

IEEE History Center

ISSUE 108, November 2018



IEEE Volunteers are active all over the world in preserving history. See inside for profiles. Here, the speakers at the dedication of the French Transatlantic Telegraph Cable Milestone dedication gather in front of the French and English language plaques at Orleans, Massachusetts.

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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 (March) and twice electronically (July and November) by the IEEE History Center.

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By Michael N. Geselowitz, Senior Director,
IEEE History Center

In keeping with the evolving format of our newsletter, and on the occasion of my receiving the IEEE Eric Herz Outstanding Staff Member Award, IEEE History Center Research Coordinator and Newsletter Editor Robert Colburn has asked to interview me for our new "History Center in Action" series (see page 7).

Thus, instead of my usual column, I will use this space to thank you once again, as

we near the end of this year, for your outstanding and generous support of our efforts to preserve, research and promote the history of IEEE, its members, your professions and industries, and the related technologies. Best wishes to you and your families in the coming year for health, happiness, and success.

2019 will mark the 50th anniversary of the Moon Landings. See page 11 for more information about History Center plans to celebrate this achievement,

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/Oral-History/List_of_all_Oral_Histories

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: 500-1200 words. Submit to ieee-history@ieee.org. Articles and letters to the editor may be edited for style or length.

THE IEEE HISTORY CENTER NEWSLETTER ADVERTISING RATES

The newsletter of the IEEE History Center is published three times per annum; one issue (March) in paper, the other two (July and November) electronically. The circulation of the paper issue is 4,800; the circulation of the electronic issues is 57,000. The newsletter reaches engineers, retired engineers, researchers, historians, archivists, and curators interested in the history of electrical, electronics, and computing engineering, and the history of related technologies.

Cost Per Issue

Quarter Page	\$150
Half Page	\$200
Full Page	\$250

Please submit **camera-ready** copy via mail or email attachment to ieee-history@ieee.org. Deadlines for receipt of ad copy are 2 February, 2 June, and 2 October. For more information, contact Robert Colburn at r.colburn@ieee.org.

HISTORY COMMITTEE CHAIR'S COLUMN

By Robert Dent



The second and final meeting of IEEE History Committee occurred on 14 October 2018 in Saint Louis, MO, U.S.A. The History Committee met at the same location as the Society of the History of Technology (SHOT). This is intentional because of our mutual interests in history and technology. Also, many of the History Committee members and staff are also members of SHOT. These meetings

are a great opportunity for an interaction between the members of SHOT and the IEEE. There was a session chaired by History Center Senior Director Michael Geselowitz on Friday afternoon, 12 October 2018. Presentations were written and made by members of the History Committee and the staff of the History Center.

At the IEEE History Committee meeting, there were reviews of milestone proposals for approval to the IEEE Board of Directors, Middleton book prize discussion, the continuing history book project, and a strategic planning discussion.

IEEE VOLUNTEERS ARE ACTIVELY PRESERVING HISTORY

In this issue, we profile three very active IEEE Organizational Units, and learn how they preserve and promote the heritage of the profession.

INTERVIEW WITH KIT AUGUST ON THE WAYS THE NEW JERSEY COAST SECTION IS BRINGING HISTORY ALIVE

History Center Newsletter: Your section has recently enjoyed an increase in historical activities. Tell us about some of the projects you have undertaken to celebrate your section's heritage.

August: I'm so happy you asked. It is fabulous to have been introduced to you and everybody at the IEEE History Group at Stevens Institute of Technology, keepers of the history, and to have your expertise and help in the efforts to understand and document the History of our Section.

I cannot thank you all enough. History happens all around us and we, often unwittingly, participate. We learned about History timelines from our school days, and memorized important dates and events – 1066 and all that. But we are living in a new era: an era where the network is the dominant model of the day. The professional workplace is changing as large companies are replaced by smaller, and cradle-to-grave jobs by gig economy. Our heritage in IEEE and in this section is integrally linked to this



new view of the world which has evolved from a simpler timeline, to a powerful network model.

We noticed dwindling membership of five percent per year, shifts in chapter and society popularity, emerging fields underrepresented and an increasing sense of urgency. Engaging everyone in participating is key, because IEEE membership and harnessing the resources will ensure our professional network remains strong. We are creating history and having the opportunity to tell our own story is powerful. Recording

and then sharing our history can be energizing for ourselves, inspirational to others, and transformational for the future. Reviewing the history of our section helps us understand the Membership and plan more compelling activities that will appeal to, and serve the membership.

HCN: What advice do you have for other IEEE organizational

Continued on Page 4

SUBSCRIPTION INFORMATION

The IEEE History Center newsletter is available free to all persons interested in technological history – whether engineers, scholars, researchers, hobbyists, or interested members of the public. It is published in hard copy in March, and in electronic form in July and November of each year.

To subscribe to the IEEE History Center's free newsletter, please send your name, postal mailing address, e-mail address (optional if you wish to receive the electronic versions), and IEEE member number

(if applicable – non-members are encouraged to subscribe as well) to ieee-history@ieee.org

Current and past issues of the newsletter can be accessed at www.ieee.org/about/history_center/newsletters.html

The IEEE History Center is a non-profit organization which relies on your support to preserve, research, and promote the legacy of electrical engineering and computing. To support the Center's projects, such as the Engineering & Technology History Wiki, Milestones, and Oral History Collection, please click on www.ieeefoundation.org/donate_history

units about how they can become active in their own history?"

August: As we began to investigate the history of our section, and formulate a plan -- we encountered some stumbling blocks. There was scarce information available since an anniversary celebration document that was created in 1984. Most information was scattered among notices of Milestones, Awards, Oral Histories, and other content, not easily connected with our section. Connecting the content is a highly manual task. We noticed uneven acknowledgement of very famous people for example, Karl Jansky the father of radio astronomy, who lived in our section and who died at an early age leaving a tremendous legacy, yet with little recognition on our section history site.

What story will we leave behind? We realized quickly that there is a potential for many stories to be lost to time, and they might not be easily recovered. So we set out to plan several methods to investigate and celebrate our section history and involve as many people in the process as possible.

HCN: What events involving your section history would you like other IEEE volunteers to know about?

August: Our section began this new year by putting forward a proposal to the IEEE History Committee to recognize a Milestone: Project DIANA, to commemorate the 1945-1946 Detection of Radar Signals Reflected from the Moon. I put my toe in the water of IEEE history. On 10 January 1946, a team of military and civilian personnel at Camp Evans, Fort Monmouth, New Jersey, U.S.A., reflected the first radar signals off the Moon using a specially modified SCR-270/1 radar. The signals took 2.5 seconds to travel to the Moon and back to the Earth. This Project DIANA achievement marked the beginning of radar astronomy and the space age right here in the New Jersey Coast Section.

We were making our plans to celebrate the DIANA Milestone, which will take place at InfoAge at Camp Evans, Wall, New Jersey, when we learned NOKIA Bell Labs' Marcus Weldon announced they have been selected as the exclusive technology partner for the upcoming Vodafone Mission to the Moon Project responsible for designing, developing and managing the first LTE network on the Moon. Very cool. It's a great time to be hooked on History. We hope people will be as enthusiastic as we are about the IEEE Milestone for Project DIANA and will come out for the celebration. It will be a great event to celebrate the History of the New Jersey Coast Section.

HCN: Were there any special history topics you noticed that needed more attention in your section?

August: There are many topics to consider. We noticed the section has fewer recent graduates joining, and we must

"What story will we leave behind? We realized quickly that there is a potential for many stories to be lost to time, and they might not be easily recovered. So we set out to plan several methods to investigate and celebrate our Section History and involve as many people in the process as possible."

engage them. Also, we noticed gender disparity among engineers in our section. With 1124 members, 98 are women (assuming 14 unspecified members to be female) representing 8.72 percent, 5 women IEEE Fellows compared with 69 men (6.76 percent women to 93.24 percent men IEEE Fellows), and Fellows by gender 5.1 percent women and 6.7 percent men, and in addition, little is noted about the history

of women in engineering. This makes us wonder what the women have been up to; I have been in this section since 1991, and with all the outreach and various programs, I would have hoped there would be a better story about women in engineering by now. We are determined to investigate this history and report. Together with the IEEE History team, we will begin with a history inquiry into the women of Bell Labs.

HCN: What projects did you consider to explore the section's history and serve the membership?

August: We saw many possibilities that will engage members of all ages and experiences and leave a lasting legacy. To serve membership and the community, to reinvent and foster lifelong learning, we prepared a PACE project, and some additional associated grant proposals. We will hold meetings, planning sessions, and prepare online resources for a project that brings together experienced engineers, students, and community members to improve technology for those with hearing loss. Many members of the section have experience at Bell Labs, and related companies. Bell Labs history, and of Alexander Graham Bell includes his innovations in communications and as a teacher of the deaf. As part of this effort, we will explore and document the history of members of the section, technologies of communications, as well as technologies that improved hearing and speech and their social implications.

We are extending the project to include students at Stevens Institute of Technology who will have a Senior Design Project in collaboration with our efforts. And we have involved the Mock Trial Team of Nyack High School in Rockland County to assist in creating a realistic environment in a court room, where people with hearing loss and deafness might have difficulties in communication. We are networking with Gallaudet University, Harvard Law School, and others. We hope to extend the efforts to reduce disparity for those with hearing loss in our project, 'Hear, ye!' Again, IEEE History experts are on the team and will help us present the technology and social history of our section through this view. We are very excited about this project.

HCN: As your historical activities have gotten rolling, what are some of the benefits you have seen for your organizational unit?

August: Technology has a special kind of history. As time passes, it is possible to perceive changes – or rather, transformations – not only in the nature of the work of engineers, and the technologies that are available, but also in the way things are understood and done. For the first time in history, experienced people can learn meaningful things from less experienced people as vice versa. People in the community are more involved. The humanities play a growing role in the profession, and this in turn inspires the way people think, and informs the process.

We established new interactive technical meetings, ‘Dinner and a Movie’, and ‘Meet and Greet Distinguished Lecturer’ where everybody participates, instead of classroom-style lectures. We feature a technical discussion, networking, a social aspect, and food attracting people who hadn’t attended a meeting in years, or had let memberships lapse, but are now becoming involved again. Meetings were well attended and generated great feedback. We repurposed online IEEE technical videos available on the Vehicular Technology Society website about intelligent vehicles, and a moderator invited everyone to position themselves as an advocate or critic of the technologies presented. We had enthusiastic attendance, lively participation, and great feedback.

HCN: What resources did you find to be important when forming a plan to update your section activities for history?

August: IEEE has a fabulous collection of Oral Histories online; we plan to link to our Member related content to our section history page on the Engineering & Technology History Wiki

https://ethw.org/IEEE_New_Jersey_Coast_Section_History and we have begun adding to that content by recording participation in many section events.

Contemporary lifestyle is characterized by the ability to use digital resources. Online education and social media competes for limited time. Whereas in the past our section might have attracted large audiences for technical events, we now compete with YouTube. The very technologies and methods we invented over the history of IEEE appear to be bringing about transformation, challenging how we ourselves fit in, work, and engage our membership, and remain relevant. Yet at the same time, it is our IEEE membership that will be positioned to play a more important role— the constant over time for professional dialog and networking. And when we are older, with the community and network of IEEE membership, we are not put out to pasture. In this organization, we are engaged as engineers always, which is deeply rewarding.

Engineering is a bridge for people, is transformational for societies and provides a vision for the future. We will not return to the ways of the past because newer paradigms have transformed the world. As I catch momentary glimpses of the dinosaur in the mirror, I am inspired to learn more.

Being part of IEEE and the story of engineering gives us each an opportunity to be part of something bigger than ourselves. Without our History, it is difficult to create a vision of our direction.

CONTINUITY, AND SUPPORT FROM ACADEMIA: CRUCIAL PILLARS FOR HISTORY

The IEEE United Kingdom and Republic of Ireland Section is one of the most active IEEE Sections in the field of history and preserving the heritage of IEEE professions. Former UKRI Section Chair and long-time volunteer Tony Davies shares some of the section’s secrets to success.

History Center Newsletter: The UKRI Section has always been very successful in historical activities, especially proposing and dedicating milestones. What are some of the ways the Section encourages its members to become active in history?

Davies: One reason may be that the section kept the same active volunteers in prominent positions for a very long time. While we have regular elections and changes in the top leaders (Section Chair, etc.) the people involved have stayed around at the senior section level for a very long time. Key positions such as Secretary and Treasurer were unchanged for many years and provided important continuity. Out of this story, it seems to me that one strong message is ‘continuity’ - e.g. the captain of the

ship changes regularly but the voyage continues on the same course.

HCN: What advice do you have for other IEEE organizational units about how they can become active in their own history?

Davies: It is not only because we have a lot of history; other sections are also rich in heritage. In the UK and Ireland case, the Life Members Affinity Group people are the main driving force with History Milestones. Having good and long-standing personal contacts with the people in the Institution of Engineering and Technology History and Archives areas is helpful. In the past IEE (now IET) was very interested in and supportive of historical matters, and does have a substantial archive of documents and objects.

A secondary message is that in the past, UK academics had plenty of time to devote to ‘volunteer activity’ and this was encouraged generally by senior academics. Senior academics encouraged and expected junior academics to be members of,

and involved in, professional institutions such as IEE, IEEE, etc., and the same was true in industry. The institution committees were often populated and led by senior industry people, and they strongly encouraged and expected their junior staff to be involved too.

HCN: In addition to the Milestones we have covered in other newsletter issues, what are some of the history activities the UKRI Section focuses on?

Davies: HISTELCON 2019 is planned for Glasgow in September 2019. There is an informal policy to try to have it in various

places in the Section, rather than always in London. There is also with the need to find free or low cost places to meet. I proposed that they should hold it in Glasgow, and after some 'negotiation' could also obtain the offer of a free meeting room there - so it is going ahead on 1st November this year in Glasgow. Being in Scotland made sense, because recent meetings have been in Ireland, Birmingham, Wales - so it was easy to persuade the present leadership of the Section (which is some quite new and younger people) that Glasgow was a good possibility and affordable.

ACTIVITIES OF IEEE JAPAN COUNCIL HISTORY COMMITTEE

By Isao Shirakawa, IEEE Japan Council History Committee Chair

The IEEE *Japan Council History Committee* (JCHC) was established in 2006, and started its activities to promote the evaluation for the history of Japanese technology in electrical, electronic, communication, and computing engineering in cooperation with the IEEE History Center; to encourage each IEEE Section/Chapter in Japan not only to search for those achievements worthy of the IEEE Milestones, which were accomplished within its area no less than twenty-five years ago, but also to promote nominations of candidates for the IEEE Milestones; and to preserve the record of the past IEEE Milestones approved in Japan so as to enhance the awareness of the IEEE Milestones Program.

The JCHC progressed greatly under the leadership of Eiichi Ohno (Chair) and Eiju Matsumoto (Secretary) from 2006 through 2012, and since then it has been run by Isao Shirakawa (Chair), Kazunori Shimamura (Vice Chair), and Miki Yamamoto (Secretary). Each of the nine sections in Japan sends a representative, and the venue for the committee meeting, which is accompanied by a historical excursion, rotates annually among all the sections. Hence the JCHC has become able to clarify objective two stated above so that it can explicitly require each Section to look for such achievements as attained within its area suitable for proposing as an IEEE Milestone. Each section has been engaged competitively in proposing candidates for IEEE Milestones. The total of IEEE Milestones approved in Japan has increased from seventeen to thirty-four since 2013.

It should be added here that the JCHC hosted the IEEE *HISTELCON* (HISTory of ELECTRO-technology CONFERENCE), the 5th in its series, on 7-9 August 2017 at the University of Hyogo, Kobe, Japan. Although HISTELCON is a flagship conference of the IEEE Region 8, this time the JCHC was asked to host it in 2017. Actually, the HISTELCON 2017 was organized into two parallel Sessions, Technical Program and Poster Presentation. As for the former, thirty-two technical papers were presented in ten sessions, featuring the historic expertise of those technological achievements which might be possible candidates for the

future IEEE Milestones (papers by country; Japan: 20, U.S.A.:5, Russia: 2, Hungary: 1, Israel: 1, Korea: 1, Malaysia: 1, Serbia: 1). <http://www.ieee-jp.org/section/kansai/histelcon2017/program/technical/Histelcon%202017%20Technical%20Program%20Draft.html>

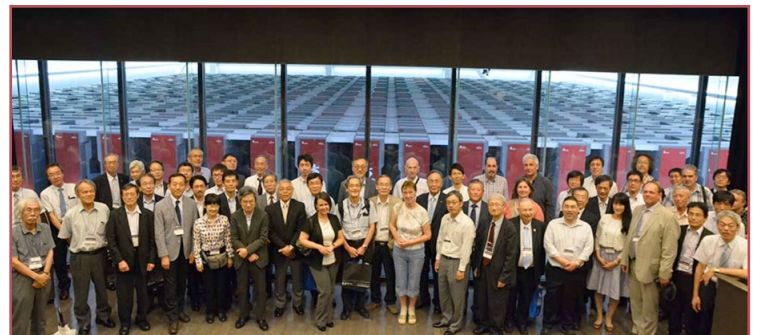
As for the latter, twenty-three posters were presented, mainly on the subject of those technological/industrial achievements which were approved as the IEEE Milestones in Japan.

http://www.ieee-jp.org/section/kansai/histelcon2017/program/technical/image/exhibition_list_all-2.pdf.

One hundred and thirty people attended from Japan, U.S.A., Korea, Russia, Australia, Hungary, Israel, Malaysia, and Serbia.



A scene of the poster session at HISTELCON 2017



Participants of the conference excursion of HISTELCON 2017 at RIKEN's K-SuperComputer Center

IEEE HISTORY CENTER DIRECTOR MICHAEL N. GESELOWITZ IS THE WINNER OF THE 2018 IEEE ERIC HERZ OUTSTANDING STAFF MEMBER AWARD

IEEE History Center Senior Director Michael N. Geselowitz is the winner of the 2018 IEEE Eric Herz Outstanding Staff Member Award. We took the opportunity to interview him in the IEEE History center offices at the Stevens Institute of Technology in Hoboken, NJ, U.S.A., to get his perspective on the importance of IEEE's historical activities.

HCN: You have just been awarded the IEEE Eric Herz Outstanding Staff Member Award. Could you explain that award briefly?

Geselowitz: The IEEE Eric Herz Outstanding Staff Member Award is awarded annually since 2005 by the IEEE Board of Directors to an IEEE staff member of at least 10 years tenure for her or his impact on success of a number of IEEE initiatives and on furthering the goals and objectives of IEEE.

HCN: What are some of the high points of your IEEE activities that you believe might have caught the eye of the Herz Award Committee?

Geselowitz: Before I answer that, let me make three points. First, everything that I have done has been a group effort. I have been fortunate to be able to surround myself with a top-notch team, and we get to work with outstanding staff from across the IEEE organization. Second, IEEE is a volunteer-led membership association, and it is the volunteer-staff partnership that gives it its amazing strength. I have been blessed to be able to work with outstanding volunteers over the years at all levels. First and foremost among these are the chairs and members of the IEEE History Committee. Finally, I am particularly honored and humbled that the Award is named after Eric Herz, whom many readers of the Newsletter will remember. Eric's long and illustrious career as both a volunteer and staff member of IEEE exemplified everything great about IEEE. As the General Manager (as the Executive Director was then known) Eric was crucial to the founding of the IEEE History Center. He was also on the search committee that brought me to IEEE in 1997, and was a mentor and facilitator of my accomplishments.

HCN: So, again, what are those key accomplishments?

Geselowitz: First, I would say our web presence. Soon after I came on board, we launched the IEEE Virtual Museum, IEEE's first dedicated history site online. The Virtual Museum evolved into the IEEE Global History Network, the first wiki site of any IEEE Organization. A wiki lets the members participate in the preservation of their own heritage. The Global History Network so successful that we were approached by history operations of some of the other "Founder Societies" asking to join us on the

site. A grant from the United Engineering Foundation enabled us to do just that, and the Engineering & Technology Wiki was born. There is now a single point of entry for the public for the history of engineering and related fields, and it has been a huge success in terms of content and traffic. I should note that each incarnation of the website received numerous external accolades.

For the second of our successful programs, I would mention IEEE REACH (Raising Engineering Awareness through the Conduit of History). The IEEE Foundation has been reorganizing the past few years. They are running their first ever major campaign, and they approached the History Center about developing a new history program that would resonate with donors. We decided to develop a pre-university program, an area where we always could do more. The dedicated REACH site—which also received an external award, from the British Society for the History of Science for public engagement—only launched two years ago, and is already a success [editor's note—there is a REACH update on page 8].

Third, I would say the IEEE Milestones Program. Working with the History Committee and with Research Coordinator Robert Colburn, who administers the Program for the Committee, we have built it up to where it is probably our most visible activity both within and outside of IEEE. The Milestones program started in 1984. When I arrived at IEEE, there only 27 Milestones in eight regions, and four of those had been grandfathered in from joint designations with other society programs predating ours. The first in Region 10 had been dedicated two years earlier, and that had been the last dedication. The time range covered was 1861 to 1962, and the fields of interest were almost entirely communication and power. Today there are 192 dedicated Milestones spanning 1751 to 1989, from all ten IEEE Regions with representative achievements from across IEEE's fields of interest. In fact, our readers should keep their eyes open, because the 200th IEEE Milestone will almost certainly be dedicated in 2019!

Finally—this is more of an operational issue—I am proud of our move to Stevens Institute of Technology. The History Center was founded in 1980, but, in 1990, a decision was made to house it at a university that would become a strategic partner. The original home was Rutgers, the State University of New Jersey. Rutgers is a fine university with a fine History Department, but over the years their focus drifted away from the history of technology, while our programs evolved in new directions as outlined above. Consulting with the History committee, we decided to seek a new partner. After a great deal of research, exploration, and discussion, I was able to bring the History Center to Stevens in 2014. So far, the partnership has exceeded even my high expectations.

HCN: In what way do you see these history activities of the Center contributing to IEEE's broader mission of fostering an innovative future?

Geselowitz: Well, of course, there are any number of old philosophical sayings about needing to know where one was to know where one is and where one is going...and as a professional historian, I of course subscribe to those! More immediately, however, history of engineering is a critical contributor to technological literacy. We live in an increasingly technologically based society, yet many people are unaware of the basics of where technology comes from and how it interfaces with society. History is a great and engaging way to tell that story, so that people can become better citizens of a technological world. Moreover, if the story

excites a few additional young people to pursue technological careers, all the better.

HCN: That is great. Finally, I would like to ask, given your past achievements, what are your vision and goals for the History Center going forward?

Geselowitz: As I said at the top, what makes IEEE so great is the volunteer-staff partnership. It turns out that right now the staff of the History Center are involved with the History Committee in undertaking some intensive strategic planning. We should be able to report some progress in the March 2019 issue of this newsletter. So, I urge our readers to continue to follow our activities next year and beyond. It is my strong belief that the best is yet to come!

MAGOUN HONORED BY IEEE REGION I

Outreach historian Alex Magoun was surprised and humbled to learn that the IEEE Region I Board of Governors selected him in September to receive the 2018 IEEE Region 1 Enhancement of the IEEE or Engineering Profession's Image with the Public Award. Nominated by Princeton/Central Jersey Section chair Francis O'Connell, Magoun was recognized for "creating a space and maintaining the history of the Princeton/Central Jersey Section that allows the public to view important inven-

tions created by electrical engineers." This refers to the revival of the David Sarnoff Library as a museum for the history of RCA and its laboratories, and the successful transfer of the museum to The College of New Jersey, where the Sarnoff Collection (<https://davidsarnoff.tcnj.edu/>) can be visited on Sunday and Wednesday afternoons. Magoun looks forward to continuing to enhance the image of IEEE members and their predecessors through promotions of their historic work.

REACH MEETS THE NEEDS OF TWO PRE-UNIVERSITY DISCIPLINES, SOCIAL STUDIES AND STEM

By Kelly McKenna, IEEE REACH Program Manager

As mentioned in previous newsletters, the IEEE REACH Program was designed for pre-university Social Studies teachers as a free Online Education Resource (OER) that brings to life the history of technology in its social context. Every student is required to take history, and now that REACH is available to Social Studies teachers, all students have an enhanced opportunity to further develop technological literacy skills, including those students who may not otherwise be exposed to the "T" and the "E" in STEM (Science, Technology, Engineering, Math). The REACH Program, however, also has a great deal to contribute to pre-university STEM education.

REACH bridges Social Studies with STEM by highlighting the history of technology and the impact that science and technology have had on politics, economics, culture, and society and the influences in return that social factors have on science and technology. The Program meets the C3 (College, Career, and Civics) Framework for Social Studies standards promoted by the National Council for the Social Studies (NCSS), and focuses on the Social Studies' theme "Science, Technology and Society". Owing to the lack of other resources in this

important area, the program has gained significant traction. Since its inception, REACH has captured its target audience of pre-university Social Studies teachers and students. Currently the program has more than 500 subscribers. and the numbers continue to grow.

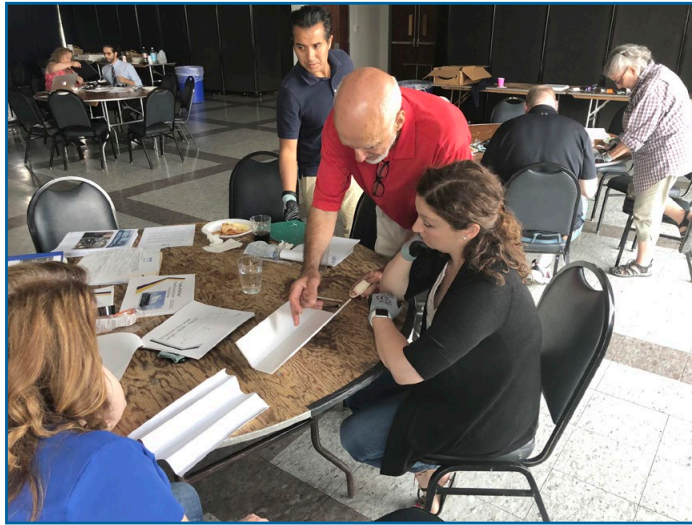
The history of technology in its social context, however, is not only part of K-12 Social Studies standards. It is also included in the Next Generation Science Standards (NGSS) supported by the National Academies of Sciences, Engineering, and Medicine. NGSS provides a detailed description of the key scientific ideas and practices that all students should learn by the time they graduate from high school, and highlights "Links Among Engineering, Technology, Science and Society" as a core idea. Core ideas in NGSS are defined as having the power to focus K-12 curriculum on the most important aspects of science. In addition, according to the International Technology and Engineering Education Association's (ITEEA) Standards for Technological Literacy, "a technologically literate person, is a person who understands, in increasingly sophisticated ways that evolve over time, what technology is, how it is created, and how it shapes society, and in turn is shaped by society." The resources found in the IEEE REACH program directly address

skills needed for students to be technologically literate.

NGSS states that, by the end of 12th grade, students should “come to appreciate that science and the current scientific understanding of the world are the result of many hundreds of years of creative human endeavor.” The IEEE REACH resources specifically focus on this concept. Each REACH inquiry unit, or lesson plan, focuses on one of nine areas of human endeavor, as defined by the social studies standards: Agriculture; Manufacturing; Materials and Structures; Energy; Communication; Transportation; Information Processing; Medicine and Healthcare; and Warfare. NGSS further states “any [science] education that focuses predominantly on the detailed products of scientific labor—the facts of science—without developing an understanding of how those facts were established or that ignores the many important applications of science in the world misrepresents science and marginalizes the importance of engineering.” IEEE REACH combats this potential misrepresentation and potential marginalization of the engineering profession by providing all teachers and students with the tools needed to understand the importance of the applications of science in the world. Where science education traditionally has provided the “how,” REACH provides the “why,” as well as the “when and where.” Through a history perspective, REACH highlights how, over time, science and engineering have affected society and how, in return, society has affected science and engineering, directly addressing both the NGSS standards and the ITEEA technological literacy standards.

Both the *C3 Framework* and the *Next Generation Science Standards: For States, By States* were released in 2013, so the implementation of curriculum based on these standards is still developing within both disciplines. IEEE REACH is perfectly positioned to assist teachers in both disciplines, to incorporate the links between society and engineering in the pre-university classroom.

We continue to market REACH to Social Studies teachers, which is our target audience. In April, we presented the program at the National Council for History Educators’ (NCHE) national conference, where it received a tremendous positive response. As Katerina Karis, a middle school History teacher, shared, “I completely hit the jackpot when I stumbled into this workshop! As a History teacher, I’ve felt completely left out of the STEM movement and this brought it home for me. I



Teachers making ship models listen intently to design advice provided by IEEE volunteer, Dr. John Vardalas, as part of the REACH teachers’ professional development practicum, A Hands-On Workshop Investigating the Greek Trireme and Its Impact on Democracy and Empire.

can’t wait to incorporate these resources into our curriculum.” In July, we presented a teachers’ professional development workshop (PDW) in a Title One school district in Georgia, and in August, in conjunction with the National Council for the Social Studies (NCSS), we implemented a teachers’ PDW at the Stevens Institute of Technology in New Jersey, where teachers participated in a boat-making hands-on activity and walked away with a game plan to implement the REACH resources in their classroom. In addition, we will be exhibiting at the NCSS national conference in November and we continue to work with state departments of edu-

cation’s social studies specialists and county administrators.

Recognizing NGSS’s predominate emergence and how REACH addresses an often-missing link in the standards, we are making initial efforts to promote REACH in the STEM space. We have submitted proposals to participate in both the Massachusetts STEM Summit in Worcester in November and the ITEEA’s 2019 annual conference taking place in Kansas City, Missouri in February, 2019. I am pleased to announce that we have been accepted to be included in the Massachusetts STEM Summit, which is organized collaboratively by the Massachusetts Business Roundtable, the Massachusetts STEM Advisory Council, and the UMass Donahue Institute. Notifications for ITEEA’s 2019 conference are scheduled for November 2018.

The REACH resources meet the needs of educators in both Social Studies and STEM. The interdisciplinary nature of the program is exciting for teachers, as Melanie Kirchof, a high school Social Studies teacher in Austin, Texas, who attended the NCHE REACH presentation exclaimed, “One of my favorite parts of history is the development of technology and its impact on society. Finding out that there is a free resource available to teachers has been the highlight of the NCHE 2018 conference. I can’t wait to share this resource with other teachers, both Social Studies and STEM!”

We welcome the involvement of supporters of the IEEE History Center to continue to help grow and sustain the REACH program. If you have not done so already, be sure to check out the IEEE REACH program at <http://reach.ieee.org>. Be sure to share it with teachers you know. In addition, any financial contributions to the program are greatly appreciated. Visit https://www.ieeefoundation.org/support_REACH to donate.

THOMAS PETERSON TECHNICAL JOURNAL COLLECTION DONATED TO HISTORY CENTER

The IEEE History Center wishes to thank Thomas F. Peterson, Jr. for the donation of a vast collection of technical and scientific journals from his personal research library. These journals, including the *Journal of the Franklin Institute*, the *Electrical Review*, the *Electrician*, *Radio News*, and the *Philosophical Magazine* will allow the History Center to expand its research library.

During the past year, Mary Ann Hellrigel worked with Tom Peterson to ensure the safe transfer of this very generous and much appreciated donation. The books arrived at the Center's office in Hoboken on 26 September 2018. Many people may know Tom Peterson from his many years of volunteer work, his leadership at the Radio Club of America, and as founder of Motion Picture Sound Inc., a firm that produced sophisticated audio for movies and television. His current research projects focus on magnetism and medical advancements for the treatment of multiple sclerosis.

Once again, the History Center wishes to say, THANK YOU, Tom Peterson.



SOCIETY'S ADAPTATION TO THE INDUSTRIAL AGE

During the fall 2018 semester, Mary Ann Hellrigel, Archivist and Institutional Historian at the IEEE History Center, is teaching a course, *Industrial America, 1877 – 1939*, at our partner institution, Stevens Institute of Technology. Twenty-two students are examining the invention and commercial development of new technologies, society's adaptation to the industrial age, and the transformation of how people lived, worked, and played. They are studying aspects of industrialization including the creation of the electric light and power industry, electrical manufacturing, new organizations and institutions, (such as the AIEE and IRE), and a new profession—electrical engineering. They are also exploring the invention of the research and development laboratory, the modern factory and moving assembly line, and large-scale agriculture. They also have the opportunity to think about the adoption of new technologies, including the incandescent lamp, motion pictures, automobile, radio, manufactured consumer goods, and let's not forget indoor plumbing and hot and cold running water systems.

TUESDAY, SEPTEMBER 17, 1912.

**Electric Light Protects
Better Than Firearms**

A REVOLVER in the hands of a novice gives very little protection at any time—it is particularly ineffective against a burglar at night. Any attempt to use it except for giving an alarm is dangerous, because it exposes you to the return fire of the intruder who may be a "good shot" and "quicker on the draw."

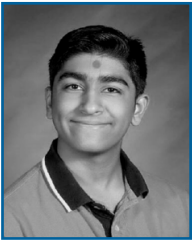
Electric light is safer—you can turn it on without exposing yourself. By merely touching a switch conveniently located near the head of your bed you can instantly flood the house with brilliant light. No burglar ever lived who would dare to remain either in the house or its vicinity exposed to the searching rays of electric light.

Let us wire your house for electric convenience and electric protection. We will do the work at moderate cost payable on easy terms.

Harrisburg Light and Power Co.

A 1912 advertisement by the Harrisburg Light and Power Co. shows just one of the ways society adapted to industrialization

KUSH PATEL IS 2018-2019 RESEARCH ASSISTANT



Kush Patel is a Freshman Quantitative Finance major at Stevens Institute of Technology from Ridgewood, New Jersey. He attended Bergen Technical High School from 2014 to 2018, and majored in Computer Science. One of his most rewarding experiences was working at C9 Concepts, a political firm,

during the recent New Jersey gubernatorial election. During his time at the firm, Kush was able to come in contact with various politicians, such as Phil Murphy and Bill Clinton. At Stevens Kush is a member of the Photography Club and the Indian Undergraduate Association. Always having had a passion for history, Kush is eagerly looking forward to working at the IEEE History Center, and is grateful for this opportunity.

THINGS TO SEE AND DO

2019 ANNIVERSARY OF MOON LANDINGS



An Apollo Project Saturn V rocket being built in 1967

20 June 2019 will be the 50th anniversary of the landing of humans on the moon.

The IEEE History Center is interested in hearing from members who worked on any aspect of the Apollo project. We would be especially interested in your experience either as a First-Hand History on the Engineering & Technology History Wiki or as a Topic Article on aspects of the technology you worked with.

The ETHW enables members to record their involvement in technological innovation. Through these First-hand Histories, the ETHW invites and encourages members to share their experiences in developing products and services -- from invention, R&D, design, testing, production and commercialization -- with the world. Ideally these recollections will also include the broader range of experiences that led to members' successes as professionals, including their inspirations, educations, and affiliations. Because of the wiki functionality, the ETHW also enables individuals to contribute their experiences as contributors to a

collective First-hand History of a group, such as an R&D lab or design team within a university or corporation.

IEEE has dedicated several milestones recognizing achievements that were part of the Lunar landings.

The Canaveral section dedicated a Milestone in 2001 for "Electronic Technology in Space Rocket Launches, 1950-1969, The Boston Section dedicated the Apollo Guidance Computer https://ethw.org/Milestones:Apollo_Guidance_Computer,_1962-1972 and the Long Island Section dedicated the Lunar Module https://ethw.org/Milestones:Grumman_Lunar_Module,_1962-1972 as IEEE Milestones. In addition, as a forebear to the Apollo project, the Mercury Spacecraft https://ethw.org/Milestones:Mercury_Spacecraft_MA-6,_1962 is also an IEEE Milestone.

The History Center especially encourages the submission of milestone proposals related to the Lunar program. Guidelines for proposing a milestone can be found at: http://ieemilestones.ethw.org/Milestone_Guidelines_and_How_to_Propose_a_Milestone Because of the long lead time for approval of proposals, in order to hold a dedication in 2019, we recommend proposals be submitted as soon as possible.

HISTELCON 2019

HISTELCON is an IEEE Region 8 conference covering topics in the area of Technology History.

HISTELCON 2019 will be 18th-19th September 2019 at the Technology and Innovation Centre, Strathclyde University, Glasgow, Scotland. The primary theme is 'historic computers' with an aim to include papers on those inventions and developments which have not already been the subject of extensive historical publications, and to include the contribution special purpose processors have made to the development and use of advanced digital signal processing methods in many applications areas. Sessions to cover other aspects of technology history in the electrical, electronic and related fields will also be provided for. In accordance with the traditions of previous

HISTELCONs, the conference will include invited keynote lectures as well as submitted, reviewed contributions.

Among the computer topics which might be included are, for examples, the history of the F100L and the Viper microprocessor, the Mascot real-time software design method, the Transputer, the ARM computer designs, and the impact of digital signal processing microprocessors including the TMS 320 for the implementation of very sophisticated signal processing algorithms.

The aim will be to keep the conference affordable, with reduced registration fees for IEEE members and students and members of co-sponsoring organisations.

<https://www.ieee-ukandireland.org/category/news/histelcon.2019/>

TECH HISTORY ON THE WEB – RECENT STAFF FAVORITES

A selection of sites which IEEE History Center staff have come across in the course of their work, and which might be of interest to our readers.

Tedium. (The Dull Side of the Internet) <https://tedium.co/>. Twice a week, Ernie Smith writes up his online research on a variety of arcane subjects involving U.S. technologies, popular culture, and business, largely from 1980-2000. He presents his meandering stories with casual style and a thoughtful conclusion as food for further thought, or research.

“Harvard’s 1983 Experiment with Coin-Operated Word Processors,” www.insidehighered.com/blogs/technology-and-learning/harvard%E2%80%99s-1983-experiment-coin-operated-word-processors. Thirty-five years ago, Harvard and other U.S. universities and colleges began installing coin-oper-

ated word processors for students who could not afford their own—with mixed results as the Comments section indicates.

“BINAC—A Brief Look Back,” <https://youtu.be/udJUWenPK4w/>. Produced by the Computer History Archives Project, this twelve-minute documentary uses access to obscure film, photos, and documents to tell the story of John Mauchly and Presper Eckert’s first commercial stored-program digital computer, and its manual, sold in 1949 to Northrop Corporation.

“US Navy Radio Communications—1950s & 1960s,” www.navy-radio.com. An expansive site maintained and regularly updated by Nick England K4NYW that covers much more than its title indicates. Despite the URL, this is a non-profit hobby project featuring thousands of photos and PDF documents related to historical U.S. Navy radio communications.

IEEE HISTORY CENTER PROGRAMS
OF SUPPORT FOR SCHOLARSFELLOWSHIP AND INTERNSHIP SUPPORT FROM THE
IEEE HISTORY CENTER

The IEEE History Center offers two programs of support annually for scholars pursuing the history of electrical engineering and computing: an internship for an advanced undergraduate, graduate student, or recent Ph.D., and a dissertation fellowship for an advanced graduate student or recent Ph.D. The internship and the dissertation fellowship are funded by the IEEE Life Members Committee. The internship requires residence at the IEEE History Center, on the campus of Stevens Institute of Technology in Hoboken, New Jersey, USA; there is no residency requirement for the dissertation fellowship.

The IEEE Life Member Fellowship in the History of Electrical and Computing Technology

The IEEE Life Members Fellowship in the History of Electrical and Computing Technology supports either one year of full-time graduate work in the history of electrical science and technology at a college or university of recognized standing, or up to one year of post-doctoral research for a scholar in this field who has received his or her Ph.D. within the past three years. This award is supported by the IEEE Life Members Committee. The stipend is \$25,000 with a research budget of up to \$3,000.

Reimbursable research expenses include economy class travel to visit archives, libraries, historical sites, or academic conferences, either to hear papers or to present one’s own work. Hotel stay, meals while travelling, copying costs, reprints of scholarly articles, and books directly pertaining to research are reimbursable. Any research trip expected to cost

more than \$1,000 must be approved in advance by IEEE History Center Staff. Examples of non-reimbursable expenses include, but are not limited to: licensing fees for images for book version of thesis (book publisher should pay for those), computers or computer peripherals, digital cameras, clothing, and office supplies (paper, pens, printer cartridges, CDs, memory sticks, etc.).

Recipients are normally expected to take up the Fellowship in the July of the year that it is awarded. Fellowship checks are normally mailed to the Fellow quarterly in July, October, January, and April. For Fellows in the southern hemisphere who follow the southern hemisphere academic year, arrangements can be made to mail the checks in December (two quarters worth), March, and June.

Candidates with undergraduate degrees in engineering, the sciences, or the humanities are eligible for the fellowship. For pre-doctoral applicants, however, the award is conditional upon acceptance of the candidate into an appropriate graduate program in history at a school of recognized standing. In addition, pre-doctoral recipients may not hold or subsequently receive other fellowships, but they may earn up to \$5,000 for work that is directly related to their graduate studies. Pre-doctoral fellows must pursue full-time graduate work and evidence of satisfactory academic performance is required. These restrictions do not apply to post-doctoral applicants.

The Fellow is selected on the basis of the candidate’s potential for pursuing research in, and contributing to,

electrical history. Application forms are available on-line at http://www.ieee.org/about/history_center/fellowship.html. The deadline for completed applications is 1 February. This completed application packet should be emailed to ieee-history@ieee.org or mailed to the Chair, IEEE Fellowship in the History of Electrical and Computing Technology Committee, IEEE History Center at Stevens Institute of Technology, Samuel c. Williams Library, 3rd Floor, 1 Castle Point on Hudson, Hoboken, NJ 07030-5991 Applicants will be notified of the results by 1 June.

The IEEE Fellowship in Electrical Engineering History is administered by the IEEE History Committee and supported by the IEEE Life Members Committee.

IEEE History Center Life Member Internship

Scholars at the beginning of their career studying the history of electrical technology and computing are invited to contact the Center to be considered for a paid Internship at the Center's offices on the Stevens Institute of Technology campus in Hoboken, New Jersey, USA.

The intern program seeks to provide research experience for graduate students in the history of electrical and computer technologies, while enlisting the help of promising young scholars for the Center's projects. The Intern generally works full-time for two months at the History Center on a Center project that is connected to his or her own area of interest. This time is usually during the summer, but other arrangements will be considered. Interns are also encouraged to consult with the Center's staff and its associates, and guided to research

resources in the area. The internship is designed for those near the beginning or middle of their graduate careers, but advanced undergraduates, advanced graduates, and, on rare occasions, recent Ph.D.s will also be considered. Special consideration is often given to scholars from outside the United States who might not otherwise have an opportunity to visit historical resources in the United States.

The stipend paid to the intern is US\$5,000, but additional funds may be available to defray travel costs, depending on the intern's circumstances. This internship is supported by the IEEE Life Members Committee, and the stipend was recently increased thanks to a generous gift from Emerson Pugh.

There is no formal application form. To apply, please mail curriculum vitae showing your studies in electrical history, a three- to five-page page (single or double spaced) writing sample, along with a cover letter describing the sort of project you would be interested in doing (see contact information below). The deadline for contacting the IEEE History Center is 1 March.

IEEE and Stevens are AA/EO employers. Women and minorities are encouraged to apply for all positions. The IEEE History Center is cosponsored by the Institute of Electrical and Electronics Engineers, Inc. (IEEE)—the world's largest professional technical society—and Stevens Institute of Technology. The mission of the Center is to preserve, research, and promote the legacy of electrical engineering and computing. The Center can be contacted at: IEEE History Center, Stevens Institute of Technology, 1 Castle Point on Hudson, Hoboken, NJ 07030-5991, +1 732 562 5450, ieee-history@ieee.org, http://www.ieee.org/about/history_center/index.html.

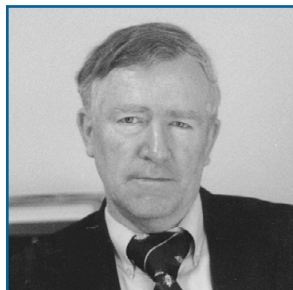
Your contributions to the **IEEE History Center Fund** preserve the heritage of the profession and its contributions to humanity. We invite you to find out more about the Center and its programs at <https://www.ieee.org/about/history-center> and more about the Engineering & Technology Wiki (ethw.org)

IN MEMORIAM

IN MEMORIAM JAMES BRITTAIN (1931-2018)

James Brittain, Fellow of the IEEE, Professor Emeritus at Georgia Institute of Technology, and pioneering advocate for what he once called "the increase and diffusion of knowledge about the contributions of electrical engineers," passed away 8 March 2018 at the age of 86, five miles from his birthplace in Mills River, North Carolina, U.S.A.

Born on a small farm without electricity in the foothills of western North Carolina during the Great Depression, Brittain attended the local public school with 25 classmates. After joining the U.S. Air Force because his family could not afford college, Brittain became a student and then instructor of radar technology. His success led to pursuit of an electrical engineering degree at Clemson College in South Carolina, a



master's degree at the University of Tennessee, and a return to Clemson as an instructor.

During the 1960s, he began adding historical observations to his EE classes and writing short historical articles. These activities culminated in his decision to pursue a Ph.D. at Case Institute of Technology in Cleveland, Ohio, not in electrical engineering, but in the new field of the history of technology. In 1969, with his Ph.D. dissertation on "B. A. Behrend and the Beginnings of Electrical Engineering" in hand, Brittain accepted an assistant professorship in the history of science and technology at the Georgia Institute of Technology.

During his graduate studies, Brittain had begun engaging

with members of the IEEE History Committee. This resulted in his appointment thereon in 1972, with service continuing for an unprecedented seven years. His letter to *IEEE Spectrum* in the spring of 1973 included the first proposal for a center for the history of engineering that would match the activities of the scientific professions. Working with Frederick Terman, Jack Ryder, Bernard Finn, Thomas Hughes, Reed Crone, Donald Christiansen, Michael Wolff, Robert Lucky, and many others, Brittain concentrated interest in and support for a professionally run center that would undertake activities like a newsletter, a landmark program, publication prizes, publications, oral histories, an IEEE archive, bibliographies, and catalogs of artifacts. The IEEE Board of Directors approved the first appropriation for the “Establishment of a Center of the History of Electrical Engineering” in December 1978. Looking back from 2012, Brittain wrote that the IEEE History Center’s “success has exceeded my most sanguine expectations.”

Jim Brittain’s contributions to the preservation and promotion of the history of his field extended well beyond the History Center. In 1977, he researched and wrote the study that successfully endorsed the scholarly edition of Thomas Edison’s papers, which, he wrote, “promised to become the most important documentary project yet undertaken in the field of American technological history.” Over nearly sixty years, he published 398 articles, including hundreds for *Proceedings of the IEEE*, where he initiated the monthly “Scanning Our Past” section and served as a member of the editorial board for twenty-seven years. He chaired the IEEE History Committee twice, wrote four books, and taught thousands of engineering students at Georgia Tech to respect the social, political, economic, and cultural contexts that shape and interact with technological and scientific development.

The staff of the IEEE History Center offers its condolences to his wife and family.

IN MEMORIAM JOHN MEREDITH

Just as this issue was going to press, the History Center was deeply saddened to learn of the death of John Meredith, who

was a key supporter of the History Center. The March issue will carry an appreciation of his life and work.

BOOKS IN OUR FIELD

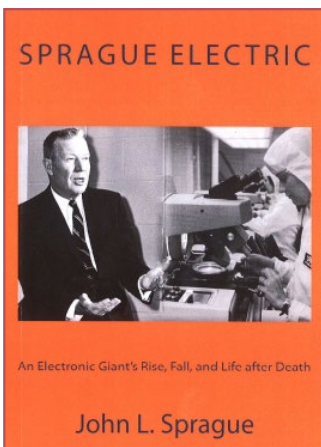
BRUDERER, HERBERT, *Meilenstein der Rechentechnik*

Herbert Bruderer, of the Departement für Informatik der Eidgenössischen Technischen Hochschule, has just published a two-volume work in German. <http://www.degruyter.com/books/978-3-11-051827-6>.

FROM THE IEEE HISTORY CENTER PRESS

SPRAGUE ELECTRIC: AN ELECTRONIC GIANT’S RISE, FALL, AND LIFE AFTER DEATH

by John L. Sprague



The rise of the Sprague Electric Company from a high-tech kitchen-table startup is representative of much of the U.S. electronics industry. Sprague Electric began in 1926 in the Quincy, Massachusetts kitchen of a young naval officer, Ensign Robert C. Sprague, and became a thriving manufacturer employing thousands of workers. Its broad product line of electronic components achieved international sales and a reputation for

the highest quality. There were more than 50,000 Sprague components on every *Apollo* mission, and more than 25,000 aboard every Space Shuttle. The company later declined, went through a series of acquisitions, and eventually dissolved.

Sprague Electric provides a valuable business and technological history, a story of corporate success, and a cautionary tale of what to avoid. Told by company insider John Sprague, *Sprague Electric* gives the reader a front-row seat.

The *Sprague Electric* story reveals the value of investment in research and development, and also the effects of raw material supply chains on product lines. It is a story of a company’s relations with the small New England mill town of North Adams, Massachusetts where its factories were located, and how labor relations — initially cordial— later soured. It is a story of how a vulnerable company weathered the stresses of the Great Depression and triumphed, only to be brought down by the recessions of the 1970s and 1980s.

It is a history of acquisitions, mergers, and spin-offs— some of them botched— and of the strategic and tactical mistakes that eventually caused the company to vanish. Yet, *Sprague Electric’s* successor companies continue its legacy in the electronic components industry. Corporations formed from its different business units and operations are now located around the world. The principal manufacturing plant of Sprague Electric is now an acclaimed art museum.

Available from **Amazon.com** in hard copy and on Kindle.

http://www.amazon.com/Sprague-Electric-Electronics-Giants-after/dp/150338781X/ref=sr_1_2?ie=UTF8&qid=1429202871&sr=8-2&keywords=sprague+electric



REALIZE THE FULL POTENTIAL OF IEEE

IEEE Foundation



With roots dating back to 1884, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humankind. The size of IEEE, scale and access to decision-makers in government, academia and industry enables it to play a unique and important role in driving innovation, work-force development and global problem solving through the application of engineering.

Thanks to donor support, the IEEE Foundation strives to be a leader in transforming lives through the power of technology and education.

The IEEE Foundation, established in 1973, is the philanthropic partner of IEEE. Our work inspires the generosity of donors to enable IEEE programs that improve access to technology, enhance technological literacy, and support technical education and the IEEE professional community.

IEEE Foundation:

Inspires Donations to IEEE

Bringing visibility, focus, scale, impact and relevance to the work of IEEE through philanthropy

Manages Donations for IEEE

Ensuring effective financial management and strong governance

Invests in Programs of IEEE

Turning the donations into action and impact through IEEE Programs

IEEE Foundation is leading a special campaign across IEEE's expansive network to raise awareness, forge partnerships and generate the required financial resources to fund these Priority Initiatives:

IEEE Smart Village: Expanding access to sustainable electricity, education and entrepreneurial solutions to empower off grid communities.

EPICS in IEEE: Enabling students to envision, develop and install technology solutions that solve community problems. (*Engineering Projects in Community Service*)

PES S+: Awarding transformational scholarships and connecting unique career experiences. (*Power & Energy Society Scholarship Plus Initiative*)

REACH: Bringing the importance of engineering and technology to a wider audience in more dynamic ways. (*Raising Engineering Awareness through the Conduit of History*)

Additionally, expanding the IEEE Awards Program, supporting IEEE History Center programs and leveraging the strong IEEE-Eta Kappa Nu connection are important components of this special campaign.

IEEE Foundation

445 Hoes Lane | Piscataway, NJ 08854, USA | donate@ieee.org | 732.562.5446 | https://www.ieeefoundation.org/donate_history

Donations to the IEEE History Center Fund may be designated for general use to support IEEE history activities, to support collection and posting of Oral History interviews of important innovators, and to build the History Center endowment.

You may donate online at https://www.ieeefoundation.org/donate_history or by mail at: IEEE History Center at Stevens Institute of Technology, Samuel C. Williams Library, 3rd Floor, 1 Castle Point on Hudson, Hoboken, NJ 07030 USA



at Stevens Institute of Technology
Samuel C. Williams Library 3rd Floor
1 Castle Point on Hudson
Hoboken, NJ 07030-5991



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