwin Howard Armstrong, an electrical engineer, inventor, and IEEE Medal of Honor recipient who developed FM radio and the superheterodyne receiver system during the WWI and WWII eras.

The *Unseen Signals* exhibit celebrates the life and "unsung genius" of New York City native Armstrong by highlighting his technological innovations, patriotism, and the continuing relevance of his achievements to our wireless world. From its historical overview of the emerging radio era of the early 20th century to displays of Armstrong's remarkable intellectual and professional journey, the exhibit offers a fascinating look at the rise of the radio broadcasting industry and the foundations of wireless communications, a dynamic field that Armstrong helped create.

The IEEE Global Museum, presented by the IEEE History Center, brings museum-quality traveling exhibits to IEEE members and the public to help promote an understanding of electrotechnology and its impact on society. On 1 November 2024, the IEEE History Center and the IEEE Foundation hosted a celebration with NMIH to mark the launch of the Global Museum and the unveiling of *Unseen Signals*, its first exhibit.

"The launch of the IEEE Global Museum's first major exhibit brings a new dimension to IEEE's efforts to raise public understanding of our electrotechnical world," explained Daniel Jon Mitchell, DPhil., Senior Historian at the IEEE History Center and staff program lead for the Global Museum.

"The influence of Armstrong's genius and accomplishments are immeasurable and have impacted much of our modern lives," agreed Andria Zaia, President & CEO of NMIH. "It is a great privilege to partner with the IEEE Global Museum to bring this incredible story to the public and we look forward to our ongoing collaboration."

"Congratulations to the IEEE Global Museum and the National Museum of Industrial History on the successful launch of *Unseen Signals*," added Karen Galuchie, Executive Director of the IEEE Foundation. "It's vital that we support programs that acknowledge and celebrate the historical achievements of innovators like E. Howard Armstrong and we're grateful to all the donors who helped to make this inspiring traveling exhibit a reality."

Opened in 2016, the National Museum of Industrial History is dedicated to exploring America's rich industrial heritage and is an affiliate of the Smithsonian Institution.

For the entirety of the *Unseen Signals* exhibit, which runs through 30 April 2025, IEEE members and their guests will receive a 50% discount on the price of entry to the National Museum of Industrial History.

Based in IEEE's Operations Center in Piscataway, NJ, U.S.A., the IEEE History Center is dedicated to preserving, researching, and promoting the history of information and electrical technologies. The future of the IEEE Global Museum and its projects depends on philanthropic support. Inspired to help IEEE promote the history of technology? Contact Danny DeLiberato, CFRE at d.deliberato@ieee.org or call +1 732 562 5446 or make a gift online.

Alexander Magoun, IEEE Outreach Historian and Unseen Signals curator; David Michelson, IEEE History Committee Chair; Daniel Jon Mitchell, IEEE Senior Historian and Unseen Signals co-curator; Karen Galuchie, IEEE Foundation Executive Director; Michael Molnar, Radio Enthusiast and Donor.

WAYS TO SUPPORT HISTORY BY GIVING TO THE IEEE FOUNDATION

By Jessica Arkel, IEEE Foundation

Have you ever pondered how IEEE makes such a large impact? One of the main reasons is the generosity of individuals, IEEE Members, and friends and their donations to the IEEE Foundation. Contrary to popular belief, in the United States, individual giving is the most significant portion of contributions to nonprofits.

The Giving Guide: Impact and Philanthropy

IEEE Foundation

Giving USA attributes 67.2% of all nonprofit contributions in 2023 to individual persons, resulting in US$374 Billion – which is 3.3% more than individual giving in 2022. The collective impact of individual donations is astounding.

Because of individual support in 2023, the IEEE Foundation was able to educate 789,000 people, raise $8M, and add seventeen new funds supporting IEEE Women in Engineering Family Cares Grant Program, scholarships, and the IEEE Global Museum, among many other accomplishments.As a trusted resource for IEEE Members and friends, the IEEE Foundation shares the following information to ensure you can maximize impact through your philanthropy. As a US 501(c)3 organization, the IEEE Foundation offers many ways to give, including: Donor Advised Funds, IRA Charitable Rollover, Monthly Giving, Appreciated Marketable Securities, Cryptocurrency, and Planned Giving. Below are brief descriptions of each giving method and what other IEEE Members have to say about why they chose that method. While we hope you use these methods to make an impact at IEEE, these can generally be used with any organization close to your heart that accepts philanthropic gifts.

Donor Advised Funds

A Donor Advised Fund (DAF) is a centralized charitable account that enables charitably-inclined individuals, families, and businesses to make tax-deductible charitable donations (in the United States) of cash, publicly traded stock, and in some cases, certain illiquid assets to a public charity that sponsors a DAF program.

To donate via a DAF, a donor makes an irrevocable contribution to the Donor Advised Fund (DAF) associated with their financial institute of choice and can take an immediate tax deduction. The donor can name their DAF anything the donor would like; appoint friends and family members to help the donor manage the responsibilities of a DAF and design a Legacy Plan to determine what will be done with the DAF assets beyond their lifetime, which may include appointing successors or charitable beneficiaries (Tip – nominating the IEEE Foundation as a successor for your DAF also qualifies you for entry into the IEEE Goldsmith Legacy League). The donor can then invest assets in the DAF according to their designated investment strategy, giving the donor the potential to generate even more philanthropic capital. As soon as the DAF is set up, the donor can recommend organizations for grants to be approved by their financial services provider. The financial services provider can approve grants to most organizations that are tax-exempt under Internal Revenue Code (Code) Section 501(c)(3) and classified as public charities under Code Section 509(a), as well as certain private operating foundations. For a comprehensive list, check with your financial services provider.

Dr. Bhagawandas Pannalal "B.P." Lathi and his wife, Rajani, generously gave to the IEEE Foundation in late 2022 when they established the Bhagawandas and Rajani Lathi Fund. This initiative supports authors of outstanding electrical engineering textbooks awarded through the IEEE Education Society. They chose IEEE as the home of this fund because "IEEE is one of the most respected and widely circulated scholarly platforms for electrical engineers and technologists." The Lathis encourage potential donors to consider the aspects of electrical engineering they value and improve the excellence of those areas by giving to the IEEE Foundation. They provided their generous gift using their Donor Advised Fund (DAF).

IRA Charitable Rollover

The IRA Charitable Rollover allows individual retirement account (IRA) holders age 70 ½ and older to make qualified charitable distributions (QCD) up to US$105,000 per year (and up to US$210,000 per year for married couples) from their IRA to the IEEE Foundation––without having to count the transfers as income for federal tax purposes. Since no tax is incurred on the withdrawal, gifts do not qualify for an income tax charitable deduction but are eligible to be counted toward an individual's minimum required distribution beginning at age 73. For more information about the specifics of IRA Charitable Rollovers, we invite you to visit our website. Levy Gerzberg loves a challenge, especially one that, when completed, can have a "return on impact" and make the world a better place. His desire to have a "return on impact" was one of the driving factors around his initiation of and contribution to support the IEEE SSCS-James D. Meindl Memorial Educational Fund. The other driving force was his respect for his mentor, Professor, and colleague, James D. Meindl. "Jim Meindl deserves to be remembered for many generations to come," explains Levy. "I learned from Jim that innovation can be both proactive and mentored. By supporting the IEEE Foundation and Meindl Fund, we are keeping Jim's memory alive – encouraging future leaders and educators to adopt Jim's collaborative, interdisciplinary model for education and invention of new ideas." Utilizing his Family Foundation and IRA funds to give to the IEEE Foundation was an excellent way to honor his mentor and keep his goals alive.

Monthly Giving

Monthly donors make automatic donations every month, which makes it easier for IEEE programs to plan long-term and budget more efficiently. Monthly donors sustain our programs. Monthly gifts can be changed in amount or canceled at any time. A commitment to a recurring gift demonstrates an ongoing dedication to improving access to technology, enhancing technological literacy, and supporting technical education. By spreading giving out monthly, gifts can be tailored to any

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budget while ensuring a lasting impact on IEEE programs.

Noel N. Schulz, Ph.D., is no stranger to the act of philanthropy within her field. According to Noel and her husband, Kirk, who became Honored Philanthropists in the IEEE Heritage Circle in 2020 in recognition of their spirit of cumulative giving, "the process of donating monthly and/or steadily to IEEE over time can accomplish the same level of impact on an initiative as a larger donation without being an excessive burden on one's personal finances."

"We encourage others to adopt this cumulative method of providing support," confirmed Dr. Schulz, "as it has and continues to have a major impact on the livelihood of IEEE programs."

Appreciated Marketable Securities

A gift of appreciated marketable securities, such as stocks, bonds, and mutual funds, may provide a significant benefit to the donor as well as support the mission of the IEEE Foundation. By donating appreciated securities that are held for at least one year, the donor:

- can avoid the capital gains taxes on the "paper profits"
- is entitled to a charitable income tax deduction on the full fair value of the asset
- may use the deduction, up to 30%, of the adjusted gross income in the year of the gift
- can carry forward any unused deductions for the next five years; supports a charitable activity that advances technology and education.

IEEE Life Member John Derrick and his wife Linda made a five-year commitment to support the IEEE Power and Energy Society Scholarship Plus Initiative. Due to their careful planning, their financial advisor encouraged them to use a gift of appreciated stock to pay off the five-year pledge early, and they said they were so glad they did. The Derricks recognized that annual cash giving is still essential at retirement and adds another important dimension to their estate planning. John added, "I'm 83, so there's little time to lose! I never thought I'd be in this position in my life. I am enjoying being able to really help others." John and Linda Derrick are Alexander Graham Bell level members of the IEEE Heritage Circle.

Cryptocurrency

Crypto philanthropy is an emerging and often tax-wise way for crypto users to support the IEEE Foundation. As of 2023, we accept donations in Bitcoin, Ethereum, and more than 100 other leading cryptocurrencies. Donating crypto is safe, easy, and fast. Making a cryptocurrency charitable donation to the IEEE Foundation is a quick three-step process detailed here on our website.

If the cryptocurrency one wishes to donate has decreased in value, it may be better to sell the asset, take the capital loss, and make the gift with the cash proceeds. As with any tax-related questions, be sure to consult with a qualified, professional tax advisor.

Planned Giving

There are many ways to show support through Planned Giving, and it is never too early to start! As you create or update your estate plan, consider the role IEEE has played in your life and the #IEEELegacy you want to leave. The IEEE Foundation team is honored to assist you in finding the right way to include IEEE in your estate plan. Here are some of the many options:

- Wills and Trusts: Leaving a bequest by including language in wills and trusts is the most common way to leave an estate gift to the IEEE Foundation. To make a gift from your estate, you must sign a new will or living trust instrument, add a codicil to your present will, or amend your present trust instrument.
- Charitable Remainder Trust: Life income gifts, such as a Charitable Remainder Trust (CRT), may be the answer to assuring the future of both your loved ones and the IEEE Foundation. CRTs are tax-free trusts that pay you – as well as other possible designated beneficiaries – an annual distribution, often in quarterly installments.
- Life Insurance: Some people have life insurance to ensure the financial security of their loved ones. Yet, life insurance can be used for other purposes, including leaving a philanthropic gift to the IEEE Foundation. There are two different ways you can structure a gift of life insurance to the IEEE Foundation: Name the IEEE Foundation as Beneficiary or Transfer ownership to the IEEE Foundation.
- Retirement Plan: If left to a non-spouse beneficiary, the assets from 401(k), 403 (b), IRA, Keogh, or other such accounts are not only subject to estate tax, but the heir(s) may have to pay income tax as they withdraw the funds. To avoid this 'double taxation', you can name the IEEE Foundation as the beneficiary of your retirement plan and use other assets not subject to income tax to make gifts to your heirs.

IEEE Foundation Director Dr. Karen A. Panetta, along with Jamie A. Heller, updated their estate plans and became **IEEE Goldsmith Legacy League** members in 2023. To her, Legacy means sustainability and long-term impact. "Knowing that my lifelong dedication to developing programs and technology to benefit humanity will continue through my support of IEEE Foundation, I'm confident that my efforts had an impact and people recognize it. Helping others follow in our footsteps to make a better world for everyone is the most aspirational goal a person can have in life. Being a member of a community that embraces this at its core ensures that we as individuals can really achieve this goal."

From supporting education and scholarships and other initiatives that strengthen IEEE's mission, the *IEEE Goldsmith Legacy League* members are truly *Forever Generous*. You can honor that generosity by joining them and creating a meaningful legacy of your own. The IEEE Foundation invites you to cement your legacy by considering a gift via the various methods of giving – Donor Advised Funds, IRA Charitable Rollover, Monthly Giving, Appreciated Marketable Securities, Cryptocurrency, and Planned Giving – and joining other like-minded IEEE members in supporting the impactful programs of IEEE. To stay up to date on Foundation news and impacts, we invite you to follow us on LinkedIn, Twitter, and Facebook or sign up to receive our newsletter. To learn more about the innovative programming that the IEEE Foundation supports, explore our website.

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