IEEE History Center
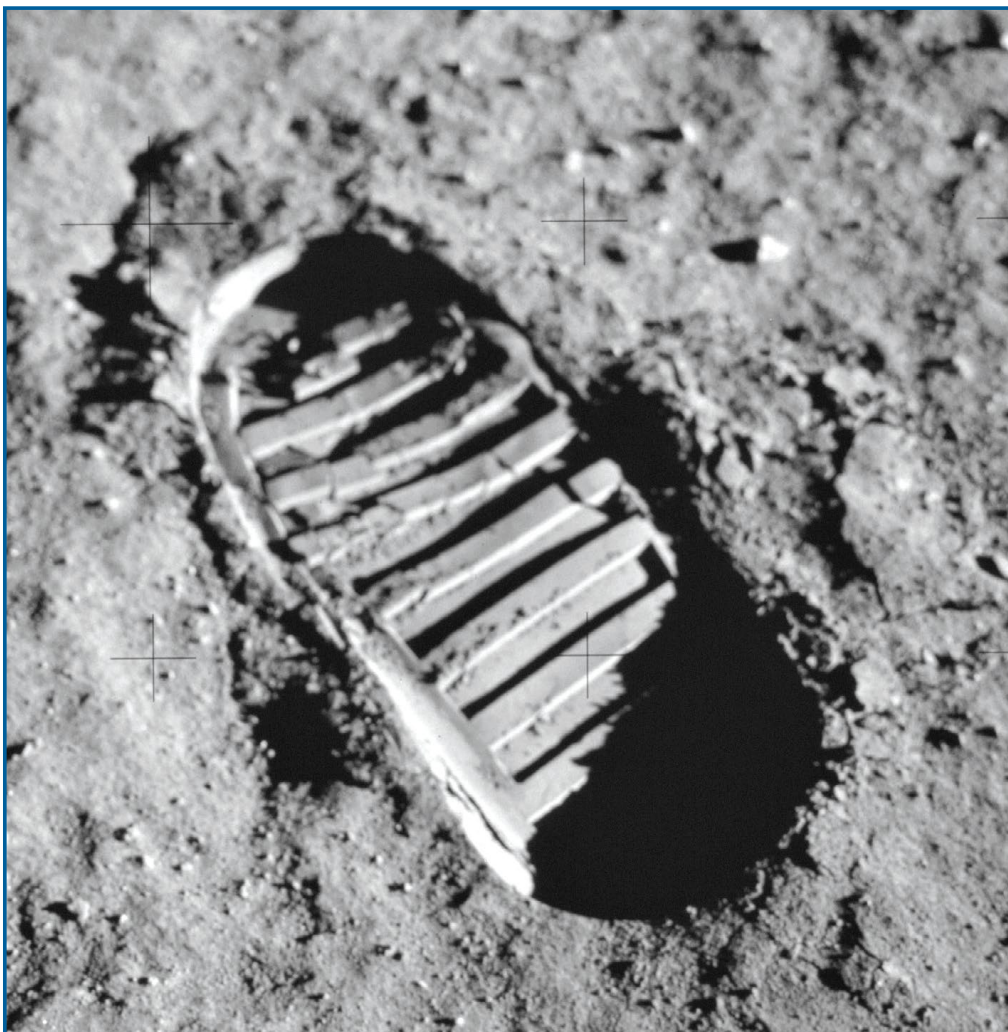
FOOTSTEPS: IEEE'S COMMEMORATION OF HUMAN SPACE TRAVEL

IEEE Celebrates the contributions of its members to the technologies of space travel.

SIGNALS FROM THE DIRECTOR

By Michael N. Geselowitz, PhD

In 1999, the U.S.' National Academy of Engineering (NAE) approached its partner professional engineering societies about a project to poll their memberships. The idea was, in observance of the change of the century/millennium, to identify the "top twenty" engineering achievements that transformed 20th century society. It soon became clear—because the other societies lacked full-time historical staff— that the IEEE History Center would be the main staff support for the project, which we gladly undertook. The contest was completed, and a website, **http://www.greatachievements.org/**, created (the website is still maintained and can be visited). The popularity of the web project led NAE to commission a book, which was published by their Joseph Henry Press imprint in 2003 as *A Century of Innovation: Twenty Engineering Achievements That Transformed Our Lives* by

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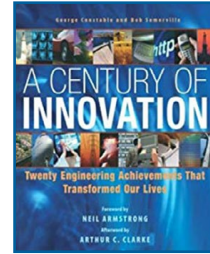
HOW CAN THE HISTORY CENTER HELP YOU?
A Handy Guide to Some of Our Programs and Contacts

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

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

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

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

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

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

Support for scholars:

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

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

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

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WAYS YOU CAN HELP HISTORY

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

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

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

George Constable and Bob Somerville. (The book is out of print, but is available in PDF format on the NAE website: **https://www.nae.edu/Publications/Reports/25878.aspx**.)

The book included a "Perspective" essay for each achievement by a leader in that field, an afterward by—naturally—Arthur C. Clarke, and a forward by Neil Armstrong. I had the immense privilege and honor to meet Armstrong at the book launch, representing the IEEE History Center, as well as, with other dignitaries, IEEE more broadly.

The Number One engineering achievement of the 20th century was judged to be electrification (I promise you, the IEEE did not "put in a fix"). Numbers Two and Three were the automobile and the airplane. Sitting comfortably at Number Twelve was another form of "transportation"—spacecraft. I still recall the discussions as to whether space travel really had the impact of these other achievements. In the end, the project decided yes, because of the growth of space-based telecommunications and global positioning.   But there was subtext to these discussions—a feeling that sending human beings to walk on the surface of the moon and bringing them back alive

was in some sense THE greatest engineering challenge in all of human history, independent of social influence, and that the impact on the human psyche was sufficient to put it on the list. That is why Neil Armstrong—the first person on the moon, an aeronautical engineer as well as an astronaut, and someone dedicated to the education of young people—was asked to write the introduction.

As you can see from a glance at the cover of this issue, the IEEE History Center is doing something unusual this year. Without giving short shrift to other technologies and other achievements, where possible we are going to orient our programs—such as Milestones, Oral Histories, articles—around the 50th anniversary of Armstrong's "giant leap for mankind," which he undertook on 20 July 1969. Our focus will be the role of engineers, and particular IEEE members, in this achievement, and in raising the public visibility of the profession and IEEE. As you will see throughout this issue, we will be collaborating with a wide array of IEEE organizational units and external entities to celebrate this unique achievement.

HISTORY COMMITTEE ACTIVITIES

HISTORY COMMITTEE CHAIR'S MESSAGE

By Bob Dent

2019 marks the fiftieth anniversary of the lunar landing. What an achievement. Do you remember where you were? I went to Central Park in Manhattan where there was a large screen set up in a section of the park called Sheep Meadow. The screen showed images of the astronauts bouncing around the lunar surface.

This was a major accomplishment. The IEEE History Committee, with the assistance of the staff of the IEEE History Center, will be celebrating the contributions IEEE members made. I am sure that many technological breakthroughs occurred to accomplish this flight to and back from the moon. As Chair of

the IEEE History Committee, I see many potential milestones here. Please consider taking the time to propose one so it will be captured in a permanent recognition of a contribution to our profession. Information about proposing an IEEE Milestone can be found at: **http://ieeemilestones.ethw.org/Milestone_Guidelines_and_How_to_Propose_a_Milestone**

As 2019 has started, three 2018 members completed their term. I thank Antonio Perez-Yuste, Juan Carlos Miguez and Kartik Kulkarni for their participation and hard work during their time. Also. I welcome four new members to the committee; Elizabeth Bruton, Michael Polis, Antonio Savini, and Enrique Tejera. I look forward to a successful year for the IEEE History Committee.

IEEE MEMBERS SHARE THEIR MEMORIES WORKING ON SPACE TECHNOLOGIES

Back in December, IEEE Life Members Committee Chair Charles Turner sent an email on the IEEE History Center's behalf to the Life Members announcing IEEE's celebration of the contributions of its members to human space travel. The response has been inspiring, with more than fifty replies so far. Members have been submitting their First-Hand Histories and Topic Articles to the Engineering & Technology History Wiki. Together, these represent a masters class in ingenuity and creative problem-solving. IEEE History Center staff have built a page on the ETHW to collect these vital eye-witness views of technical history at: **https://ethw.org/footsteps** The page has more than sixteen Oral histories (including one by Commander James Lovell), and twenty First-Hand Histories. We hope this will inspire even more people to send theirs in. If you have a story to tell, please go to **https://ethw.org/Create** or email Robert Colburn at **r.colburn@ieee.org**

We don't have space to sample them all, but here are just a few treasures from the many wonderful stories people are telling. To read them all, please go to **https://ethw.org/footsteps**.

* * *

"About a week before engineers at Cape Canaveral were scheduled to begin their "closed-loop tests" they asked where the "Hats" were. No one at our division had any idea of what they were talking about….The hats were the couplers from a coax cable to the antennas which were supposed to represent free space coupling. WE didn't have any contract for the hats…so that took time for getting the hats designed, which was my problem. The Range Safety antenna was narrow band half wavelength cavity backed slot antenna, so we had to have a very loose coupling to keep from detuning the antenna. I just used a small loop of wire terminated by a a 50 ohm resister and mounted it a fairly large cavity. The Telemetry antenna was a blade type with an ablative coating to keep it from being destroyed during blackout. it's hat was similar to that for the range safety antenna except the cavity had to be large enough to accommodate the Blade. Getting these hats designed and through the Douglas system was difficult, but we made it with all the hats painted a shiny yellow as I recall."

—Carol Crom

"A First Assignment was to help the man who was designing the *entire* digital portion of the radar interface to the Lander's computer. He immediately told me, "things were not

> *"Upon my reporting on my first day of work, I recall very vividly when Mr. Robert (believe that was his first name) Walker came into the room, and said (I am paraphrasing) 'Our objective is to put a man on the moon and your job is to tell us how to get there and to get back,' and then walked out of the room."*

working right." In those days, digital design was all Nand/Nor gates. Goodie, I thought, I had just finished a class in how to do everything under the sun with such new astonishing *integrated* circuits. (My own highest-level Boss had once confided in me that he could not understand how these newfangled transistors worked because he couldn't find any *voltages* on them. I eventually fell in love with my Curve Tracer on a wheeled lab cart. (Good thing I discovered that some ignoramus had clipped off the longer ground pin of the bench plug, connecting the whole cart to 120VAC.)

Back to my digital design task. Turned out that the problem(s) were due to classic race problems—two signals changing at nearly the same time at the inputs to a gate. The tiny overlap was giving tiny spikes at the output. How did you FIX that in the Good Old Days? I was instructed **not** to re-analyze the Logic but to just add small a-few-picofarad capacitors at every misbehaving output in the entire design. Stop rolling your eyes! It worked fine then, no matter how awful it sounds now."

—Don Watts

"Most of my work on space projects was very enjoyable, since it required investigating new concepts to meet future needs. I was also lucky to have good team-mates and supportive bosses. However, since much of the technology was still in the formative stages, we had to be very careful in our predictions. This was especially true for NASA projects, which required prolonged analyses, followed by feasibility studies, proof-of-concept experiments, prototype development, and finally production and launch of the proposed spacecraft….Although the process was cumbersome, I rather liked it, because of what I had learned from my father. He was a lawyer (and later a judge), and he always stressed the need to examine all aspects of an issue, instead of focusing on just what appears to be important – because sometimes a seemingly minor issue can turn out to be very significant in making or breaking a case. I was reminded of this many years later, when a colleague reminisced about how his very expensive, state-of-the art equipment for spaceborne use was almost destroyed during tests by a malfunctioning run-of-the-mill fuse!"

—Saj Durrani

"Each silicon-controlled rectifier was built into a massive bolt, screwed into a large heat sink, with a fat braded wire and a small control wire. When fired, current flowed from the bolt to the fat braded wire. Unfortunately, the SCRs were failing at a high rate. A root cause study revealed that a relatively weak

and slowly rising firing signal focused all of the current to an area of the SCR silicone chip close to where the firing signal was introduced. This successively burned that area and thus raised the SCR firing threshold, until the SCR stopped firing – meaning that the power supply stopped working.

I developed the new SCR driver based upon a complementary NPN / PNP cardiac pacemaker circuit I had used as my senior project at Stony Brook. The circuit, providing a more powerful and abrupt firing signal, distributed current to the entire SCR chip area. This resolved the root cause of the SCR failures and greatly raised power supply reliability."

—Richard Reis

"Upon my arrival in Huntsville and reporting on my first day of work, I recall very vividly when Mr. Robert (believe that was his first name) Walker came into the room in which I was located and said (I am paraphrasing) 'Our objective is to put a man on the moon and your job is to tell us how to get there and to get back,' and then walked out of the room.

At that time I was 32 years old and had 7 years' experience and my "professional" experience, related to space work, was restricted to developing technology for the TIROS weather satellite under contract with the Goddard space flight center in Washington, DC. After he left I was sitting there thinking "what have I gotten myself into", because I knew from my previous research on the subject that getting to the moon and back meant having to "hit" a square foot of space behind the moon when measured in the 6 components of position and velocity (or the six orbital parameters)."

—Walter Land

CENTER ACTIVITIES

FOOTSTEPS: IEEE'S COMMEMORATION OF HUMAN SPACE TRAVEL
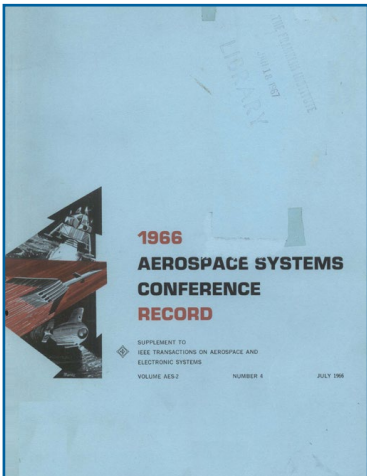
IEEE, its members, and publications were crucial to space flight technologies

Because many technologies within IEEE's fields of interest were crucial to space travel, IEEE is eager to celebrate this heritage and publicize the contributions made by IEEE members.

IEEE Was There:

Then as now, IEEE members were publishing seminal journal and conference papers. The IEEE History Center maintains a page that captures links to these papers, and shows the importance of IEEE as a publisher of technology.

https://ethw.org/Human_Space_Travel_Seminal_IEEE_
Journal_and_Conference_Papers

Outreach to IEEE Members:

The response from Life Members who worked on space travel-related technologies has been enthusiastic. Already, more than fifty Life Members have responded. Many of these have supplied valuable and interesting first-hand histories which might otherwise have never been recorded. These can be found at:
https://ethw.org/footsteps

The IEEE Milestones Program:

The IEEE Milestones Program is one of the most visible ways that IEEE celebrates the heritage of important achievements in its fields of interest, and celebrates the value of the profession to humanity. Two space-related IEEE Milestone proposals (Project Diana, 1946, and LURE Lunar Ranging Experiment, 1969) were approved by the Board of Directors, and will be dedicated in 2019. In addition, three space-related milestone proposals are currently being written: The Parkes Radiotelescope (which received the TV and radio feed from the moonwalk), S-band Communications Systems, Space Shuttle Training Simulator Software, and Space Shuttle Remote Manipulator.

IEEE has already dedicated four milestones related to space travel and the lunar program:
- Electronic Technology for Space Rocket Launches **https://ethw.org/Milestones:Electronic_Technology_for_Space_Rocket_Launches,_1950-1969**
- The Mercury Spacecraft: **https://ethw.org/Milestones:Mercury_Spacecraft_MA-6,_1962**
- Apollo Guidance Computer: **https://ethw.org/Milestones:Apollo_Guidance_Computer,_1962-1972**
- Lunar Module: **https://ethw.org/Milestones:Grumman_Lunar_Module,_1962-1972**

There are many more that could be proposed. The staff of the IEEE History Center **http://www.ieee.org/about/history_center/index.html** is eager to work with milestone proposers and to guide them through the approval process.

Cohosted Events and Public Visibility:

IEEE History Center staff are in discussions with the Intrepid Air & Space Museum, Adler Planetarium, Cradle of Aviation Museum, Lincoln Laboratories, Nokia, and others about co-hosted events.

A BRIEF TIMELINE OF HUMAN SPACE TRAVEL

12 April 1961— Yuri Gagarin space flight

20 February 1962—John Glenn space flight

16 June 1963—Valentina Tereskhova becomes first woman in space

18 May 1969—Launch of *Apollo X* (the "dress rehearsal")

16 July 1969—Launch of *Apollo XI*

20 July 1969—Neil Armstrong steps onto the Moon

17 July 1975—*Apollo* and *Soyuz* dock in space

12 April 1981—Space Shuttle STS-1 *Columbia* launches, on the 20th anniversary of Gagarin's flight

20 November 1998—Launch of the first component of the International Space Station
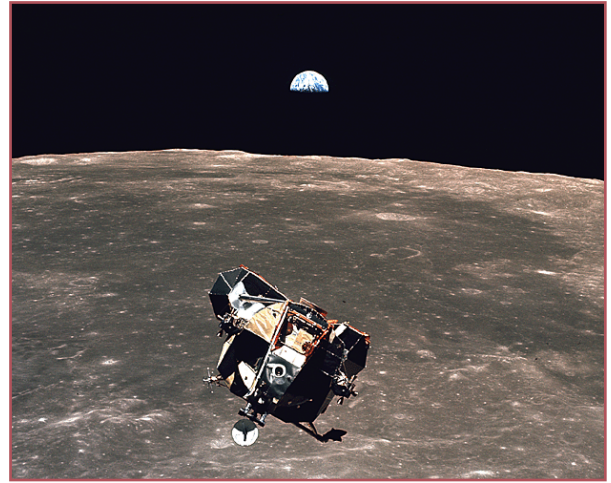
The Lunar Module returning from the Moon's Surface. Photo courtesy of NASA.

THE RACE AGAINST TIME: AN INTERVIEW WITH DIGITAL CONTENT SPECIALIST NATHAN BREWER

"The History Center has a great deal of physical resources, and putting them online makes them accessible to the entire world, where they can be used far more efficiently by scholars and enjoyed by the general public."

History Center Newsletter: In what ways do you see the History Center and the preservation of technological history contributing to IEEE's mission of fostering an innovative future?

Brewer: Looking to the past provides insight not only on technologies' previous successes and failures from a technical standpoint, but also allows for the study of the socio-political and ethical implications of technology.

HCN: What are some of the aspects of your job that you find especially interesting or satisfying?

Brewer: Making materials available on the Engineering and Technology History Wiki (**http://ethw.org**) is probably the most satisfying. The History Center has a great deal of physical resources, and putting them online makes them accessible to the entire world, where they can be used far more efficiently by scholars and enjoyed by the general public.

HCN: If you could go back in time, what historical moment would you like to have been present for?

Brewer: It would be fascinating to witness some of Benjamin Franklin's electrical experiments or seeing some of Edison's initial lighting and power installations.

HCN: Who are some pioneers of technology who you find most interesting?

Brewer: Franklin Pope was a very interesting figure. He was the second president of AIEE, and much like Thomas Edison, involved in almost every emerging electrical technology that emerged in the latter half of the 19th century. One of the more interesting projects he worked on was a proposed San Francisco-Moscow telegraph line, which shows that as early as 1864, engineers were already thinking in ways to become globally connected.

HCN: Do you feel you have a personal mission as a historian?

Brewer: My personal mission is to minimize long-term loss of collections. I approach preservation from a catastrophist point of view—in that it's not if a disaster happens; it's when. Preservation efforts are a race against time to ensure that the most amount of material survives. Examples from history show us time and time again that anything can happen to collections—from the burning of the Great Library in Alexandria to poor collection management at the BBC, catastrophic collection loss events can quickly and permanently rob the world of knowledge.

IEEE REACH EXPANDS ITS "REACH"

By Kelly McKenna, REACH Program Manager

2018 proved to be a successful and enthusiastic year for the IEEE REACH Program. We added new inquiry units (or lesson plans) including Electric Lighting, and Refrigerator Rail Cars, conducted two new teacher development workshops, presented the program to numerous teachers at Social Studies and STEM conferences, and have more than doubled our subscription base.

Currently, the program has 610 subscribers. Subscribers include educators who teach in schools located in forty-five different states within the United States, and forty-two countries

outside of the U.S. These educators work in different Social Studies disciplines; the majority are high-school World-History teachers, which is our target audience. Others are Civics, Economics, Geography and U.S. History educators. These teachers encompass different educational levels, from high school and middle schools, to elementary schools and universities. At the university level, the program attracts professors from engineering as well as education programs; they are the "teachers who teach the teachers." This will ensure that REACH's mission, to improve and enhance technological literacy skills of students at the pre-university level, continues and is sustained.

This has all been made possible by the gracious donations given to the REACH program, the research of the IEEE historians, and the grass-root marketing efforts used to get the program in front of teachers.

Moving forward, we will continue to add content to the website. In 2019, keep an eye out for new lesson plans including: the next one on Skyscrapers, new videos for Electric Lighting and Refrigerator Rail Cars, and new hands-on activities. We will continue to market the program, and to present at different educational conferences, with presentations at Social Studies and STEM conferences. For example, in March we will be presenting and exhibiting at the National Council for History Educators' (NCHE) annual conference taking place in Washington DC, and also at the International Technology and Engineering Association's (ITEEA) annual conference taking place in Kansas City, MO. IEEE Educational Activities is partnering with the IEEE History Center and the REACH Program for the ITEEA exhibit. In May, we will be partnering with NCHE and the National Centers for the Humanities on a live and interactive professional development webinar on Electric Lighting, which will be presented by scholar and IEEE Historian, Dr. Mary Ann Hellrigel. We are also working with other outside organizations on similar opportunities. New in 2019 will be an advertising campaign.

Our goal is to expand the IEEE REACH program, both in content and awareness, ensuring that teachers are aware that these great, free, resources exist to assist them in bringing the history of technology and engineering into the classroom. Our ultimate goal is to ensure that all students are technologically-literate citizens, and that they obtain an understanding of the implications technology has for society.

SPACEFLIGHT MOVIE FESTIVAL

In commemoration of human space travel, the staff of the IEEE History Center have compiled a list of their favorite space technology films. The films we chose emphasize the technical aspects and technological support of spaceflight. We recognize that there are a lot of great space films not on the list, but we hope that you will enjoy watching, or rewatching, these.

"2001: A Space Odyssey" —Director Stanley Kubrick went to enormous lengths to get the technical details correct. His depiction of space travel, and the role of technology within it, sets up one of the classic human vs. computer encounters of cinema.

A still from the movie "A Trip to the Moon"
Photo courtesy of Wikimedia Commons.

"A Trip to the Moon (Le Voyage dans la Lune)" – Arguably the first completely surviving science fiction film, the 1902 Georges Méliès classic is the first film to depict spaceflight. While not realistic (the film launches its astronauts in a giant cannon), the film pioneered the use of fantastical special effects.

"Aelita (Аэлита)" – The first appearance of rocketry in film, this 1924 Soviet film depicts an alien Martian society with gorgeous constructivist sets, costuming and makeup set against a melodramatic backdrop of an interplanetary Bolshevik revolution spreading from human contact with Mars.

"Apollo 13"—A celebration of technical discipline, logical thinking, and ingenuity. The engineers on the ground push their skills to the max in order create the solutions that will return the crew of the stricken *Apollo XIII* to earth after an explosion on board.

"The Dish" – The story of the satellite ground station and radio telescope in Parkes, Australia, and how it overcame many obstacles (including wind squalls) to receive the television images of the Apollo moonwalk. Sam Neill leads an excellent cast. The scene with the U.S. ambassador NASA officials, and the local high school band playing what they assume to be (but isn't) the U.S. national anthem is brilliantly humorous.

"Hidden Figures"—The inspirational story of the women who defied gender and racial barriers while performing the calculations needed to make the U.S. space program possible. Taraji Henson portrays mathematician Katherine Johnson, Octavia Spencer portrays NASA supervisor Dorothy Vaughn, and Janelle Monáe portrays NASA engineer Mary Jackson.

"October Sky"—The launch of *Sputnik* inspires a group of U.S. high school students in West Virginia to build and launch their own rockets. Based on the memoirs of NASA engineer Homer Hickham.

"Woman in the Moon (Frau im Mond)" – Fritz Lang's 1929 film is the first depiction of a multi-stage rocket in cinema, and Hermann Oberth served as technical advisor. The film was banned under the Nazi Regime as the Gestapo deemed the launching scenes and production models to be too realistic. They pulled the film from distribution, and seized the production model rockets in 1936. The film was an inspiration to the V-2 team, and the first successful launch of the V-2 bore the *Frau im Mond* logo at its base.

MEET OUR NEW RESEARCH ASSISTANTS

THOMAS ALVARADO

My name is Thomas Alvarado, and I am a Freshman at Stevens Institute of Technology. I am a Mechanical Engineering Major and currently am working towards the Co-Op Program. I knew I wanted to be an engineer from the day that I joined the lego robotics club in my middle school in Suffern, New York. From there I kept working towards building a strong background in engineering courses, sciences like chemistry and physics, and math courses, in particular, calculus. I feel that I am so lucky to be able to attend a school like Stevens because of the challenging curriculum and the endless opportunities that students have here, especially with New York City being right across the river. My interests include walking around the city, learning about nuclear power, swimming, and cycling.

ZACHARY HALPERN

My name is Zachary Halpern, and I'm from Cartersville, Georgia, located halfway in between Atlanta and the Tennessee border. I attended Cass High School in White, GA, which was recently built in the middle of a rural but quickly growing area. I am currently attending Stevens Institute of Technology in Hoboken, New Jersey as an Electrical Engineering major and hope to participate in the Co-Op program, allowing me to graduate in 2023.

My general interests lie in a mixture of fields, being a mixture of electrical, civil, mechanical, and even environmental engineering. I enjoy marveling at groundbreaking feats of technology, whether it be in something as simple as a phone or something as massive as a skyscraper construction and control systems. One of the things that never ceases to amaze me relating to our daily world is looking back at the size and limitations of the first generations of the technology we use today. The fact that a simple laptop is able to harness the power of computers once the size of a room is nothing short of stunning. Even currently where this power, passed onto even smaller devices such as tablets or phones running on a 7nm chip, can outperform most decent current laptops, just boggles my mind. I am highly interested in seeing where we can go with technology and how we can nearly eliminate the limitations.

LOGAN SMITH

Logan Smith is a freshman Computer Engineering student at Stevens Institute of Technology. He hails from the small town of Pittsgrove in southern New Jersey. Coming from a family of antique store owners, Logan has long had a fascination with history and has handled many electronic devices from all throughout the past two centuries firsthand, including one of the first commercially marketed electric fans. He is excited to join the team and learn more about the history behind the devices he encountered growing up, and he hopes his background and understanding of history will be a valuable asset for the IEEE History Center. In his spare time, Logan enjoys hobby programming and electronics as well as running, biking, and skateboarding.

THINGS TO SEE AND DO

THINGS TO SEE AND DO: SPACE ACTIVITIES

The Science of Apollo, 28 March 2019, **https://www.lindahall.org/event/science-of-apollo** Linda Hall Library, Kansas City, MO, U.S.A.

11-14 April 2019, IEEE Region 3 Meeting in Huntsville, AL, U.S.A. There will be a special emphasis on the Saturn and Apollo programs.

15 July 2019, Panel discussion at Huntsville, AL, U.S.A. Contact Klaus Dannenberg **klaus2@aol.com** for more details.

20 July 2019, Apollo Moon Fest at the Cradle of Aviation Museum, Garden City, Long Island, NY, U.S.A. The Cradle of Aviation Museum will have a number of events celebrating the anniversary of the lunar landings. Check their calendar for details: **https://www.cradleofaviation.org/plan_your_visit/event_calendar.html**

19 July 2019, the Intrepid Sea, Air, and Space Museum, New York, NY, U.S.A. **https://www.intrepidmuseum.org/PublicEventsCalendar.aspx** Astronomy Night/Apollo XI anniversary.
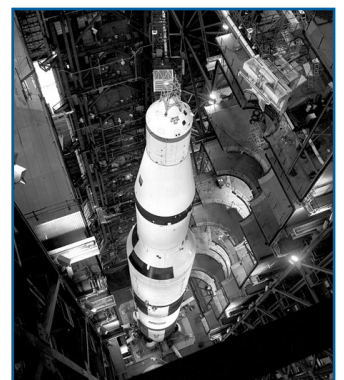
An Apollo Project Saturn V rocket being built in 1967

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. In this issue, we feature sites marking the 50th anniversary of the landing of humans on the Moon.

http://apollocelebrationgala.com/

https://www.nasa.gov/feature/nasa-releases-logo-to-mark-apollos-50th-anniversary

http://www.collectspace.com/news/news-091318a-smithsonian-apollo11-50th-celebration.html

The International Federation of Automatic Control (IFAC), headquartered in Laxenburg, Austria, recently released an e-book on its website (**www.ifac-control.org**) entitled "The IFAC Story". It is a 300 page comprehensive history of the organization since its founding in 1957.

IEEE FOUNDATION

UNPRECEDENTED SUCCESS: DUAL IEEE MILESTONE DEDICATION

The IEEE Foundation continues to introduce members to the *Realize the Full Potential of IEEE Campaign* during a reception held between dual Milestone dedications in Silicon Valley. The Campaign, the first in IEEE history, seeks to raise $30 million in support of Foundation funded programming, such as the IEEE History Center. To date the Campaign has succeeded in raising in excess of $18 million or almost 61% of the goal. This level of success is unprecedented in IEEE's experience.

During the events held on 15 August, IEEE dedicated two important and long-awaited IEEE Milestones in Silicon Valley, CA, USA – "Birthplace of Silicon Valley" (Shockley Labs) and "Moore's Law."
https://ethw.org/Milestones:List_of_Milestones
Between the dedications, the IEEE Foundation proudly hosted a reception for the members and donors who gathered to celebrate both. The day started with more than 300 guests being treated to remarks from Jim Gibbons of Stanford University, and IEEE President Jim Jefferies unveiling the Birthplace of Silicon Valley Milestone on the site of Shockley Semiconductor Laboratory, which manufactured the first silicon devices. The event ended with a packed house at the Computer History Museum witnessing 2017 IEEE President Karen Bartleson unveiling the Moore's Law Milestone and listening as experts opined as to the future of Moore's Law.

Those attending the events represented some of the Foundation and the Campaign's earliest supporters, including Professor Tom Kailath, who has been instrumental through his personal support and by making important connections in support of the Foundation's Global Leaders Series. Also attending were friends of the Foundation, Dr. and Mrs. Jim Spilker, Professor Argoyswami Paulraj, Dr. Jim Omura, Dr. Marcian and Mrs. Hoff, and Professors Eli Yablonovitch and Marty Hellman.

Connecting the work of the Foundation to the Milestone events was Foundation President and Silicon Valley resident, Dr. John Treichler.

Foundation and the Campaign's earliest supporters celebrating the milestone dedications. (In order, left to right), Dr. Jim Omura, Professor Tom Kailath, Professor Eli Yablonovitch, Dr. Jim Spilker, Marty Hellman.

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

JOHN MEREDITH TRIBUTE

On 26 September 2018, IEEE lost a key member of our family, IEEE Life Senior Member John Meredith, who died in Colorado Springs, CO, USA, at the age of 78. John received the BSEE from the University of Arkansas and the MSEE from the University of Colorado at Colorado Springs, a town where he was to stay for the rest of his life. His career had begun as Assistant Electronics Officer on the carrier Intrepid (**https://www.intrepidmuseum.org/**), where he qualified as underway Officer-of-the-Deck. He went on

to positions at the Navy Electronics Laboratory and the S5G Navy Nuclear Plant, and then at numerous private companies. However, his *Intrepid* experience was dear to his heart, and the IEEE History Center is privileged that he recorded those experiences for us in a First-Hand History on the Engineering & Technology History Wiki (**https://ethw.org/First-Hand:Adventures_on_the_USS_Intrepid**).

The official IEEE records will note that he served on the IEEE Board of Directors twice, as Region 5 Director from 2004 – 2005, and as IEEE President in 2007. However, anyone involved closely in IEEE Activities for the past 40 years knew John and knew that he served IEEE in every possible way both in formal positions and behind the scenes. Joining IRE as a student in 1960, and becoming an IEEE member in 1965, he first emerged as a formal volunteer in 1979, when he became Treasurer of the Pike's Peak Session. He then proceeded to fulfill every imaginable position in the Pike's Peake Section and Region 5, as well as on numerous other committees on the Board. He was also involved in IEEE Educational activities through his life-long interest in education and his activity on ABET. In fact, although, as outlined above, he was a "working" engineer his whole career, he continued to teach electrical engineering courses at the University of Colorado at Colorado Springs, and the next generation of you engineers was always uppermost in his mind.

The tributes to John have been pouring in from IEEE Region 5, from IEEE-USA, and from around the IEEE world. In addition to his IEEE work, he was a key volunteer for the AARP Foundation's Tax-Aide Program. We, however, would just like to add a note about his importance to IEEE's historical activities. After the death of Charles Wright, John took over the informal position of Milestone coordinator for Region 5. Charlie had begun a tradition of Region 5 being a leader in proposing and dedicating Milestones, and as John carried this forward, he came to work closely with the IEEE History Committee and the IEEE History Center. He began to champion not just local history, but to promote historical activities throughout IEEE. John always led by example, for instance contributing not only one of the initial First-Hand Histories to the ETHW, but numerous other articles as well.

His support of the IEEE History center can be seen particularly in his two stints on the IEEE Life Members Committee—the LMC is an important supporter of the IEEE History Center—and when he became active as a Director on the IEEE Foundation Board of Directors, eventually rising to be Vice president for Grants (he was made a Director Emeritus in 2015). The Foundation is the major supporter of the History Center. In both those positions, he was always a voice for the importance of history. Therefore, although John is deeply missed, we are pleased to announce that the IEEE Foundation has established a fund in his memory: **https://give.ieeefoundation.org/campaign/2018-john-meredith-memorial-giving/c209852**.

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.

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