A glance at this issue reveals the current high energy in the wide range of programs conducted by the IEEE History Center that comprise IEEE’s central historical activities: maintaining and growing the IEEE Global History Network; overseeing IEEE Milestones in Electrical Engineering and Computing, conducting oral histories, fulfilling reference requests, managing the IEEE archives and IEEE’s institutional history, training Rutgers graduate students and teaching Rutgers undergraduates, supporting historical activities in IEEE Organizational Units around the world, and facilitating research into the history of IEEE technologies by international scholars.

It is hard to believe that the IEEE History Center is just 30 years old. On 11 August 1980, at IEEE headquarters in New York, the Center for the History of Electrical Engineering was established with a single employee – Robert Friedel, director and historian of technology. Formed in preparation for IEEE’s 1984 centennial milestone, the center focused on gathering biographical information on major contributors to electrical engineering and computing, and locating and documenting engineering papers. Having completed that task, the center’s role grew to include public outreach, pre-college education, and scholarly research into the history of technology, as well as the organizational history of IEEE. Its staff grew accordingly and, in response, exactly 10 years after its founding (that is 20 years ago, in 1990) the center relocated to the campus of Rutgers, the State University of New Jersey, in New Brunswick, New Jersey, where it changed its name to the IEEE History Center. The full history of the Center is told on page 3.

What I would like to say here, in recognition of these two anniversaries, is that none of it would have been possible without you, our supporters. So let me take the end of 2010, our commemorative year, to once again thank you for your donations and to wish you and yours a joyous winter holiday season and a healthy, happy and productive new year.

By preserving, researching and making known our engineering heritage, the History Center allows the public to realize and appreciate that IEEE and its members have been advancing technology for humanity in these and other crucial areas for more than 125 years.
IEEE HISTORY COMMITTEE ACTIVITIES

IEEE HISTORY COMMITTEE INVITES ORGANIZATIONAL UNITS TO NAME CORRESPONDING MEMBERS

In order to broaden its reach and stimulate historical activities within the organizational units of IEEE, the History Committee invites all IEEE organizational units to name Corresponding Members of the History Committee. Corresponding Members may also be appointed from non-IEEE organizations active in the history of technology. (Examples include, but are not limited to: the International Committee for the History of Technology, the Society for the History of Technology, the American Society of Mechanical Engineers History Committee, and government or educational organizations.) Corresponding Members of the History Committee receive all electronic communications – except for invitations to teleconferences – received by regular members of the Committee, including but not limited to: Agendas, Minutes, draft Minutes, Milestone Report, and the History Center newsletter. For regular members, travel expenses to all meetings, and telephone expenses are reimbursed according to standard IEEE practice. Corresponding members are invited to attend any face-to-face meetings, and to participate fully (without vote), but their expenses are not reimbursed by the History Committee. Their home organizational unit may choose to reimburse them. There is no limit to the length of time a corresponding member may serve.

The role of Corresponding members shall be to report back to their organizational units on activities and discussions of the IEEE History Committee, and to report on their organizational units’ history activities to the IEEE History Committee. Corresponding members shall also be eligible to serve as milestone advocates.

Organizational Units who wish to name a corresponding member to the IEEE History Center should send an email to IEEE History Committee Chair Michael Williams at m.williams@computer.org or ieee-history@ieee.org. The email should include the corresponding member’s name, e-mail address, and brief biography.

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 was. 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 (ones in situ and still operating are 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 22,500. The newsletter reaches engineers, retired engineers, researchers, archivists, and curators interested specifically in the history of electrical, electronics, and computing engineering, and the history of related technologies.

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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, 2 October.

For more information, contact Robert Colburn at r.colburn@ieee.org.
COLLECTING THE HISTORY OF THE IEEE HISTORY CENTER

As part of the 30th anniversary of the IEEE History Center, IEEE Archivist and Institutional Historian Sheldon Hochheiser contacted five key individuals in the center’s history for their recollections. Dr. James Brittain, long-time member and former chair of the IEEE History Committee was the person most responsible for guiding IEEE to establishing the center. He contributed a written memoir of the process. His recollections have been added to the IEEE Archives collection. In addition, Dr. Hochheiser has scheduled oral history interviews with the first and second center directors, Dr. Robert Friedel (now at the University of Maryland), and Dr. Ronald Kline (now at Cornell University), as well as with long-time IEEE history committee member and chair Dr. Bernard “Barney” Finn (Curator Emeritus at the Smithsonian). Dr. Finn is also donating material on the history center and the history committee in his possession. The center’s third director, Dr. William Aspray (now at the University of Texas—Austin) has also agreed to be interviewed.

THE DEFOREST PORTRAIT – AN INTRIQUING REFERENCE REQUEST

The History Center receives many intriguing reference requests from scholars, historians, electrical engineers, journalists, government policy offices, and members of the general public. Recently, the granddaughter of radio pioneer and audion tube inventor Lee deForest contacted the Center looking for help tracking down the portrait of deForest portrait painted by her mother Harriet deForest, Lee deForest’s daughter, in February 1952. The painting was done for the IRE building, then located at 1 East 79th Street, New York City (the Brokaw mansion), and accepted by Joan Coggeshall on behalf of IRE President Donald Sinclair.

IEEE History Center staff did some sleuthing and were able to ascertain that the portrait is the one which currently hangs in the meeting room area of the IEEE Operations Center in Piscataway, New Jersey, roughly across from the portrait of radio pioneer Alfred Goldsmith.

THE IEEE HISTORY CENTER: 30 YEARS OF PRESERVING THE HISTORY OF THE PROFESSION

Since the formation of IEEE in 1963, there has been a standing History Committee responsible for promoting the collection, writing and dissemination of historical information in the fields covered by IEEE technical and professional activities, as well as historical information about the IEEE and its predecessor organizations.

In 1979, the IEEE Board of Directors endorsed the concept of a professionally staffed history center to support the work of the IEEE History Committee and allocated funds, and in 1980, the Center for the History of Electrical Engineering was established in the New York offices of the IEEE. For most of the first decade, the Center staff consisted of a director, an archivist or curator, and a part-time research assistant. The first director was Dr. Robert Friedel, and Dr. Ronald Kline succeeded him in 1984. They and their staff laid the groundwork for the Center, establishing it as a leading resource for electrical history.

The Center undertook many projects during its first decade. Most notable, perhaps, were three exhibits that circulated nationally: the first on Faraday and Maxwell, the second on the IEEE Centennial, and the third on Edison and the electric light. In addition, the Center collaborated on exhibits with the Smithsonian and other institutions. Perhaps most importantly, the Center established the IEEE Milestones Program, overseen by the History Committee, wherein IEEE Sections could recognize and publicize engineering achievements within their geographical area.

Move to Rutgers and Program Expansion 1989-1997

At the end of the decade, the History Committee determined that the Center should become a place where considerable historical research would be carried out. This decision was heavily influenced by a report prepared for the Committee by historian Terry Reynolds. In order better to carry out research, the Center moved in 1990 to the campus of Rutgers University in New Brunswick, New Jersey. This move was carried out under the leadership of the Center’s third director, Dr. William Aspray, who had been hired in 1989.

With University support added to IEEE support, the Center was able to expand to a staff of three permanent Ph.D. historians, a rotating post-doc, a curator, a research assistant, and four (later six) Rutgers graduate-students working part-time as research assistants. Dr. Rik Nebeker joined the staff in 1990 as Research Historian. He has since been promoted to Senior Research Historian.

Center staff carried out and published research projects on the National Science Foundation’s role in the development of computing, the impact of the computer on meteorology, the history of the electric trolley, the history of radar, and many other topics. Oral history became a major activity; the Center conducted more than 200 interviews in this period. The interviews were transcribed, edited, and made available to researchers. The Center started a series of international conferences on the history of technology with conferences in
1991 in New Jersey on Technological Competitiveness, 1995 in Williamsburg, Virginia on the history of computing. Long-term cooperation was begun with sister groups, such as the History Committee of the IEEJ (Japan’s counterpart to the IEEE).

New Director, Emphasis, and Name: IEEE History Center 1997-2010

In 1997, Dr. Michael Geselowitz became the Center’s Staff Director. With the guidance of the History Committee, the Center embarked on a new phase in its own history, characterized by an increased emphasis on reaching out to engineers, to public-policy makers, to public-school teachers, and to a fourth, sometimes overlooked group of people concerned with electrical history—amateur historians and collectors. Shortly thereafter, the Center acquired a new name, the IEEE History Center. It more accurately described the scope of the Center’s activities. In 1998 Geselowitz, Nebeker, and the post-doc were joined in these efforts by Robert Colburn as Research Coordinator, as well as by an archivist/web manager. Projects carried out by this team include a major overhaul of the Center’s web site, several IEEE Society histories, teaching and participating in the intellectual activity at Rutgers University, a workshop with the IEEJ in 2000, the “Going Digital” web history project sponsored by the Sloan Foundation, two more of the international conferences (1999 in New Brunswick, New Jersey, USA, on women and technology; 2001 in St. John’s, Newfoundland, Canada, on the history of telecommunications).

The Center also began a more concerted effort to get word on history out to the IEEE membership, beginning features in many IEEE publications, including a series of special millennium articles in Proceedings of the IEEE, a regular column in The Institute, occasional special articles for IEEE Spectrum, and regular e-features for Spectrum and Today’s Engineer. In 2000, the History Center also increased its move in the direction of public outreach with the introduction of an entirely new web-based program, the IEEE Virtual Museum. This program was discontinued in 2008, and most of its articles were migrated to the newer IEEE Global History Network.

In 2003, the History Center staff was responsible for Philosophy Hall at Columbia University in New York being named a U.S. National Historic Landmark (this is the building where Edwin Armstrong, winner of the first IEEE Medal of Honor in 1919, when it was the IRE, did most of his pioneering radio work). The Center also worked on a special project to copy to DVD and make accessible some very important privately held video interviews with computer pioneers. In 2004, the Center held its next conference at Bletchley Park, Milton Keynes, England on the history of electronics.

Perhaps most importantly, the Milestones Program passed its own Milestone in 2004, as the 50th Milestone was dedicated and IEEE Region 9—the last Region without a Milestone—received two recognitions. By 2010, the number of milestones had passed 100. In addition, we conducted institutional history research projects with Eta Kappa Nu and with the Marconi Fellowship Foundation at Columbia University.

In 2006 and 2007, the History Center was involved in numerous special projects, including Society Anniversaries and Lectures. The oral history program began videotaping interviews. The IEEE Milestones Program continued to grow at a record pace. In 2007, the Center held its biennial conference, at New Jersey Institute of Technology in Newark, N.J., U.S.A, on the history of electric power. In 2008, John Vardalas, who had started at the Center as a post-doctoral fellow was promoted to Outreach Historian, and Dr. Sheldon Hochheiser joined the Center as Institutional Historian and Archivist.

Beginning in 2008, a major focus of the Center’s activity became building a new wiki-based website for bringing the history of IEEE’s fields of interests to both IEEE Members and the public, The IEEE Global History Network (GHN). The GHN went live late in 2008. While anyone can access the GHN, only IEEE members and staff, and other registered users can add and edit material. To oversee the GHN, Nathan Brewer joined the History Center staff in 2009 as Web Content Administrator. By 2010, the GHN had grown to include thousands of entries, including firsthand accounts by IEEE Members, more than 450 oral histories, articles on the history of technology, selected documents from the IEEE Archives, and articles on the history of IEEE and its organizational units.

In 2009, as part of IEEE’s celebration of its 125th anniversary, the History Center undertook two projects. The Center’s conference, held at both Drexel University and the University of Pennsylvania in Philadelphia had the theme of the history of professional technical societies. And the Center conducted oral histories with twenty-three IEEE Past-Presidents. The Center began a new program, STARS an online compendium of invited, peer-reviewed articles on the history of major developments in electrical and computer science and technology. STARS articles appear on the GHN. The program was designed to provide recognition to the most important technological trajectories, and thus to complement the Milestone program’s emphasis on specific achievements in specific places. The Center also undertook a pilot program with the Hillsborough, NJ school district on bringing the history of technology into high school social studies curricula.
In 1962, a joint committee of the AIEE and the IRE societies agreed on a set of “Principles of Consolidation,” which first the boards, and then the membership, of both societies approved. On 1 January 1963, the Institute of Electrical and Electronic Engineers was born with 150,000 members, 140,000 of whom were in the United States. Now a single society spanned the technologies, the industries, and the academic allegiances of what had become a complex, multifaceted discipline.

Documenting the historic merge, the IEEE Merger Collection contains nearly six hundred primary documents pertaining to the merger of IRE and AIEE in 1963. Spanning from the early 1950s to 1970, the papers in this collection provide a unique look at the state of the profession pre-merger, the general attitude concerning unity in the profession, and various post-merger hindights and considerations. Correspondence from many prominent individuals such as IRE, AIEE and IEEE Past Presidents Ernst Weber, B. Richard Teare, Donald Fink, L. F. Hickernell, Patrick Haggerty, and Warren Chase are all featured in the collection.

The collection was initially processed, organized, and cataloged into a formal finding aid by George Carlyle Sell in 1978 as a project with the Department of History and Sociology of Science at the University of Pennsylvania. For the first time, the entirety of the collection has been digitized and made available on the IEEE Global History Network for public viewing. The versatile wiki platform of the Global History Network allows for quick linking from the finding aid to prominent figures, events and corporations, making background biographical materials easier to find than ever. The finding aid goes into item-level detail, and is organized into fifty-nine different folders, making the collection extremely accessible and easy to navigate.


Another piece of archival material that has been posted on the GHN is a portion of a video series entitled “The Computer Pioneers”. Filmed in 1983 by Richard Solomon, “The Computer Pioneers” is a video oral history project which aims to tell the story of significant developments in the computing industry. Solomon produced oral histories with numerous development teams, the first of which to be posted on the Global History Network is the series on the Weizmann Institute.

Recognized as an IEEE Milestone, the WEIZAC was one of the world’s first electronic computers, and the first in Israel. It was designed and constructed in 1954, and operated until the early 1960s. WEIZAC was used for mathematical research, such as solving problems related to the computation of ocean tides; this entailed complex calculations which could not reasonably be performed manually. The calculations carried out using WEIZAC took hundreds of computer hours, and enabled scientists to chart maps giving a very close approximation of high and low tide fluctuations throughout the world. As a result, the Weizmann researchers predicted the precise location of an amphidromic point (at which high and low tides never occur) in the southern Atlantic. Measurements performed in the wake of the discovery confirmed the existence and location of this point.

Spanning nearly eleven hours of video, this oral history project provides a deep look at the development of one of the world’s first electronic computers. Among the interviewees are many of the prominent figures behind the design of the WEIZAC computer such as Chaim Pekeris, Thelma and Gerald Estrin, Zvi Riesel, and Aviezri Frankel. The Weizmann Institute Video Oral History can be viewed in its entirety at: [http://www.ieeeeghn.org/wiki/index.php/Archives:The_Computer_Pioneers:_Weizmann_Institute_Video_Oral_History](http://www.ieeeeghn.org/wiki/index.php/Archives:The_Computer_Pioneers:_Weizmann_Institute_Video_Oral_History)
HISTORY CENTER WELCOMES SIX GRADUATE ASSISTANTS FOR 2010-2011

The IEEE History Center is pleased to welcome back five graduate assistants – Matthew Friedman, Christopher Hayes, Rochisa Narayan, Megan Schenkelberg, and Ji-Hye Shin – and to welcome new graduate assistant Steven McGrail. These graduate assistants will help edit oral histories and post them on the Global History Network, scan and preserve the Center’s archival photograph collection and help with many other tasks.

Christopher Hayes is a returning graduate assistant, majoring in U.S. history and minoring in African-American history. His areas of interest are late-twentieth century black radicalism, particularly the Black Liberation Army, as well as imprisoned black radicals and the freedom movements they formed while held captive.

Matthew Friedman’s research focuses on postwar modernity, noise and the destabilization and production of subjectivity in the United States in the 1950s and 1960s. A native of Montreal, Matt worked as a journalist for a decade, for publications as diverse as the Montreal Gazette and the National Post and NetGuide and InternetWeek magazines. He is the author of three books on information technology electronic commerce, one of which was published just in time for the dot-com crash of 2000 and sank into obscurity.

Steven McGrail holds a B.A. in Philosophy from Syracuse University, a Masters from Hunter College. His thesis was "The Press for Peace: Newsmakers, Image, and the Portsmouth Conference of 1905." Currently he is a Ph.D. candidate studying U.S. cultural history, 19th/early 20th century America; national narratives, consumer culture, press and periodical literature, and regional identities. He has been a paralegal, a museum guide at the San Francisco Museum of Modern Art and at the Palace of the Legion of Honor in San Francisco.

Rochisha Narayan received her Bachelor’s and Master’s degrees in history from St. Stephen’s College, Delhi University, and an M.Phil in history from Delhi University. At Rutgers, her areas of interest include the history of South Asia, Women and Gender history, and Global and Comparative history. Her dissertation examines the interlocking histories of family, caste and politics in colonial north India from the late eighteenth to the early twentieth century.

Meagan Schenkelberg, a fourth year IEEE graduate assistant, is working on her dissertation on seventeenth-century England. She is focusing on the importance of gender in political, social and cultural aspects of the Restoration, particularly how women served as symbols of Charles II’s court. Meagan is also co-organizing an interdisciplinary graduate conference on British history for the spring, and beginning in September participating in a monthly dissertation writing seminar at the Folger Shakespeare Library in Washington, DC.

Ji-Hye Shin was born in the Republic of Korea and attended Yonsei University in Seoul, Korea, as an undergraduate and graduate student. She received her MA in international studies with a concentration on American Studies. At Rutgers, she studies US immigration history. Her dissertation will examine the processes of racial and ethnic formation in the nineteenth and twentieth century United States with particular interests in immigrant communities.

JAPAN VISIT BY OUTREACH HISTORIAN VARDALAS

On 24 August, Research Historian Dr. John Vardalas, while in Tokyo, Japan, gave a presentation on the activities of the IEEE History Center and on an overview of the IEEE Global History Network. Jointly hosted by the IEEE Japan Council History Committee and the IEEE Tokyo Section, the presentation was well attended and well received. Following the presentation, additional discussions were held, led by Dr. Eiichi Ohno, the Chair of the IEEE Japan Council History Committee, on the Milestone program. Of particular interest to the members of the Tokyo Section was use of the GHN for proposing and nominating milestones.

Another highlight of Dr. Vardalas’s stay in Japan was the visit to the Electrical Power Historical Museum Yokohama. He was fortunate to be given a tour by the General Manager of the museum, Mr. Yutaka Takahashi, Mr. Isao Oki, the Manager of the Research Group, and Mr. Keiichi Hohki, the Associate Vice President of the Central Research Institute of Electric Power Industry. Operated as a public service by the Tokyo Electric Power Company, this museum is a gem. While offering a Japanese perspective to the history of electric power, this museum also gives a wonderful overview of the subject from a global perspective. Its artifacts are wonderful and bigger than life. How often does one see a large generator sliced open for inspection, or a portion of a large hydroelectric turbine? If you are interested in the history of technology, this museum is a must if you visit Tokyo.

Along with Dr. Eiju Matsumoto and Dr. Eiichi Ohno, History Center staff member Dr. John Vardalas also visited the Toshiba Science Museum.
Hyunsoo Park, student in the Graduate Program in Planning and Public Policy at Rutgers University, has just completed his Ph.D. degree with a dissertation entitled "The Social Structure of Large Scale Blackouts". It examines major power outages in the United States from 1965 to 2003, viewing them as instances of failure in socio-technical systems. Hyunsoo Park has had contact with the IEEE History Center during his studies at Rutgers, and he thanks the History Center in the acknowledgments of his dissertation. He presented some of his findings at the 2007 conference on the history of electric power that the History Center put on in Newark.

EE IN THE MOVIES

ELECTRICAL TECHNOLOGIES IN THE MOVIES: ANSWERING MACHINES

Soon after the telephone was invented, Thomas Edison tried to find a way to record telephone messages. Earlier, he had worked on a machine to transcribe telegraph messages through indentations on paper tape. He thought something similar might work for telephone messages, and he experimented with a diaphragm attached to an embossing point that was held against a sheet of rapidly-moving paraffin paper. Speech caused the diaphragm to vibrate, which then made indentations in the paper. Edison later changed the paper to a metal cylinder with tin foil wrapped around it, and the phonograph was born.

Edison’s invention was put to use primarily as a music player and a dictating machine, rather than as a telephone-message recorder. The latter device was the objective of the Danish engineer Valdemar Poulsen when, in 1898, he developed magnetic recording. Poulsen used steel wire to capture the varying magnetic fields of a telephone signal. Like Edison’s invention, Poulsen’s proved practical in dictating machines.

An automatic answering machine requires more than a means of recording a telephone message. The device must pick up an incoming call, play a message, and then record the caller’s message. Though many people tried, it proved difficult to build a practical machine. In the 1930s AT&T developed one, but used it only for internal use in providing time-of-day automatically. An alternative was the telephone answering service, with operators in centralized offices. Such services became known in the 1950s, and we see one, called Susanwerphone, in the 1960 movie "Bells are Ringing", starring Dean Martin and Judy Holliday.

The commercial success of answering machines came finally in the 1960s and 1970s. These machines used magnetic-tape recording, rather than magnetic-wire recording. In 1960 the Ansafone, invented by Kazuo Hashimoto, became the first answering machine to be sold in significant numbers in the United States. Other machines soon followed, notably the PhoneMate Model 400 in 1971. An early automatic machine is shown in the 1955 movie "Kiss Me

Continued on Page 8
It was in the 1980s that answering machines became fairly common, and many movies from that decade show them in use. An answering machine plays a major role in Pedro Almodóvar’s 1988 movie "Women on the Verge of a Nervous Breakdown". In "New York Stories" (1989) a woman breaks off a relationship by leaving a message on the man’s answering machine. In "Ferris Bueller’s Day Off" (1986) the title character makes clever use of answering machines, including to give false messages.

Answering machines cause embarrassment in "My Best Friend’s Wedding" (1997), where a message being left on a machine is heard by all the people at a dinner party. A similar thing happens in "Intimate Strangers" (2004). Obsessive behavior is shown in "Swingers" (1996), where the main character frequently checks for a message from his ex-girlfriend, also in "Let It Snow" (1999) and "Chuck & Buck" (2000), where a character listens repeatedly to a message left on his machine.

The use of an answering machine to screen calls is shown in many movies. In "Short Cuts" (1993) someone uses an answering machine to avoid harassing calls. In "As Good as It Gets" (1997) the parents of one of the main characters never pick up when their son calls. In "The Closet" (2001) a woman uses an answering machine so as not to take calls from her former husband.

Users found other ways to use answering machines. In "How to Lose a Guy in 10 Days" (2003) Andie Anderson, trying to be annoying, leaves 17 messages on an answering machine. In "3 Iron" (2004) a young man, who finds unoccupied homes to stay in, checks the home’s answering machine, often learning from the message that the residents are away. A character in "Darjeeling Limited" (2007) knows the code for his ex-girlfriend’s answering machine, and he checks her messages.

A technological change is apparent around the turn of the century, as tapeless answering machines, which use solid-state memory, became available in the mid 1990s. An early movie showing such machines is "First Wives Club" (1996). As always, we would be grateful for reports from readers of other interesting movie scenes that involve answering machines. You may contact us at ieee-history@ieee.org.
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/web/aboutus/history_center/about/fellowship.html. The deadline for completed applications is 1 February 2011. This completed application packet should be sent to the Chair, IEEE Fellowship in Electrical History Committee, IEEE History Center, Rutgers, The State University of New Jersey, 39 Union Street, New Brunswick, NJ 08901-8538. Applicants will be notified of the results by 1 June 2011.

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

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**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 Rutgers University campus in New Brunswick, New Jersey.

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 at 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 this country.

The stipend paid to the intern is US$3,500, 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.

There is no formal application form. To apply, please mail a curriculum vitae showing your studies in electrical history 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 2011.

IEEE and Rutgers 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 Rutgers—the State University of New Jersey. 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, Rutgers University, 39 Union Street, New Brunswick, NJ 08901-8538, ieee-history@ieee.org, http://www.ieee.org/web/aboutus/history_center/index.html

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**BAKKEN TRAVEL GRANTS**

Scholars and artists are invited to apply for travel fellowships and grants, which the Bakken Library and Museum in Minneapolis offers to encourage research in its collection of books, journals, manuscripts, prints, and instruments. The awards are to be used to help defray the expenses of travel, subsistence, and other direct costs of conducting research at the Bakken for researchers who must travel some distance and pay for temporary housing in the Twin Cities in order to conduct research at the Bakken.

1. **Visiting Research Fellowships** are awarded up to a maximum of $1,500; the minimum period of residence is two weeks, and preference is given to researchers who are interested in collaborating informally for a day or two with Bakken staff during their research visit.

2. **Research Travel Grants** are awarded up to a maximum of $500 (domestic) and $750 (foreign); the minimum period of residence is one week.

The next application deadline for either type of research assistance is **February 11, 2011**.

For more details and application guidelines, please contact:

Elizabeth Ihrig, Librarian
The Bakken Library and Museum
3537 Zenith Avenue So.
Minneapolis, MN, 55416
tel 612-926-3878 ext. 227
tel 612-927-7265
e-mail Ihrig@thebakken.org
www.thebakken.org
Sections of two-conductor and three-conductor transmission cables from Edison's Pearl Street Generating Station. These cables were dug up recently from under the streets of lower Manhattan. Photo courtesy of Carl Sulzberger

BIBLIOGRAPHY

BLASZCZYK, REGINA LEE, American Consumer Society, 1865-2005: From Hearth to HDTV, Harlan-Davidson, Wheeling, 2009

Sometimes, the best way to gain an understanding of a broad historical topic is with a book written by a known authority in a subject, but written broadly for use in a college course. Blaszczyk, an award-winning business historian known for her scholarly monograph Imagining Consumers: Design and Innovation from Wedgwood to Corning (2002), and her edited volume Producing Fashion: Commerce, Culture, and Consumers (2007) is the ideal author to write a survey of American consumer society for students and others, and she succeeds admirably.

Blaszczyk divides her book into three chronological parts: Victorian America 1865-1900, characterized by birth of the first mass consumer society, the rise of mass merchandisers and consumer advertising to teach people what to buy, and "Victorian preciousness" including people collecting and displaying possessions in their homes; Modern America 1900-1945, where mainstream culture became fast-paced, technologically savvy, and always changing, geared towards immediate satisfaction; and Boomer America 1945-2005, where America became the world's most affluent society, albeit one with heterogeneous tastes as the trappings of consumer culture became available to most people, and the focus of consumer culture evolved from possessions to experiences (or alternatively, from hardware to software.)

While much of her narrative, of course, deals with areas at best tangential to IEEE’s fields of interests including clothing, furniture, housing and shopping, there is much to show the central role that electrical technologies have played in the shaping of American consumer society. These themes play out particularly in Chapter 5 “Sensing a Wider World” in part two and Chapter 9 “Electronics are Us” in part three.

The theme of “Sensing the Wider World” is the beginning of American's love affair with technologies that altered time, sound, light and distance. After discussions of bicycles, cameras, and phonographs, it soon moves on to a fine discussion of radio in American culture both, the large role radio broadcasting played in the 1920s and 1930s, and the less widespread but also important role of ham radio as a hobby. It then refocuses on the electrification of American households (by 1930 68% of which had electricity), and how the electrical industry successfully looked to consumers as a new market for not only electric lighting but electric appliances as well, in a successful effort to not only increase markets, but balance the load throughout the day. And finally, she notes one crucial distinguishing factor of electrical technologies: radios, appliances and telephones were part of complex technological systems, to which consumers became inexorably linked.

In “Electronics are Us” the focus is on consumer electronics in entertainment, beginning in 1948, which Blaszczyk calls the “year of consumer electronics” for things like the introduction of the LP record and the Ampex tape recorder, the invention of the transistor and the spread of TV. She covers, roughly chronologically, a range of household entertainment technologies, and how they were incorporated into and effected American consumer culture—television, transistor radios, hi-fi, tape cassettes, video games, personal computers before the internet (which she notes were more appliances then sources of entertainment,) the internet, cable TV, and finally the iPod, which she notes effectively represented the convergence of what had been the many separate strands of the consumer electronics revolution. American consumer society had evolved not only from analog to digital, but from material things to meaningful experiences; from hardware to software; from hearth to HDTV.

By the book’s end, she has well proven her contention that there is no better lens to examine what it means to be an American than the lens of American consumer culture. (And that is a culture in which electrotechnologies have played a larger part.)

As Brox so well illustrates, the growth of worldwide whaling in-
in its head. Spermaceti produced a truly superior candle. One
provided the highly prized spermaceti, a waxy substance contained
sperm whales produced the best flames. The sperm whale also
duced a more reliable, brighter and cleaner flame. The oil from
first big step forward came with whale oil. Whale oil lamps pro-
the science of fire, and more convenient ways to ignite fuel. The
discoveries of better combustible materials, an understanding of
cheaper, and more reliable flames. Key to this progress were the
out of the reach of all except the very rich and the nobility.
a cleaner and slightly brighter light but their high cost put them
dimmer as the candle burned. Keeping these candles lit was a
made of tallow. These candles threw off a very dim light, which got
could afford them, candles provided lighting. Most candles were
keys deposited with the magistrate.” In the home, for those who
decree in Paris ordered that “all houses are … to be locked and the
out any lighting in the streets, only rodents, thieves, vandals went
out at night. Concerned with the dangers of the night, a 1380 a
had set. In Imperial Rome, according to Cicero, “night fell of over
the city like the shadow of a great danger….Everyone fled to his
home, shut himself in, and barricaded the entrance. The shops fell
silent, safety chains were drawn across behind the leaves of the
doors.” A thousand years later, the world with the world still with-
out any lighting in the streets, only rodents, thieves, vandals went
out at night. Concerned with the dangers of the night, a 1380 a
de cree in Paris ordered that “all houses are … to be locked and the
keys deposited with the magistrate.” In the home, for those who
could afford them, candles provided lighting. Most candles were
made of tallow. These candles threw off a very dim light, which got
dimmer as the candle burned. Keeping these candles lit was a
problem. They also gave off a foul odor. Beeswax candles produced
a cleaner and slightly brighter light but their high cost put them
out of the reach of all except the very rich and the nobility.

Progress, as Brox explains, in the use of fire for lighting arose from the development of cleaner, brighter, longer lasting, cheaper, and more reliable flames. Key to this progress were the discoveries of better combustible materials, an understanding of the science of fire, and more convenient ways to ignite fuel. The first big step forward came with whale oil. Whale oil lamps produced a more reliable, brighter and cleaner flame. The oil from sperm whales produced the best flames. The sperm whale also provided the highly prized spermaceti, a waxy substance contained in its head. Spermaceti produced a truly superior candle. One sperm whale could yield from 500 to 900 gallons of spermaceti. As Brox so well illustrates, the growth of worldwide whaling in-
dustry and the incredible multiplication of candles and lamps in the
home and workplace were inextricably tied to each other. The
demand for a better flame launched the countless whalers from the
shores of New England and other ports around the world. The
greater luminosity and efficiency of these lamps resulted from a
revolution in the science of combustion. Joseph Priestly’s and An-
toine Lavoisier’s work demonstrated that oxygen fueled flames.
This scientific breakthrough led the Swiss scientist Francois-Pierre
Ami Argan to design a radically new wick that allowed the lamp
flame to burn at much higher temperatures. The results were
cleaner, more efficient, and brighter flames. Artificial lighting driven
by whale oil reached its peak in the 1860s but a new technology
would dramatically expand the capabilities of fire-based illumination.

Gas lighting altered the technology, economics and busi-
ness of lighting. In luminosity, reliability, and convenience, gas light-
ing greatly surpassed oil lamps and candles. The one downside
was the ever present danger of poisoning if the flame went out in
enclosed spaces. Gas considerably increased the quality and con-
venience of illumination in the work place and in the streets. Rather than having a countless number of local fuel sources, the
advent of gas lighting gave rise to large utilities that could produce
the gas in a few centralized locations and then distribute the gas
to a large geographic area through a network of pipes. These net-
works for transmitting service to a larger number of distributed in-
dividual subscribers represented new technological and
organizational models. The gas lighting networks set the stage for
the electrical power networks that followed.

Coal was essential to gas lighting. The gas came from
roasting coal in the production of coke, which was also critical to
steel making. Increasing the production of coal required better il-
illumination of mines. Flames and coal mines were a dangerous
combination. Fine coal dust and methane, often found in these
mines are highly explosive. How could one turn on a light without
igniting a deadly explosion? Brox gives us the answer - Humphrey
Davy’s invention, in 1815, of the miner’s lamp, or Davy lamp. You
will have to read Brox’s book to learn how Davy’s invention kept the
lamp flame from igniting the explosive coal dust and methane.
Davy is the same man who, seven years earlier in 1808, produced
the first source of light from electrical energy. Among other things,
Davy was pioneer in electrochemistry. Using very powerful batter-
ies that he developed, Davy was the first to isolate elements like
sodium, potassium, barium and others. These powerful batteries
also allowed Davy to discover the arc light - the first artificial light
that did not depend on a flame. His discovery became the talk of the
town. To all who saw it, this dazzling light was indeed won-
drous. It would take a few decades and the development of elec-
tric generators before his discovery became a useful source of
illumination. But once it did, progress in electric lighting was, as
Brox explains, remarkably fast; arc lighting, incandescent light, flu-
orescent light, and LEDs - all within 150 years. Even more impor-
tant, as her narrative reveals, electric lighting has profoundly
transformed people’s relationship to the night.

Available from Houghton Mifflin Harcourt, Boston, New York, ISBN-
This book should appeal to readers interested in the history and the development of wind power for electricity production, and particularly in the Danish example.

Starting with a review of the early development of wind power by Poul la Cour (1846 – 1908), an inventor, mathematics teacher, and mechanical genius, the book reviews the growth of the industry. La Cour built the first electricity-producing wind power plant in Denmark in 1891. The plant used an historic Dutch windmill design with a four-bladed rotor incorporating sophisticated mechanical controls that anticipated many subsequent developments. Use of wind power in Denmark peaked in the years prior to and including World War I, the “Golden Age” of wind power, because of the cost and unavailability of fuel for diesel engines that were widely used to power agricultural machinery. The Danish Wind Electricity Association, organized in 1903, listed 132 small wind power plants then in operation. In 1910, more than ten firms produced so-called “wind-motors,” of which the Lykkeguard Company supplied the largest part. These plants produced direct current (dc) with an average output of 60,000 to 70,000 kWh each year.

At the beginning of World War II, a major Danish industrial firm, F.L. Smith & Company, introduced a novel wind power plant with two or three blades designed on modern aerodynamic principles. These stations with rotor diameters of 17.5 m (57.4 ft) and 24 m (78.7 ft) were equipped with 50 or 70 kW generators. The three-bladed models produced between 90,000 and 135,000 kWh per year.

The F. L. Smith & Company stations generated alternating current (ac), thus making it possible for the plants to operate in parallel with the utility network. The book relates a particularly interesting detail, namely that development work after World War II was made possible through Marshall Plan financial support.

The reviewer of this book had the opportunity in September 1941 to study the Danish wind power plants which were then in operation. The results of his findings were published in 1942 in the German Journal “Elektrizitätswirtschaft.” Later, in a 1951 issue of the same publication, the reviewer analyzed the operating modes and the actual energy outputs for the years 1941 to 1944 of 64 Danish wind power plants that had reported their data to the Danish Wind Electricity Association. Another factor greatly facilitated the development of wind power in Denmark. All patents and design details were shared by all manufacturers. Also, the government provided generous subsidies. This resulted in a strong development of new wind power plant designs by several major manufacturers. Perhaps the most successful firm was the Vestas Company, which to today is the leading supplier of modern wind power plants worldwide. In the years 1982 to 1985, Vestas and other Danish manufacturers supplied hundreds of modern wind power plants to the United States, most of which were installed in California. In fact, 90 percent of Danish wind turbine production was exported to the United States in those years.

Denmark was a pioneer in the early development of wind power for electric energy production and is today one of the leaders in the design and manufacture of wind turbine units and in the actual use of wind power to produce electricity for Danish industrial, commercial, and residential utilization. This book, “Wind Power – The Danish Way,” is an interesting and informative account of the long history of wind power in Denmark. Its 88 pages include many vintage and modern photographs and illustrations that effectively supplement the text.

Gary Frost’s Early FM Radio offers a new perspective on the development of FM radio. The usual view is that Edwin Armstrong, almost single-handedly, brought this technology to fruition. Frost shows that many people contributed to its development and sheds new light on Armstrong’s relation to RCA. In 1990 the law firm that represented Armstrong in his long legal battles with RCA donated the Armstrong files to Columbia University, and Frost has made extensive use of these records in revising the standard account of FM history.

Frost examines the contributions of radio engineers, at RCA, Westinghouse, and elsewhere, from the first decade of the century into the 1940s. He considers, as well, the important role of radio amateurs and the pioneers of FM broadcasting. A concluding chapter provides an overview of how FM has fared in the years since 1940. Though a lay person would understand most all of the book, the technical level is fairly high, as many equations and circuits are presented and explained.

Gary Frost is an engineer and freelance historian. This book is carefully researched, and sources are given in endnotes. There is also an essay on sources and a glossary of technical terms. About two dozen figures, many of them circuit diagrams, complement the text. An appendix gives the basic information about FM-related patents issued in the United States from 1905 to 1953.


David Nye, the author of *Electrifying America* and *Consuming Power*, has written an engaging history of the opposite side of electrical history, namely what happens when the electricity goes off and there is no power to consume. *When the Lights Went Out* explores how the public reaction to blackouts has changed and how the festive mood in New York City during the 1965 blackout was significantly different from the eruption of arson and looting during the 1977 blackout.

Nye describes how electricity – by banishing darkness – altered time. Thus, as power systems became more complex and thus subject to blackouts, “artificial darkness” (which is really not ‘artificial’ at all, but a return to the natural state) became the new anomaly. Cities became anti-landscapes, uninhabitable without electricity. Nye examines the social reactions to the controlled blackouts instituted during World War II, the coal shortage brownouts of 1946 caused by the strikes, and the accidental blackouts of 1965, 1977, and 2003, and the rolling blackouts of the 1980s and 1990s.

Nye examines how the economic forces in the deregulated electric utility industry fostered the development of interconnections, which have increased the complexity of the systems which need to be monitored and maintained, and which make large failures possible.

The final chapter “Greenout?” makes a plea for voluntarily reducing our use of electricity. The effects on the environment – global warming, acid rain, strip mining – are cited, but Nye also points out the advantages to our sensory balance and reduction of stress to reduce our dependence on electricity. Nye notes that the U.S. economy loses an estimated $50 billion per year as a result of power failures, and points out that – as the power consumption demands on the grid increase, and the generation and delivery systems become more complex – those failures will continue.

“A fascinating pictorial, the unfolding of the bizarre and the beautiful,... that will delight the senses and excite wonder.”

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Smithsonian Institution

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