

IEEE History Center

ISSUE 121, March 2023

ARCHIVES UPDATE, IEEE REACH AT WORLD SCIENCE FORUM, AND BATTERSEA STATION REOPENS



Part of the controls of the Battersea Power Plant in London, England restored and open to the public.

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The newsletter reports on the activities of the IEEE History Center and on new resources and projects in electrical and computer history. It is published three times each year—once in hard copy (July) and twice electronically (March and November) by the IEEE History Center.

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Dr. Michael Geselowitz
Senior Director, IEEE History Center

Welcome to 2023. Last year was a transitional one for the History Center. As you know from previous newsletters, one year ago IEEE History Center staff returned to the office after a two-year hiatus...and it was a new office! Relocating to the IEEE Operations Center, Piscataway, NJ, U.S.A., we adjusted to our new surroundings and started to explore the opportunities afforded by this change, including the resulting in-person interaction with

our IEEE staff colleagues. We also focused on reorganizing the location of our collections (IEEE Archive, History Center Library, Artifact Collection) as the space was new, and the possibility for receiving donations returned. As you can see from the article on page 3, these efforts have already enabled us to begin to expand our holdings. Then in October 2022 the IEEE History Committee met face-to-face for the first time in thirty months. It was great to see our dedicated volunteers in person again, to receive their guidance and to support them in their historical awards ac-

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
ieemilestones.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.

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: http://ieemilestones.ethw.org/Milestone_Guidelines_and_How_to_Propose_a_Milestone

Milestone proposals in process: http://ieemilestones.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>

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.

tivity (IEEE Milestones, Middleton Book Prize, SHOT IEEE/Finn Prize, Life Member History Fellowship).

When it comes to the programs of the History Center, the Engineering & Technology History Wiki (www.ethw.org) remains the main platform through which we disseminate historical content to the public (see page 3). For example, the oral history collection continued to grow last year, and will this year as well.

We are excited that in 2023, the History Center will augment our online platform with the launch of our delayed IEEE Global Museum project. The first exhibit is debuting at the IEEE Foundation's 50th Anniversary celebration (see page 8) in New York City on 16 February and being exhibited throughout the IEEE Board Series for several days at the same venue. Look for a full report in the July issue of the newsletter.

As the World COVID situation continues to improve, I anticipate increased opportunity for face-to-face interaction in 2023. For the first time since 2017, IEEE will be convening its triennial Sections Congress in Ottawa, Ontario, Canada in August. The History Center will be teaming with the IEEE His-

tory Committee to present IEEE's historical activities to the IEEE geographical leaders from around the world. The SC2023 site can be found here: <https://sections-congress.ieee.org/>.

Later, in September, IEEE Region 8 is holding IEEE HISTELCON 2023 in Florence, Italy. The IEEE History Committee and IEEE History Center are technical co-sponsors. We are looking forward to participating, and to seeing many of our supporters and partners in IEEE historical activities there. If you would like to present a paper, the deadline is 15 April, and the call for papers is here: <https://2023.ieee-histelcon.org/call-for-papers/>. We will report back on both these exciting events in the November issue of the newsletter.

Like the ETHW, the IEEE REACH content is web-based (<http://reach.ieee.org>). REACH is our free, on-line materials for pre-university education, designed to be used by teachers in the classroom. As described on page 4, with the re-opening of schools and return of educational conferences, interest in REACH has increased rapidly, especially in Africa.

Here is to a safe, healthy, collegial, and successful year for us all!

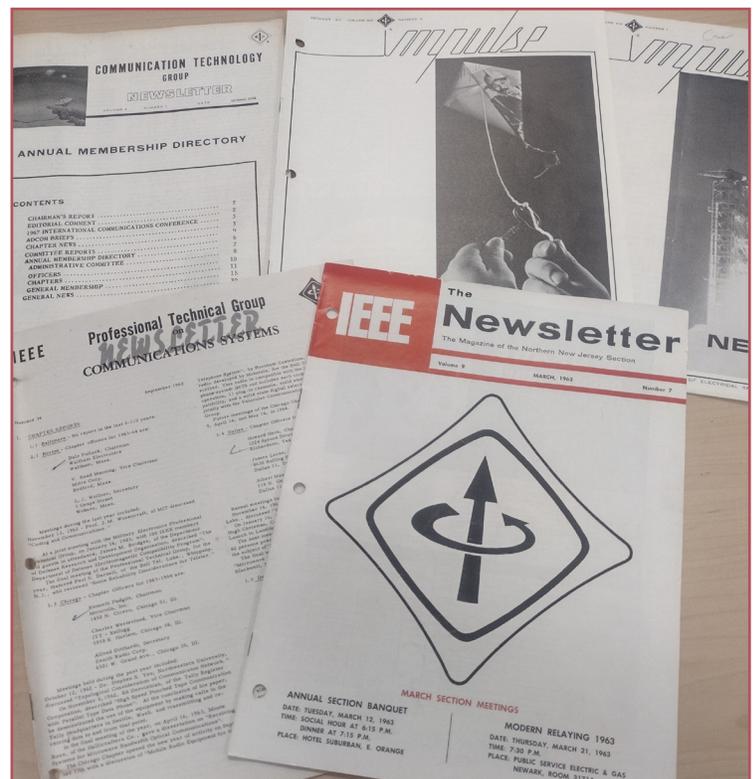
CENTER ACTIVITIES

ARCHIVES UPDATE: KARGER DONATION, AND IMPORTANCE OF NEWSLETTERS

"Newsletters are one of the most valuable records for documenting IEEE history that are available to us, yet because of the decentralized nature of IEEE's broad range of organizational units, there is often no central repository of OU newsletters."

Gunther Karger was born on 16 March 1933 in Schmieheim, Germany. In 1939, his parents sent him on a transport of children to Sweden to escape from Nazi Germany. He was the only member of his family to survive the Holocaust, and after World War II he was sent to the United States. After graduating high school as valedictorian, he enlisted in the United States Air Force, where he worked on radar systems. After leaving the Air Force, he enrolled in Louisiana State University, where he graduated in 1958. Karger held positions at Boeing, Bell Labs, and Eastern Airlines, and was involved with IEEE in several volunteer positions, including editor for the IEEE Communications Society Newsletter, member of the Executive Committee of the IEEE North Jersey Section, and chair of the IEEE Canaveral Section.

In October of 2022, Karger donated several of his IEEE-related materials to the IEEE History Center, including several key issues of various newsletters which were previously considered missing. These include 15 issues of the IEEE



Recently donated newsletters will enhance the IEEE History Center's ability to preserve IEEE history.

Communications Technology Group Newsletter from 1963 to 1967, which would later become the IEEE Communications Society Newsletter, and then later the IEEE Communications Magazine. Also included in the donation were five complete issues of the IEEE Canaveral Section newsletter from 1965-1968, as well as two partial issues, and two complete issues of the IEEE North Jersey Section newsletter and three partial issues from 1960-1963.

To view these newsletters, you may visit the relevant pages:

https://ethw.org/IEEE_Communications_Society_History

https://ethw.org/IEEE_North_Jersey_Section_History

https://ethw.org/IEEE_Canaveral_Section_History

or to read more about Karger's fascinating life story and IEEE career, visit his oral history at:

https://ethw.org/Oral-History:Gunther_Karger

IEEE REACH AT THE WORLD SCIENCE FORUM AND BEYOND

IEEE REACH (reach.ieee.org) was on display during the World Science Forum (WSF), held 6-9 December 2022, in Cape Town, South Africa. WSF is one of the most significant science gatherings worldwide and was attended by delegates from 118 countries, and was established by the Hungarian Academy of Sciences, in collaboration with UNESCO. 2022 was the first time the biannual conference has been held in Africa. The 2022 theme was Science for Social Justice.

The IEEE REACH Program was invited to submit a proposal to exhibit at WSF because of its work with UNESCO, under the IEEE/UNESCO Memorandum of Understanding. After the successes of the REACH/UNESCO co-branded pilot program and subsequent STEM teacher workshops in Uganda, with assistance from the IEEE Uganda section, and Vincent Kaabunga, Past-Chair of the IEEE Africa Council, UNESCO expressed interest in scaling the program to other African countries. As part of this initiative, Kelly McKenna, IEEE REACH Senior Program Manager, and Kathleen Weeks, IEEE Senior Corporate Development Manager, and staff support for IEEE in Africa, were invited to host a REACH exhibit booth at WSF. Together they demonstrated that the history of science and technology in secondary education has the potential to be a catalyst for STEM education

NEWSLETTERS ARE VITAL HISTORICAL RECORDS

Newsletters are one of the most valuable records for documenting IEEE history that are available to us, yet because of the decentralized nature of IEEE's broad range of organizational units, there is often no central repository of OU newsletters. As such, these documents are in danger of becoming permanently lost. If you, or someone involved with your OU, has a collection of physical or digital newsletters, please contact Nathan Brewer at n.w.brewer@ieee.org to help the History Center fill in any the gaps in these important series of publications which allow us to tell the story of IEEE and its members.

"IEEE REACH enables educators to introduce the history of science and technology into the classroom. By exploring science and technology history, students understand how it shapes society and how society shapes it, thus providing a new lens from which students may view technology and engineering as relevant to their lives and future."



IEEE REACH Senior Program Manager, Kelly McKenna (second from right) meets delegates at the World Science Forum in Cape Town, South Africa, in December.

in Africa and the world.

The exhibit elicited excitement from key stakeholders across Africa. Currently, preliminary meetings are being held with pre-university education centers that are located in Kenya and South Africa, each with connections to the respective countries' Ministries of Education. As things progress the REACH team anticipates opportunities for participation from the IEEE sections in the regions and continued engagement with the IEEE Africa Council.

In addition to exhibiting at WSF, in November 2022, with assistance from the Uganda Section and IEEE volunteers and with support from IEEE, an IEEE REACH workshop was provided for STEM educators during the 19th annual Conference on Mathematics, Science, and Technology Education in Africa (COMSTEDA 19) held in Kampala, Uganda. This annual conference was hosted by the Uganda Ministry of Education and included the annual meeting for Strengthening Mathematics and Science Education in Africa (SMASE-Africa), which includes twenty-seven member countries as part of its affiliation. 1,029 teachers and students attended both in person and online for the workshop with more than sixteen countries participating, including approximately thirty-eight STEM education centers with

ten virtual hubs that included student participation. The program was positively received, and engagement efforts continue for scaling the REACH program to more countries both through these efforts and the continued partnership with UNESCO.

IEEE REACH enables educators to introduce the history of science and technology into the classroom. By exploring science and technology history, students understand how it

shapes society and how society shapes it, thus providing a new lens from which students may view technology and engineering as relevant to their lives and future. The resources are prepared in a global perspective and can be adapted for local circumstances and are providing a new and unique STEM education pathway.

TECHNOLOGY UNEXPECTEDS

MICROPHONE FOR HUMAN SPEECH FOUND AN UNUSUAL APPLICATION IN SPACE

by Michael Pettersen

The Shure SM11 microphone, introduced in the 1970s, was developed for human speech. However...

Every NASA Space Shuttle used two Shure moving coil dynamic omnidirectional microphones, the model SM11. The mics monitored the deafening sound level of the external booster rockets triggering a mechanism that captured the exhaust gases for analysis after the Shuttle returned to Earth. The SM11 was mounted in the "shell" of the Shuttle, and served as "acoustic trigger" for a circuit. When the sound pressure hit a certain level during liftoff, the mic signal would also reach a certain level and trigger a circuit to engage relays. The relays opened valves on "vacuum bottles" that sucked in samples of the booster rocket exhaust gases, for analysis post-flight.



Shure SM11 used on the Shuttle Atlantis



Space Shuttle Atlantis headed to orbit

Because the booster rockets fell away, an acoustic trigger was a simple solution because no "connection" was required between the Shuttle and the boosters. Air was the "connection." The SM11 is very simple – a Mylar diaphragm, a voice coil, a magnet, thus there is not much to fail inside. The SM11 output signal is linear with sound pressure level until the diaphragm "bottoms out" against the magnet. We could not test this at Shure, having no sound source to equal the noise of a booster rocket. But we thought it would work OK, and it did.

During the entire Shuttle program from 1981 to 2011, there was only one reported failure of an SM11; it occurred on the Shuttle *Atlantis*. NASA sent the mic to Shure for analysis. Examination showed the anomaly was due to the mic cable; an inner conductor had been severed because a service technician acutely crimped the cable.

THINGS TO SEE AND DO

REOPENED BATTERSEA POWER STATION

History Center Research Coordinator Explores an Icon of the Power Industry

On 14 October 2022 (coincidentally the date of the Battle of Hastings), the Battersea Power Station opened to the public, beginning a new service life as a spectacular public and retail space that also includes apartments, a cinema, restaurants, an amusement park, office space, and other uses. The northwest chimney has an observation deck at its top, offering magnificent views over London and southwest England.

Ninety years after it was built, Battersea is still one of the world's largest brick buildings —St. Paul's Cathedral could easily fit in its boiler hall —and it was always the Hagia Sophia of pow-

er stations. It was designed in the Brick Cathedral Style, and at its opening, it was hailed as the "Temple of Power." After it was decommissioned in 1983, its survival was in serious doubt, and several redevelopment plans called for its demolishing. Fortunately for London, history buffs, and everyone whose spirits are elevated by a great public space, the visionary repurposing plan that won out granted Battersea a new role. Electrical engineers can celebrate the preservation of one of the great buildings of the profession, and the public can enter and enjoy a masterpiece of industrial architecture.

The remodeling architects left many original aspects of



the building in place (the overhead cranes, control boards and massive circuit breakers), and have provided historical exhibits and explanations throughout the building. Whether by accident or design, Turbine Hall B has superb acoustics. The owners—aware of this—have sensibly placed a piano in the hall for anyone to play. People do, and skillfully, the setting seems to call for their best talents.

The original interior Art Deco styling (by architect J. Theo Halliday) of Italian marble has been carefully cleaned. The tracks that once brought coal from the docks to the boilers are now paved stone paths running through the entrance garden. And the enormous bronze doors at the south entrance...well, you need to experience them for yourself.

Begun in 1929, it was built in two halves, Battersea A and Battersea B. Battersea A began generating electricity in 1933, even before it was finished in 1935. Battersea B was begun in 1944, and when it was commissioned in 1955, it brought the total generating capacity to 503 MW. At the time, it was the most thermally efficient generating plant in the world. Between 1930 and 1980, Battersea supplied one fifth of the London metropolitan area's electricity. It supplied electricity to Parliament, to Buckingham Palace, and (of more personal interest to the author of this article) to my family's apartment and mine and my siblings' school. Battersea provided the electricity to light my childhood. Its chimneys (thanks to the fortuitous alignment of streets by which they were locally visible only at that precise angle) watched over me from a distance of almost a mile as I turned into my schoolyard every day, and were the visual backdrop for my childhood schoolmates' football games.

Battersea ceased to generate electricity in 1983, but in 1978, with great foresight, historically-minded staff began the process of obtaining its listing as an historic building; a Grade II listing was awarded in 1980. Many attempts at financially-feasible reuses were made. In the meantime, Battersea pursued a successful acting career, and has appeared in major films such as "Sabotage," "The King's Speech," and "Richard III," in which it co-starred with its sibling, the Bankside Power Station, now the Tate Modern. Perhaps most recognizably, it appeared as the 1977 album cover of Pink Floyd's "Animals."

Now, the public, who could not see its interior glories while it was in operation, will be able to enjoy it in a way never possible before.

TECH HISTORY ON THE WEB: CRYPTOCURRENCY

Bitcoin Energy Consumption Index <https://digiconomist.net/bitcoin-energy-consumption> keeps track of other environmental costs of cryptocurrency mining. (Carbon footprint, electronic waste, etc.) BEC estimated that one bitcoin transaction takes 1,449 kWh to complete, or the equivalent of approximately 50 days of power for the average US household.

Bitcoin Magazine's analysis of the cost of mining cryptocurrency at various kWh prices.

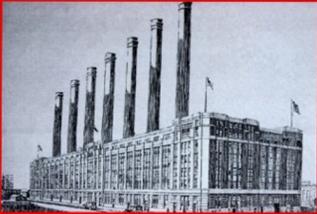
<https://bitcoinmagazine.com/business/bitcoin-mining-has-never-been-harder#:~:text=Let's%20put%20this%20into%20perspective,%2040.08%20and%20%2040.10%20per%20kWh.&text=As%20you%20can%20see%20C%20at,are%20profitable%20%20though%20not%20very>

Cost of Mining Bitcoin throughout the world <https://www.visualcapitalist.com/cp/the-cost-of-mining-bitcoin-in-198-different-countries/>

History of Cryptocurrency <https://www.coindesk.com/tech/2020/04/26/the-rise-of-asics-a-step-by-step-history-of-bitcoin-mining/>

BOOKS FROM THE IEEE HISTORY CENTER PRESS

NEW YORK POWER



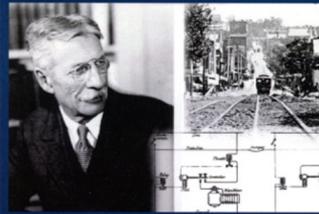
Joseph J. Cunningham

BELL LABS MEMOIRS: Voices of Innovation



EDITED BY A. MICHAEL NOLL
AND MICHAEL GESELOWITZ

THE BIRTH OF ELECTRIC TRACTION



The extraordinary life of inventor Frank Julian Sprague

Frank Rowsome, Jr.

SPRAGUE ELECTRIC



An Electronic Giant's Rise, Fall, and Life after Death

John L. Sprague

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/ref=tmm_pap_swatch_0?encoding=UTF8&qid=&sr=

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/dp/B006L7JRLY/ref=dp_kinw_strp_1

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/ref=sr_1_1?crid=20XP2PN006USY&keywords=birth+of+electric+traction+sprague&qid=1641497922&s=books&prefix=birth+of+electric+traction+sprague%2Cstripbooks%2C119&sr=1-1

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-ElectricElectronics-Giants-afterdp/150338781Xref=sr_1_1?crid=HRWR6CMKMOD&keywords=sprague+electric&qid=1641498091&s=books&prefix=sprague+electric%2Cstripbooks%2C147&sr=1-1

IEEE FOUNDATION MARKS A GOLDEN OCCASION

By Karen Kaufman, Senior Manager of Communication, IEEE Foundation

Experts estimate that fewer than five percent of all organizations ever make it to their 50th anniversary. But on 16 February 16, 2023, thanks to its unwavering purpose, strong execution, and generous support, the IEEE Foundation will celebrate five decades of success translating member and donor values into social impact by transforming lives through the power of technology and education.

Established on 16 February, 1973 as the philanthropic partner of IEEE, the IEEE Foundation has represented the intersection of technology and philanthropy, delivering opportunity, innovation and impact across the globe through such monumental initiatives as IEEE Smart Village (ISV), which promotes initiatives and education that empower energy-impoverished communities worldwide, IEEE Women in Engineering (WIE), a 25-year-old global program dedicated to promoting women engineers and scientists, and TryEngineering, which encourages up-and-coming generations to engage in the engineering field by providing educators and students with free resources, lesson plans, and STEM-centered activities.

Among its many other accomplishments, the IEEE Foundation is also extremely proud of its long-standing and successful partnership with the IEEE History Center, which has been committed to preserving, researching and promoting the history of information and electrical technologies for nearly 45 years.

A Strong Partnership

Established in 1979 through the efforts of such advocates as Jim Brittain, Fred Terman, Robert Lucky, and others and further strengthened by the leadership of Robert Friedel, who became the History Center's first director in 1980, the IEEE History Center houses nearly 1,000 technology icons' memories in IEEE Oral Histories, more than 200 IEEE Milestones honoring significant technical achievements worldwide, and more than 5,000 articles on the Engineering and Technology History Wiki. Over four decades later, and currently under the direction of Michael Geselowitz and the History Committee, the History Center continues to preserve the legacy technology, its icons, the engineering profession, and IEEE itself through a wide array of unique and beneficial programming.

Over the years, the IEEE Foundation and IEEE History Center together with generous donors have collaborated on many landmark achievements that will positively impact the field of engineering for generations to come. Among those are the following:

The William and Joyce Middleton Electrical Engineering History Award – Established in 2014 by a gift from the estates of longtime IEEE leader William W. Middleton and his wife Joyce F. Middleton, this award, which carries a prize of US \$2,000, recognizes the author of a book on the history of

“As it celebrates its milestone 50th anniversary this February, the IEEE Foundation looks back on a half-century of outstanding achievement and an enduring partnership with the IEEE History Center.”



an IEEE-related technology published within the previous three years that both exemplifies exceptional scholarship and reaches beyond academic communities towards a broad public audience.

Elizabeth & Emerson Pugh Young Scholar in Residence at the IEEE History Center – The Pugh Young Scholar in Residence internship, created and funded by its namesakes, provides students with the opportunity to conduct research on the history of technology and engineering at the History Center while working full-time for two months on a History Center project connected to his or her own area of interest.

REACH – Launched in December 2016 through the collaborative efforts of IEEE History Center Senior Director Michael Geselowitz and IEEE Foundation Directors Lyle Feisel and John Treichler,

IEEE REACH (reach.ieee.org), which stands for Raising Engineering Awareness Through the Conduit of History aims to bring the history of technology alive for students in the classroom through videos, hands-on-activities, multimedia offerings, and other engaging tools and resources.

IEEE Life Member History Fellowship – created in 1977 as collaboration between the IEEE Life Members and History Committees and funded by the IEEE Life Members Fund of the IEEE Foundation, the IEEE Life Member History Fellowship supports one year of full-time graduate work or one year of post-doctoral research for a scholar who has received their Ph.D. within the past four years in the history of IEEE's designated fields.

Looking Forward

“As the IEEE Foundation prepares to commemorate its landmark 50th anniversary throughout 2023, we recognize the indelible contributions to our longevity and success that have been made by and with the IEEE History Center and celebrate our strong partnership and bright future together,” shared IEEE Foundation Executive Director Karen Galuchie.

With an ongoing focus on taking the History Center to new heights, the IEEE Foundation and IEEE History Center are working to raise \$1 million to support a number of objectives, including increased use of the IEEE Oral History collection as a primary source for museums, authors, documentarians, news outlets, and technical papers, growth of the Center's endowment to reduce reliance on annual activities and budgetary fluctuations, and strengthening of the Center's ability to preserve and promote the history of technology and IEEE. To discuss how you may support these initiatives, contact Eileen R. Heltzer, CFRE at e.heltzer@ieee.org or call 1 732 799 4431. To make a donation online, visit The IEEE History Center page on the recently launched IEEE Foundation Website ieeefoundation.org/impact/illuminate/ieee-history-center

IEEE Foundation



Where technology and philanthropy intersect

Together, we deliver opportunity, innovation and impact across the globe.

As the philanthropic partner of IEEE, we translate the values of our members and donors into social impact. In collaboration with IEEE, we connect more than 200 member-led initiatives with financing, expertise and philanthropic guidance. Help advance the IEEE mission with a donation.

Funds and Programs:

- IEEE PES Scholarship Plus Initiative
- IEEE History Center and REACH
- EPICS in IEEE
- IEEE Smart Village
- And many more!

Join Us!

To find your program, visit ieeefoundation.org/what-to-support

To make a donation, visit ieeefoundation.org/donate



Illuminate



Educate



Engage



Energize

ieeefoundation.org

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 <https://www.ieee.org/about/history-center/index.html> and more about the Engineering & Technology History Wiki (www.ethw.org)



IEEE History Center
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Piscataway, NJ 08854

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activities by clicking on
https://www.ieeefoundation.org/donate_history
and choosing "**IEEE History Center Fund**"
at the "**Designation**" box.