Kunsthalle Wien Museumsquartier

EN

Radical Software: Women, Art & Computing 1960–1991 28.2.–25.5.2025

The artists:

Rebecca Allen b. 1953, Detroit
Elena Asins b. 1940, Madrid – d. 2015, Azpirotz, Spain
Colette Stuebe Bangert & Charles Jeffries Bangert b. 1934, Columbus, Ohio / b. 1938, Fargo, North Dakota – d. 2019, Lawrence, Kansas
Gretchen Bender b. 1951, Seaford, Delaware – d. 2004, New York
Gudrun Bielz & Ruth Schnell b. 1954, Linz / b. 1956, Feldkirch, Austria
Dara Birnbaum b. 1946, New York
Inge Borchardt b. 1935, Stettin, Germany, today Szczecin, Poland
Barbara Buckner b. 1950, Chicago
Doris Chase b. 1923 – d. 2008, Seattle
Analívia Cordeiro b. 1954, São Paulo
Betty Danon b. 1927, Istanbul – d. 2002, Milan
Hanne Darboven b. 1941, Munich – d. 2009, Hamburg
Bia Davou b. 1932 – d. 1996, Athens
Agnes Denes b. 1938, Budapest
VALIE EXPORT b. 1940, Linz
Anna Bella Geiger b. 1933, Rio de Janeiro
Isa Genzken b. 1948, Bad Oldesloe, Germany
Dominique Gonzalez-Foerster b. 1965, Strasbourg
Lily Greenham b. 1924, Vienna – d. 2001, London
Samia Halaby b. 1936, Jerusalem
Barbara Hammer b. 1939, Los Angeles – d. 2019, New York
Lynn Hershman Leeson b. 1941, Cleveland, Ohio
Grace C. Hertlein b. 1924, Chicago – d. 2015, Chico, California
Channa Horwitz b. 1932 – d. 2013, Los Angeles
Irma Hünerfauth b. 1907, Donaueschingen, Germany – d. 1998, Kreuth, Germany
Charlotte Johannesson b. 1943, Malmö
Alison Knowles b. 1933, New York
Beryl Korot b. 1945, New York
Katalin Ladik b. 1942, Novi Sad
Ruth Leavitt b. 1944, St. Paul, Minnesota – d. 2025, Baltimore, Maryland
Liliane Lijn b. 1939, New York
Vera Molnár b. 1924, Budapest – d. 2023, Paris
Monique Nahas & Hervé Huitric b. 1940, Paris / b. 1945, Paris
Katherine Nash b. 1910 – d. 1982, Minneapolis
Sonya Rapoport b. 1923, Brookline, Massachusetts – d. 2015, Berkeley, California
Deborah Remington b. 1930, Haddonfield, New Jersey – d. 2010, Moorestown, New Jersey
Sylvia Roubaud b. 1941, Munich
Miriam Schapiro b. 1923, Toronto – d. 2015, Hampton Bays, New York
Lillian Schwartz b. 1927, Cincinnati – d. 2024, New York
Sonia Sheridan b. 1925, Newark, Ohio – d. 2021, Hanover, New Hampshire
Nina Sobell b. 1947, Patchogue, New York
Barbara T. Smith b. 1931, Pasadena, California
Tamiko Thiel b. 1957, Oakland, California
Rosemarie Trockel b. 1952, Schwerte, Germany
Joan Truckenbrod b. 1945, Greensboro, North Carolina
Anne-Mie Van Kerckhoven b. 1951, Antwerp
Ulla Wiggen b. 1942, Stockholm

Radical Software: Women, Art & Computing 1960–1991 examines the pioneering role of women in digital art. It presents works by artists who were among the first to use the computer – mainframe and minicomputers – as a tool for artmaking. They are accompanied by other artists who made the computer their subject or worked in a computational way with algorithmic or mathematically-based systems. The exhibition begins with works made in academic or industrial computer labs and ends with others made on the first personal computers in the last years before the World Wide Web made the internet publicly accessible. Set within a period that was also marked by the second wave of feminism, it documents a lesser-known history of the inception of digital art, countering conventional narratives on art and technology by focusing entirely on female figures.

Zeros and Ones

During the 1960s and 1970s, artists, musicians, poets, writers and filmmakers experimented with computer technology. Working in collaboration with mathematicians, computer scientists and engineers, they produced the first computer-generated images, music and texts. By the end of the 1970s, computer technology had been applied in a diverse range of artistic contexts, from the production of drawing and painting to filmmaking and performance. Its influence on contemporary art has been far-reaching, spanning several different artistic movements.

The mainframe computers of the 1960s filled entire rooms and the costs involved in building and operating the machines were so high that they tended only to be owned by state agencies, large corporations and academic institutions. In addition, data processing time was much slower and many universities implemented a timesharing system to allow a central computer to be shared by a large number of users who were each given use of the central processor for a fixed period of time. These machines gradually took over many long and tedious calculations that had, since the seventeenth century been performed longhand, on paper by people – often women – employed as 'computers'.

During the 1960s and 1970s some universities, technical colleges and corporations lent machine time for exhibitions and artistic research, creating the opportunity for a small number of artists to gain access to computers. Elena Asins, Colette Stuebe Bangert and Charles Jeffries Bangert, Lily Greenham, Grace C. Hertlein, Ruth Leavitt, Vera Molnár, Monique Nahas and Hervé Huitric, Katherine Nash, Sylvia Roubaud and Joan Truckenbrod were among the first artists to use computers to produce drawings and prints. Several scientists including Inge Borchardt also exhibited their experiments. These pioneers of computer art learned how to use programming languages and sometimes developed their own software. Works were often made without any display or graphical user interface, meaning that artists were unable to see the results of their labour until they were printed by a plotter.

For artists such as Asins and Molnár the computer was a means to mechanise the generative or algorithmic art they had previously made by hand. By contrast, others such as Hanne Darboven, Bia Davou or Channa Horwitz produced entire œuvres of computational works without using machines. For these artists, the handcrafted development and production of systems and their exhaustive execution was fundamental to their practice. Here machine-like repetition highlights the mental and physical labour invested in the expansive works on paper by Darboven or the intricate numerical patterns developed by Davou and Horwitz, perhaps unwittingly recalling an era of human computational labour.

Computers were also deployed conceptually or as a tool by artists working across a broad range of media. Isa Genzken used the computer to calculate and plot 1:1 scale linear plans for a series of *Ellipsoid* and *Hyperbolo* sculptures made between 1975 and 1985. Barbara T. Smith generated a series of 3,000 unique 'snowflakes' for a performance in Las Vegas in 1975. Other works, such as those presented here by Agnes Denes, Alison Knowles or Liliane Lijn, variously mechanise or automate part of the creative process in text-based works.

Software

Although the first general-purpose digital computers were built in the 1940s, the theoretical principles on which these machines were based were first described in 1837 by mathematician Charles Babbage. Babbage's concept drew upon Joseph Marie Jacquard's binary system for programming textile looms to weave patterned cloth, invented in 1801. Jacquard's loom pioneered the use of punched cards to store the designs. Fellow mathematician Ada Lovelace famously observed that Babbage's 'Analytical Engine weaves algebraic patterns, just as the Jacquard loom weaves flowers and leaves.' The works of Charlotte Johannesson, Beryl Korot, and Rosemarie Trockel can be seen to reflect upon the computer's relationship to the industrial textile loom and the connection between computer software and the soft-wares, i.e. the commodities (textiles) manufactured on the loom.

The magazine *Radical Software*, from which this exhibition takes its title, was founded in 1970 by Korot, Phyllis Gershuny (now Phyllis Segura) and Ira Schneider. The introduction to the first issue calls for 'access to information and the means to disseminate it' and for artists and other readers to 'design and implement alternate information structures which transcend and reconfigure the existing ones'. It locates power not in 'hardware' or 'property' but rather in 'software' and 'informational tools' that must be made accessible and 'humanised'. *Radical Software* was dedicated to the rising medium of video art. Korot's work is shown here alongside that of Doris Chase and Lillian Schwartz, who were among the first to employ a computer to generate abstract images on film.

Hardware

While some artists adopted the computer as a tool, or focused on its functional behaviour or 'unseen systems', others were inspired by the idea of the machine and by its physical, material aspect and design. From 1963 to 1969 Ulla Wiggen produced a

series of paintings that directly copy or evoke the integrated circuits used in computers. Miriam Schapiro used the computer to render and rotate preparatory studies for paintings. Photographs and sound works by Katalin Ladik and sculptures by Irma Hünerfauth similarly reflect this fascination with the inner workings of machines while the 1960s abstract paintings of Deborah Remington can be seen to consider the digital sublime, evoking both the limitless potential and inscrutable complexity of this new era of technology. The exhibition also includes designs from the 1980s by Tamiko Thiel for the *Connection Machine*, the first commercial computer devised to work on artificial intelligence.

Home Computing

During the 1970s computers became more affordable, owing to the mass production of microprocessors, ushering in a new era of home computing. Throughout the 1980s they became more accessible to artists who were no longer reliant on technicians and machine time in laboratories. This was especially significant for female artists, who rarely gained access to the labs and often lacked the time and resources to sustain a studio practice. Tina Rivers Ryan explains: 'Faster memory and better screens facilitated real-time interactivity, turning the computer into a device with which one played – a welcome contrast to the early days of computing, when programmers had to manually feed their instructions via punch cards and then wait hours or days for the results. These were also the years that saw the rapid development of new hardware systems for gaming and even experimental virtual reality (VR) experiences.'

A series of works reflects this new era: Dara Birnbaum's video, *Pop-Pop Video: Kojak/Wang* (1980) samples a television advertisement for one such machine. Elsewhere, *Concrete Computer DisPlay* (1988/1990) by VALIE EXPORT was conceived as a 'computer sketch' for a large, computer-controlled interactive space-text installation. The interactive, participatory work of Nina Sobell and Sonya Rapoport can also be seen in relation to the changes in human-computer interaction and the rise of computer games in popular culture. Rebecca Allen's animations for bands, such as Kraftwerk, are among the earliest examples of rendered 3-D graphics in music videos. The works presented here by Betty Danon, Samia Halaby, Barbara Hammer and Charlotte Johannesson were made on early Apple or Amiga personal computers in their respective homes.

While precise, monochromatic, abstract works dominated early computer art, personal computing facilitated a more colourful, figurative and often playful approach that can also be seen in works by Gretchen Bender, Gudrun Bielz and Ruth Schnell, and Barbara Buckner. These works can also be connected to the burgeoning of 'media art' which was the subject of several major exhibitions and festivals from the late 1970s. Bender's frenetic 13-monitor installation *Dumping Core* from 1984 (displayed here in The Studio on level -1) employs computer graphics made for television to critique the use of media for 'social control'. The title of the work refers to a computer error called a 'core dump' generated by a computer programme when it crashes or terminates uncharacteristically.

Finally, the video *Ada en ADA* (1989) by Dominique Gonzalez-Foerster humorously references Ada Lovelace's contribution to computing. Today widely regarded as the first computer programmer, it was Lovelace that first recognised the potential of Babbage's machine for processing words, images and music, in addition to performing numerical calculations. Gonzalez-Foerster uses the eponymous ADA computer programming language to issue biographical data about Lovelace.

I would rather be a cyborg than a goddess

'I would rather be a cyborg than a goddess' wrote Donna Haraway at the end of her influential essay 'A Cyborg Manifesto' (1985). Drawing upon science fiction, Haraway claimed the image of the cyborg (or cybernetic organism) to describe 'a creature in a post-gender world', arguing that 'cyborg imagery can suggest a way out of the maze of dualisms in which we have explained our bodies and our tools to ourselves'. Her 'dream' was 'not of a common language', but of something more plural and mutable. She explained, 'it means both building and destroying machines, identities, categories, relationships, spaces, stories.'

Such a 'hybrid of machine and organism' has inspired countless artworks. *Self Portrait as Another Person* (1965) and *X-Ray Woman* (1966) are two of the earliest cyborgian images produced by Lynn Hershman Leeson. They appear together with Irma Hünerfauth's *Augen und Glocke* (Eyes and Bell, 1970) and images that Anne-Mie Van Kerckoven produced with computers at the Laboratory of Artificial Intelligence in Brussels in the late 1980s. Also presented here are self-portraits that VALIE EXPORT, Anna Bella Geiger and Sonia Sheridan made using the computer (in 1989, 1969 and 1985 respectively) and Analívia Cordeiro's computer dance *M 3x3* (1973) in which the movements of the dancers and the camera were synchronised by the computer. Finally, Rebecca Allen's *Swimmer* (1981), was the first three-dimensional animation of a female body. Her earlier piece, *Girl Lifts Skirt* (1974) was intended as a humorous and confrontational riposte to the absence of female bodies and female perspectives in the digital sphere.

All texts about the artists and their works can also be found online via the following QR code:

Exhibition Catalogue
The exhibition is accompanied by a new publication with essays by Tina Rivers Ryan, Margit Rosen and the exhibition's curator, Michelle Cotton. Co-published with Mudam Luxembourg – Musée d'Art Moderne Grand-Duc Jean and Verlag der Buchhandlung Walther und Franz König, it features over 200 illustrations, a timeline and twenty-seven new interviews with artists from the exhibition. The publication is available in German and English at the Kunsthalle Wien Shop at Museumsquartier and Karlsplatz as well as online for € 38.

Symposium
On the first exhibition day, 28 February 2025, Kunsthalle Wien and TU Wien will host a symposium in TU Wien's Prechtlsaal. It offers the opportunity to explore the thematic questions underlying the concept of the exhibition in depth together with highly distinguished female researchers including Gerti Kappel, Nadia Magnenat-Thalmann, Margit Rosen, Zsofi Valyi-Nagy, Ina Wagner and artists Gudrun Bielz, Inge Borchardt, Anna Bella Geiger, Dominique Gonzalez-Foerster, Katalin Ladik, Sylvia Roubaud, Ruth Schnell, Nina Sobell, Tamiko Thiel and Anne-Mie Van Kerckhoven. Emphasis is given to the contribution of women to the development of computers in general and digital art in particular. A recording will be made available online after the event.

Public programme
All information on the public programme and dates can be found at:

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