

Events and Sightings

Chigusa Kita, Editor
Kansai University

Edward Feigenbaum Personal Papers

As we examine the forces that created the modern computing environment, we will need to understand the nature of the competition between the United States and Japan in the 1980s. This competition ultimately led to the development of new high-speed computing architectures and the network infrastructure that became the Internet. Stanford University has released a wealth of materials that will help us better understand this competition in the personal papers of Edward Feigenbaum (1936–). These papers can be found at <http://library.stanford.edu/collections/edward-feigenbaum-papers>.

By any measure, Feigenbaum was an important early contributor to the development of computer science and AI. His work has garnered him the ACM Turing Award in 1994 and the IEEE Computer Society Pioneer Award in 2013. His archive illustrates the depth of his contributions and the foundation that he created for others.

If Feigenbaum had done nothing but complete his first book, a compendium entitled *Computers and Thought* (McGraw-Hill, 1961), he would have been remembered as a founder of the field. This book served as the first major textbook on the subject. It presented an overview of the research that was then current and also included fundamental papers such as the article that defined the Turing test. At the time he edited the book, Feigenbaum was a young faculty member at the University of California at Berkeley. Only a few years before, while an undergraduate at Carnegie Tech (the precursor to Carnegie Mellon University), he had been introduced to the ideas of AI by Herbert Simon. After this introduction, he began to develop his ideas by creating a system that was capable of learning an elementary language.

Some 25 years later, Feigenbaum wrote a book called *The Rise of the Expert Company* (Vintage, 1988), which showed how corporate organizations could benefit from AI and expert systems. Like *Computers and Thought*, this book was sufficient to cement his place as one of the early leaders of the effort to develop machine intelligence. However, between the two, he and the journalist Pamela McCorduck wrote *The Fifth Generation* (Signet, 1984), which forever marked the computing environment of the 1980s.

The Fifth Generation quickly became the center of a public discussion in the United States that tried to understand the resurgence of the Japanese economy and the relative stagnation of American production. The

book argued that Japan had undertaken a new and ambitious computing program that was going to outstrip American efforts. This isn't just another of those books that says Japan is better than we are ... it points with a trembling finger at Japan's commitment to produce within a decade a new generation of computers so immensely powerful that they will in effect constitute a new and revolutionary form of wealth."¹

The book appeared at a key moment in American economic history. Just three years prior, Japan had exported more goods to the United States than it imported. The United States became concerned over economic policies that seemed to allow Japan to dominate an export market while keeping non-Japanese goods out its own markets. In response, it demanded and received a statement from Japan that it would voluntarily limit trade. Similar agreements became increasingly common as tension over trade grew.

Also, Feigenbaum's book appeared just three years after Tracy Kidder's classic *Soul of the New Machine* (Little, Brown, and Company, 1981), a book that introduced many Americans to the computer and its operations. Kidder's book had seemed to argue that the computer was one of the great pillars of American industry, but Feigenbaum and McCorduck took a different view. "While we are busting our buttons about the fourth generation of supercomputers, the two authors explained, 'the Japanese have announced a major effort, involving 200 scientists and some \$400 million to design and develop the fifth generation of computers.'"² They argued that there were "grave dangers that in one decade, the 1990s, the United States will go from superpower to forlorn, backward nation, barely able to sustain itself, while a Japanese-led revolution passes us by."²

Not everyone agreed with the ideas presented in *The Fifth Generation*, especially when they realized that Feigenbaum and McCorduck were proposing a project with an annual budget comparable to that of the Apollo moon landing program to build computers and program systems that promised to mimic human thought. "Reading this book brings to mind those spare religious pamphlets," wrote the *New Scientist*, "They foretell a new and radically different future, and entreat the reader to take the vows now before the new order descends."³

In the end, the Japanese Fifth Generation Project was far less successful than Feigenbaum and McCorduck predicted. The American response, while far less

focused than Feigenbaum desired (and far less costly), developed new systems that have had a profound impact on computing, commerce, social relations, and the exercise of political power. It is, perhaps, the most public contribution of Feigenbaum's career and a period that is well documented in the collection of his papers that Stanford Library has released online.

The collection is extensive, more than 18,000 documents, and spans his career. (Although like the collections of almost all prominent scientists, it has more ceremonial correspondence than rough drafts and more information about the later part of the career than the early years.) The bulk of the material deals with his work in AI, and it gives a rich picture of the critical period from 1960 through the mid-1970s, when AI laboratories showed some early promise. It also does a good job of documenting Feigenbaum's work in expert systems.

References

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David Alan Grier is an associate professor of international science and technology policy at George Washington University. He is also the author of *When Computers Were Human* (Princeton, 2005) and *Too Soon to Tell* (IEEE CS Press, 2009), a former editor in chief of *IEEE Annals*, and the current president of the *IEEE Computer Society*. Contact him at grier@gwu.edu.

UNIVAC 120 in Japan

UNIVAC 120, the first US computer imported to Japan, is now on permanent display at the Museum of Science at the Tokyo University of Science (see Figure 1). A set of UNIVAC 120s was donated to the Tokyo University of Science (TUS) by the Nomura Research Institute (NRI). The machine was used by the Nomura Insurance Company in the 1950s. The presentation ceremony, held on 27 February 2013 at the Museum of Science, was attended by Shigeru Nakane, chairperson of the TUS board; Akira Fujishima, president of TUS; Akihisa Fujinuma, chairman of NRI; and Yasushi Iribe, president of UNIADDEX.

UNIVAC 120 was released by Remington Rand in 1954, and two sets of UNIVAC 120



Figure 1. Exhibits at the Tokyo University of Science's Museum of Science. From left to right, UNIVAC 120, Bendix G15D, and FACOM 201. Japanese differential analyzer in the front.



Figure 2. Abacuses for the visually impaired (upper) and jumbo abacuses for educational use (lower).

were imported to Japan in 1955, one to Nomura Insurance Company and the other to the Tokyo Stock Exchange. These were the first US commercial computers used for business in Japan. The first Japanese electronic computer FUJIC was developed by Fuji Photo Film Co. in 1956. The donated UNIVAC 120 is on permanent display as a new feature of the exhibition at the Museum of Science.

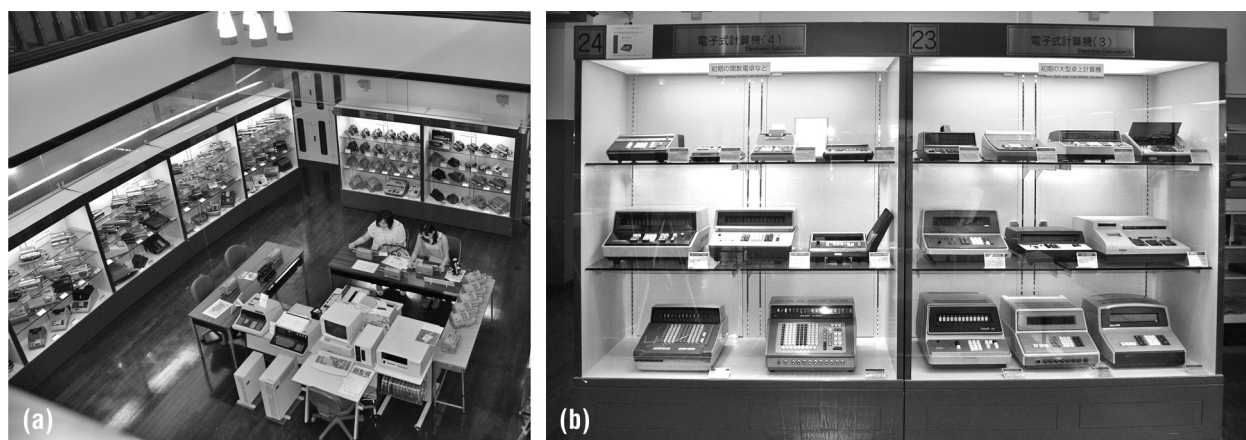


Figure 3. Calculator exhibits at the Museum of Science. (a) Mechanical calculators and (b) electronic calculators.

The museum exhibits artifacts from very early aids for calculation and early mechanical calculators to more modern electronic computers. It is one of the best places to learn about the history of computing in the East and West.

A museum tour starts with the early aids for calculation, such as counting rods and boards in Japan and Napier's rods in Europe. Visitors will first see various kinds of *soroban* (abacuses), including examples of Japanese decimal abacuses and Chinese hexadecimal abacuses (see Figure 2). Russian and Iranian abacuses are also exhibited as well as slide rules from all over the world.

The next and most important exhibit features mechanical calculators (see Figure 3). The collection of Tiger calculators is one of the best in Japan. The Tiger calculator is a typical Japanese calculator developed by Omoto Torajiro in 1923. Early models are an improved version of the Brunsviga mechanical desktop calculator. Later models adopted a different mechanism. The museum exhibits both models of Tiger calculators. The Tiger was so widely used until the latter half of the 1950s that "Tiger" became synonymous with the mechanical calculator in Japan.

In addition to the displays, there are many operational Tiger calculators that visitors can operate. Other Japanese and foreign mechanical calculators such as the Arithmometer, Odhner, and Brunsviga are also exhibited. The museum has a good collection of electric and electronic calculators, especially in the Japanese electronic calculator's exhibition (the best in Japan), which includes calculators by Sharp, Canon, Casio, Sony, and Busicom.

Another mechanical calculator on display is a differential analyzer similar to Bush's

machine that was developed by Syowa Kooku-keiki in the early 1940s in Japan. It was first used at Osaka University and then transferred to TUS.

In its vacuum-tube computer section, the museum exhibits a Bendix G15D (see Figure 1) with a magnetic tape drive. It also displays a Parametron computer FACOM 201 made by Fujitsu in 1960. Parametron is a logic element invented by Eiichi Goto of the University of Tokyo in 1954.

Finally, visitors will enjoy the museum's collection of early microcomputer boards and personal computers made in Japan and in the United States.

The museum, which is a certified Information Processing Society of Japan (IPSJ) Satellite Museum, was built in 1991 to commemorate the 100 anniversary of the Tokyo University of Science. The museum has restored the appearance of the Tokyo Butsuri Gakko (Tokyo College of Science, now Tokyo University of Science) wooden building, which was originally built in 1906.

Akihiko Yamada is a senior researcher at the National Science Museum of Nature and Science, Japan. Contact him at a.yamada@computer.org.

Kyoto Computer Gakuin Celebrates 50th Anniversary

The Kyoto Computer Institute (Kyoto Computer Gakuin, KCG) was established in 1963 and is the first computer education organization in Japan. KCG has preserved all the computer systems the institute has used for education since its establishment and set up a computer museum at the institute that was certified as a Satellite Museum of Historical Computers by the Information

Processing Society of Japan (IPSJ) in 2008. The museum currently exhibits 11 mainframes, four minicomputers, five small business computers, 34 personal computers, and four calculators. Of these artifacts, two of the mainframes, a minicomputer, a small business computer, and a personal computer have been certified as Information Processing Technology Heritage artifacts by IPSJ. As a symbol of the future-oriented culture of Kyoto, KCG also preserves and exhibits two Kyoto City trams to carry out the last wishes of Shigeo Hasegawa, the first president of KCG. David Alan Grier, president of the IEEE Computer Society, visited KCG museum exhibit and met with Wataru Hasegawa, chair of the trustee, after delivering his speech at COMPSAC 2013 in Kyoto (see Figure 4).

This year KCG celebrates the 50th anniversary of its foundation. On 1 June 2013, it held a commemoration ceremony at the Kyoto International Conference Center, which was attended by about 2,000 people (see Figure 5). Masao Horiba, the founding promoter of the Kyoto College of Graduate Studies for Informatics and supreme adviser of Horiba Ltd., and Daisaku Kadokawa, mayor of Kyoto, gave congratulatory

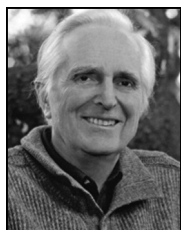


Figure 4. David Alan Grier, IEEE Computer Society president, and Wataru Hasegawa, KCG chair of the trustee, at Kyoto Computer Gakuin computer museum exhibit. (Photo Courtesy of Kyoto Computer Gakuin.)

addresses and both discussed the importance of the computer museum.

Michihiko Minoh of Kyoto University delivered a commemorative speech, "Creating 'Kyoto' from the Cyberphysical World:

Obituary: Douglas C. Engelbart



Courtesy of Computer History Museum.

Douglas C. Engelbart passed away at the age of 88 at his home in Atherton, California, on 2 July 2013.

Engelbart was born in Portland, Oregon, in 1925 and graduated with an electrical engineering degree from Oregon State University, where he trained as a radar technician. After his service in the US Navy from 1944 to 1946, he joined the Ames Navy Research Center in California in 1948. Having earned his PhD in electrical engineering from the University of California at Berkeley in 1955, he joined the Stanford Research Institute in 1957 and formed a research group called the Augmentation Research Center to pursue his visionary ideas to use digital computers for the augmentation of human intellect.

Funded by NASA and ARPA, this group developed the oNLine System (NLS) on a time-shared computer, which supported collaborative work through sharing information. This system was publicly demonstrated at the 1969 Fall Joint Computer Conference in San Francisco,

which was attended by about 1,000 computer professionals. Although it is known as the "debut of the computer mouse," the system included hypertext (linking and in-file object addressing), display editing, online processing, use of multiple windows, and online conference technology, among other innovations. The works by Engelbart and his group in the 1960s are archived at MouseSite (<http://sloan.stanford.edu/MouseSite>) as one of the five Science and Technology in the Making (STIM) projects.

Engelbart received the ACM Turing Award in 1997, "for an inspiring vision of the future of interactive computing and the invention of the key technologies to help realize this vision," and the US National Medal of Technology and Innovation in 2000, "for creating the foundations of personal computing including continuous, real-time interaction based on cathode-ray tube displays and the mouse, hypertext linking, text editing, on-line journals, shared-screen teleconferencing, and remote collaborative work. More than any other person, he created the personal computing component of the computer revolution." He was also recognized with awards from numerous other authoritative institutions worldwide.



Figure 5. KCG commemoration ceremony at the Kyoto International Conference Center. (Photo Courtesy of Kyoto Computer Gakuin.)

A Utilization Proposal of the Top-Level Domain ‘.kyoto’ (dot kyoto).” He explained “.kyoto” has great potential to improve the visibility and the strength of the Kyoto

brand. He mentioned Kyoto is a city with a 1,000 year history and that it has created numerous innovations. He then explained that the cyberphysical world of Kyoto will be a feedback system where physical world information will be processed and that the results will then be fed back to physical world. Minoh also emphasized the importance enhancing the social system based on this idea. The top-level domain “.kyoto” is expected to be approved by the end of March 2014.

At the banquet, Makoto Nagao, past director of National Diet Library and a former president of Kyoto University, toasted and thanked KCG for its efforts in education, international exchange, and preservation of historical computers.

Akihiko Yamada is a senior researcher at the National Science Museum of Nature and Science, Japan. Contact him at a.yamada@computer.org.

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