# The Magic of Computer Art:
# A Biographical Account of Bruce Wands

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*Working paper*

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Abstract

What does it mean to be part of a pioneering group or a group of early adopters? This article examines this question by considering the case of digital art. Through in-depth interviews, I explore Bruce Wands' role as an early adopter of computer art and I document his extensive role in creating and developing computer art education since the early 1980s, a time when computer art was seen simply as a passing trend. In those early days, computer artists were either artists interested in new technology or computer scientists interested in art. By retelling Wands' story we can better understand the complex relationships between technologies and cultural values in art education. These interviews provide insight into Wands as an artist, his early life, inspirations, publications, his identity as a musician, and pioneering contributions to digital art. It also importantly explores his role as an educator and examines how art education might adapt to new technologies.

*Keywords:* art education, computer art, digital art, digital memory, early adopter, experimentation

**Bruce Wands: Artist, Musician, Writer, and Educator**

This biographical account aims to capture the essence of the creative work and pedagogical practices of artist, musician, writer and educator Bruce Wands by examining the unconventional and innovative roles that he has taken as an early adopter of computer art. I also examine his extensive role in creating and developing computer art education since the early 1980s, when "computer art was seen simply as a trend" (Wands, 2013).[1] Wands, currently serves as Chair of the Master of Fine Arts (MFA) Computer Art Department at the School of Visual Arts' (SVA) in New York City (NYC), is also the Founding Chair of the BFA Computer Art Department, and is the Director of Computer Education at SVA (Wands, 2014).

I situate this paper in the discourse of technology and art education. I aim to contribute to the digital art historical record through my interviews with Wands, combined with a review of extant literature. Wands observed the history of digital art as incomplete, for reasons relating to the difficulty of archiving early computer art along with institutional opposition, and until recently from an art world that was wary of computer art as a medium (Wands, 2013, p. 3). After decades of speculation as to its validity (Thomson, 2006, p. 51), oral history has evolved into a rich and legitimate research method that is useful in telling the story of computer art as an art form and pedagogy.[2]

On October 27th, 2014 and December 4th, 2014, I interviewed Bruce Wands at SVA.[3] These audio interviews provided insight into Wands' work as an educator, his early life, inspirations, publications, music, and contributions to digital art—in an era when computer art was only in its infancy. Through the lens of Wands' work there is a lot to be observed about the history of computer art. His work spans a variety of mediums and nearly four decades. Wands' interests in computer art began in 1976, making him an early adopter. He became involved with

computer art while attending graduate school at the Newhouse School at Syracuse University (Wands, 2013). There he discovered his love of technology, music, and the arts by taking experimental studio courses,[4] video production, and the physics of music. He realized "there are a million different ways to be creative" (B. Wands, personal communication, October 27, 2014). In the years to follow, Wands would become an important advocate for computer graphics education, stressing the relationship between art education and technology. Once an underdog in his field, he is today a leader (Taylor 2014, kindle loc:226). Even with his success, Wands continues to address the challenges of digital art in education, and the role it plays in developing creativity in the classroom.

**Methodologies for Digital Art in Education**

What does it mean to be part of a pioneering group or a group of early adopters? In a SIGGRAPH '02 conference paper [5] Wands (2002) notes, "Early pioneers in these fields were either artists interested in new technology or computer scientists interested in art. When the time came in the mid-1980s to start educating students to pursue careers in these emerging fields, educators were faced with dilemmas that continue to this day." The challenge of defining the role of technology in art education has been great. Technology has quickly grown while funding for the arts has decreased. Yet art and technology, in so many instances, work together. As Eisner (2002) points out "…the arts are considered nice but not necessary … in American schools are *theoretically* among so-called core subjects, and … there is a huge ambivalence about their position in curriculum." (Eisner, 2002, kindle loc: 37)

Thus, there are many known educational, economic, political, financial, and archival challenges for art disciplines—along with myths to dispel, especially, for example, the concept that the arts are not intellectually demanding (Eisner, 2002, kindle loc: 41).[6] There is a need for

more problem-solving methodologies to address challenges in art education. In this paper I use oral history as a qualitative research method. Oral history encourages sharing and collective memory in an unprecedented fashion thanks to "the extraordinary growth and diversification of communication media [that] has contributed to the growth of commemorative practices" (Thomson, 2006, p. 59). McLuhan predicted this extraordinary growth and a collective shift "to extend our nervous systems by means of electric media" (McLuhan, 1964). By exploiting oral history to re-examine computer art and art education, researchers can effectively explore the past to understand the complex relationships of technologies and digital art (Bolin, 2009, p. 121; Stankiewicz, 2004, p. 91).[7]

**Bruce Wands' Early Inspirations**

Wands was attending elementary school in Verona, NJ around the time when computer art experimentation began. One of his greatest early inspirations was his love of music. His father played the trombone and so did Wands (See Image 1, in Appendix A). In junior high school he played in a band, *The Galaxies*, playing mainly 'Big Band' era music[8] and pre-Beatles popular music. Later, between 1963-1967, Wands attended Verona High School where he joined the marching band. He then completed two years in medical school at the State University of NY Upstate Medical, renewing his love of music, and teaching himself to play the bass guitar. After a short career as a traveling musician he decided to go to graduate school at the Newhouse School where he "opened up creatively not only with art and computer graphics, but also with music" (B. Wands, personal communication, October 27, 2014).

**The Rise of Computer Art**

In 1952, mathematician and artist Ben Laposky (b. 1914-2000) created the first known

computer graphic *Oscillon 40* (Victoria and Albert Museum, 2014). Later, innovative computer art experimentation began after-hours at New Jersey's Bell Laboratories in the 1960s (Victoria and Albert Museum, 2014). Billy Klüver and Fred Waldhauer, engineers at Bell, and artists Robert Whitman and Robert Rauschenberg —formed a group: Experiments in Art and Technology (EAT) (Daniel Langlois Foundation for Art Science and Technology, 2000). Knowlton and EAT[9] developed early computer-generated animation and the programming language BEFLIX (Victoria and Albert Museum, 2014).

The Art and Technology movement and computer art flourished through the 1960s and was initially well received by the art world (Wands 2013, p. 2).[10] In 1968, The Computer Arts Society (London) was founded and developed one of the first organizations for computer art practitioners (Computer Arts Society, 2014). Also, in 1968, Frank Malina founded the journal *Leonardo,* "with [an] emphasis on the writings of artists who use science and developing technologies" (Leonardo On-Line, 2012).

While the Art and Technology movement enjoyed success in the 1960s, in the 1970s the art world turned to New Realism and photorealism (Wands, 2013, p. 2). The EAT suffered budget cuts, an economic recession settled in after the Vietnam War, and there was collective civil unrest. Despite this, computer art and general computer use expanded. In 1976, 200 *Apple I* personal computers sold for $666.66 apiece (BBC, 2014). In 1977, the *Apple II* was the first computer with color graphics (Wands, 2006, p. 211). Simultaneously, the field of art education was undergoing important changes. Empirical research in art education transitioned to qualitative methods of participant-observer research, a new method for evaluating educational activities (Efland, 1990, 251). Overall, artists, academics, and the general public remained skeptical of new technologies and personal computer use. The coming of the digital age would have to wait.

New inventions and technologies have long existed. Stankiewicz (2004) explains, "Visual literacy and technology have been inseparable since the first rock artist demonstrated to a young apprentice how to make a hand-print with ground pigment" (p. 88). However, the rise of computer art was viewed as particularly unsettling. Wands (2014) observes, "There was a lot of sentiment against digital art in the beginning … it was changing too quickly… it didn't fit within painting, drawing or sculpture and there was no box to put it in. Museums had a lot of trouble with it. . ." (personal communication, October 27, 2014)

Wands embraced the new technologies acknowledging he was one of "the new kids on the block" (B. Wands, personal communication, October 27, 2014). In 1976, IBM mainframes were installed at select universities—including the Newhouse School where Wands was attending (Wands, 2002). Wands began producing digital line drawings, including his 1976 12x12 inch plotter drawing *Heartline* (See Image 2, in Appendix A), an early example of digital image-making (Wands, 2006, p. 20). Image making was a time-consuming process, requiring patience and iteration. Wands (2014) recalls, "We would access the computer on our own, going to the computer center to get on to a terminal and there was no monitor. You would make punch cards and drop them off … several hours later, your punch cards would be there… you would look at them, revise them, modify the code, and that's how the drawings evolved" (B. Wands, personal communication, October 27, 2014).

The computer graphics Wands created helped him launch his professional career, landing him a job as a computer animator. He designed a series of computer-animated poetry for a billboard in Times Square called *Poems of Light*, on one of the first color computer animation systems (B. Wands, personal communication, October 27, 2014). Remarkably, *Poems of Light* received millions of viewers. Decades later, the New York Historical Society exhibited this as an

early example of computer art (B. Wands, personal communication, October 27, 2014). During his tenure with Spectacolor, Wands also helped create an animated opening for NBC's *Saturday Night Live*, before moving onto to become a Film Studio Art Director at Bray Studios in 1978 where his responsibilities included the creation and production of technical animations, title design, and designing special effects for various corporate clients (Wands, 2014).

After a few years with Bray Studios and Colgate Palmolive, an academic position caught Wands' attention, an opening to teach business graphics at SVA. Personal and business computer use was broadening. Digital technologies were reaching into everyday life and organizations, like SVA, were responding: Nicholas Negroponte founded the MIT Media Lab in 1980; SVA founded the first Computer Art Master of Fine Arts (MFA) program in the United States in 1987; and Cynthia Pannucci founded the Art Science Collaboration Inc. (ASCI) in 1988 (Wands, 2002, p. 211).

Wands multidisciplinary background was beneficial to his new role. He (2014) observed, "I found that because I had been a performer, it makes you a better teacher because you know how to interact with people... I started with business graphics, then with illustration, and then I taught a course in computer video. My student reviews were always good, so they just kept giving me more courses" (personal communication, October 27). In 1984, Wands joined the Computer Art Faculty at SVA.

Wands' multidisciplinary, research-based approach to computer graphics education led to several developments in his teaching methodologies. His method of integrating new technologies into curriculum proved to be a successful model. Wands wrote curriculum that was structured yet experimental, at a time when technical literacy was limited. He worked collaboratively with SVA departments and SVA Chairs to bring computers into the classroom. Wands (2014)

discovered, “There was a lot of prejudice against computers here when I first came, but now without computers, the school probably wouldn’t exist” (personal communication, October 27).

The digital age gained momentum.[7] Acceptance of technology in art education required flexibility. Efland notes (2002), “Cognitive flexibility is the ability to change strategies...to be flexible one needs a repertoire of strategies from which choices can be made, many of which are learned from the arts” (p. 161). Wands, immersed in multiple disciplines, continued to write innovative curricula for SVA courses, including: *Computers for Film and Video*, *Principles and Practices of Computer Art*, and *Storyboarding and Scripting with the Computer* (Wands, 2014).

**Bruce Wands and the Magic of Computer Art**

By the 1990s, the audience for computer art had radically changed and became more accepting. The phrase “computer art” was used less frequently to describe artist and designers working with computers’ (Victoria & Albert Museum, 2014), now known as “digital artists”. In 1992 Wands was appointed SVA’s Director of Computer Education, a role designed to “plan curriculum related to computer art, assisting the administration with the development and integration of new technology” (Wands, 2014). Two years after he became the Founding Chair of SVA’s BFA Computer Art Department. Wands (2014) reflects, “… originally it was called the Computer Art Center. We did not offer a BFA degree. After founding the BFA degree, the first students enrolled. I was appointed Chair of that program because I wrote the curriculum. We went from 80 to 260 students in four years—we tripled in size. People around the school started to notice ... by the time I left that department, in 1998, there were about a thousand students a semester going through that floor. There were 260 majors, 300 continuing education students, and about 400 students taking electives” (personal communication, October 27).

In April 1993, a year after Wands became SVA's Director of Computer Education, CERN announced, "World Wide Web technology would be available for anyone to use on a royalty-free basis" (World Wide Web Foundation, 2014). Wands was now a busy academic, participating in conferences and exhibitions around the world, including multiple group exhibitions in China. While traveling, he began using AOL Mail to communicate (B. Wands, personal communication, October 27, 2014). Wands oversaw a busy SVA department; he facilitated the adaptation to these new developments.

In 1998, after 4 years as the SVA BFA Computer Art Department Founding Chair, Wands was appointed as MFA Computer Art Department Chair. He continued to look ahead, brainstorming future developments in digital art and technology. Wands (2014) notes, "One of my big challenges staying up on technology because you need the latest and greatest software, you need to know what studios are using, how to integrate them..." personal communication, October 27, 2014). Wands created state-of-the-art computer graphics facilities for his students. These studios remain very advanced to this day.

Many of Wands' students gained industry recognition and moved onto prestigious jobs at Pixar, DreamWorks, Disney, the Associated Press, *Time Magazine*, Simon & Schuster—to name just a few. As the MFA Chair, Wands has seen eight of his students win Student Academy Awards (MFA Computer Art Department, SVA 2014). In addition, his department has maintained a high ranking by *U.S. News & World Report*— it was ranked the fifth best Visual Communications/ Multimedia program in 2007 (Wands, 2014). Yet despite all of the successes, he remains relatively quiet and humble. In our interview, Wands remarked (2014), "I love my job... to actually get paid to teach art is almost an oxymoron, do you know what I mean?" (personal communication, October 27).

This love for computer art and its potential has taken Wands far and wide. He first traveled to Hong Kong in 1995 to give a lecture on Computer Animation and Digital Art. The Hong Kong Arts Centre was interested in expanding their reach into digital creativity at that time. Wands traveled to Hong Kong annually from 1995 through 2004 and received invitations from several colleges in Mainland China to lecture and do workshops. In 2014, Wands was appointed Visiting Professor for the Beijing Film Academy and continues to travel to China on lecture tours (See Image 3, in Appendix A).

Despite these numerous wide-ranging activities, Wands found time to develop his research, writing, music, and art, while making new connections and designing new venues for the discourse around digital art. As part of his professional endeavors, he was one of the founders of the New York Digital Salon (NYDS). In 1993, the first salon was held at the Art Directors Club (Wands, 2006, p. 211) and they received "tremendous crowds and tremendous interest in it" (B. Wands, personal communication, 4 December, 2014). Wands curated the first three exhibitions (See Image 4, in Appendix A). Roman Verostko and Mark Wilson exhibited their work at the first salon. Verostko is perhaps one of the most celebrated artists in computer art history (Taylor 2014, kindle loc: 3034). Manfred Mohr, an early computer art pioneer, appeared at multiple salons (Wands, 2013, p. 2).

Originally meant to be temporary, NYDS grew into a place for dialogue around digital art, receiving funding from the New York State Council on the Arts (2001-2005), Rockefeller Foundation (2002), and the National Endowment for the Arts (2003-2004) (Wands, 2014). Its mission matured with its intent to advocate using digital tools and technology to create art (NYDS, 2013) and "to exhibit, research, and develop an international awareness of digital art and the creative use of technology through exhibitions, publications, a website and public

events" (Wands, 2014). Looking back on his experience as the Director of the NYDS, an endeavor that has spanned over two decades and eight issues of *Leonardo,* Wands (2014) reflects, "So part of my [NYDS] role... it's paying tribute to the history of digital art and the people that created its history... Right now digital art is contemporary art. But not everybody knows this history started in 1950-1960s" (personal communication, October 27, 2014). His curatorial work for the NYDS, in turn, motivated him to write his influential publication *Art of the Digital Age* published by Thames & Hudson in 2006 (See Image 5, in Appendix A).

Wands had already published many essays and academic papers on digital art, but *Art of the Digital Age* broke new ground coming in at 223 pages and offering a detailed account of digital art history, including 232 works of art by prominent digital artists including Erwin Redl, Mark Wilson, Manfred Mohr, and Jean-Pierre Hebert (Wands, 2006). On the creation of his book Wands (2014) explains, "I felt that at that point as the Director of the NYDS I had made the statement through that vehicle, of what digital art was becoming …where it's going, and have a first-hand account of the history…" (personal communication, December 4),

**Conclusion: Wands and *The Future of Digital Art*** [8]

In the nine years since Wands published *Art of the Digital Age*, technology has evolved dramatically. In the final chapter of his book, he makes thoughtful predictions about digital art. Wands (2006) emphasizes, "Contemporary art will continue to evolve ... incorporating new technologies as part of its development" (p. 206). He predicts that three-dimensional television and immersive environments will become the next frontier (Wands, 2006, p. 207). Wands (2006) also observes, "We need only look to the video game industry as an example of the fertile creative territories yet to be explored." (p. 208). He notes that creative expression has never been more powerful (Wands, 2006, p. 208).

Thomson calls the digital revolution the "fourth paradigm transformation of oral history", observing that networked communications and digital art have given interviewing methodologies and oral histories new life and even a new digital cloud to live in (2006, p. 70). Through this project I observed numerous concepts applicable to the field of art education, but above all else, the importance of willingness to experiment—which sometimes means taking on the role of the underdog in the face of criticism.

The uncertainties in digital art do not phase Wands, who enthusiastically shares his ideas with colleagues and students. He observes that young artists entering SVA's MFA program have strong technological literacy. Wands (2014) also acknowledges the budgetary crisis in art education, stating, "In the arts curriculum area they're cutting back—which they shouldn't—because that's innovation. In so many different ways it needs to be supported" (personal communication, December 4, 2014).

Wands looks forward to the next wave of technological inventions which he is planning to use in his artwork and music, perhaps by making a new collaborative digital interface. Wands (2014) shared, "I think I'll to continue to develop interactive music interfaces…" (personal communication, December 4, 2014).

What does the future hold for digital art and art education? We can look to Wands, and art educators like him, for insights. Some of what is to come is unknown and our own making. Wands notes, with a humorous touch, "A looking glass that could see the future of technology would indeed be a very valuable one" (Wands, 2006, p. 207).

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## Endnotes

[1] Bruce Wands began teaching and advising at School of Visual Arts in 1984. Over the course of his career at School of Visual Arts he has written hundreds of courses for applying technology to arts curricula.

[2] I refer to computer art and digital art respectively. When I make historical references I use the term 'computer art'. When I make contemporary references I refer to it as digital art. Says Taylor (2014), "The term 'computer art' can still be found in academia. The occasional conference, university graduate program, or college course still carries the term 'computer art', which means some educators have resisted current trends of replacing it with the up-to-date descriptors, such as 'digital art' or 'media art'. I contextualize computer art and digital art in education as a discipline of art and technology---rather than use the term media studies.

[3] On a personal note, I have known of Bruce Wands my entire life, though I only recently came into contact with him. My mother and father grew up in the same town as Wands in Verona, NJ. My father attended school with him from kindergarten through high school. They took trombone lessons together as children. Wands and my mother shared mutual friends. I, too, spent some of my childhood in Verona, NJ. Later, in my design career and in my academic research, Wands and his work comes up many times.

[4] While taking an experimental studio course at Syracuse University Wands learned to use a language called Art Speak, written in FORTRAN which "gave a series of commands to the plotter to create complex mathematical drawings, reminiscent of the toy Spirograph" (Wands, 2006).

[5] Wands served as the Special Interest Group on Graphics and Interactive Techniques (SIGGRAPH) Art Awards Committee Chair from 2011-2014 (Wands, 2014). He has been

involved in their conferences and has presented at their conferences since 1988. The first SIGGRAPH conference was held in 1974.

[6] There are many challenges in art education. I do not describe these challenges in depth. My focus is the use of oral history as a research method in art and technology in education, specifically computer graphics education. I suggest visiting the National Art Education Association website (http://www.arteducators.org/) to learn more about the current issues. I also recommend the work of Elliot Eisner and Arthur Efland.

[7] In Marshall McLuhan's 1964 seminal work *Understanding Media: The Extensions of Man* he explores the complex relationships between people and electric media. He predicts the world wide web, stating, (1964, 57) "By putting our physical bodies inside our extended nervous systems, by means of electric media, we set up a dynamic by which all previous technologies that are mere extensions of hands and feet and teeth and bodily heat controls- all such extensions of our bodies, including cities-will be translated into information systems." His predictions were precise, uncanny, and complex.

[8] The 1980s was an incredible decade in computer art history. Video and computer games were gaining popularity and "off-the-shelf" software was available for image making with the computer (Victoria and Albert Museum, 2014). That same decade the compact disc (CD) was invented, Adobe Systems was founded, and "computer graphics and special effects began to be used in films such as 'Tron' and 'Star Trek II: Wrath of Khan' (Victoria and Albert Museum, 2014).

[9] *The Galaxies* had a repertoire of 175 songs.

[10] The group grew out of a well-known series of performances, *9 Evenings: Theatre and Engineering*,

[11] The first computer art exhibitions were held in Germany, England, Japan, and the United States.

# Appendix A: List of Images

Image 1: Bruce Wands, “Trombone”, Verona, NJ, 1950s – Photograph.

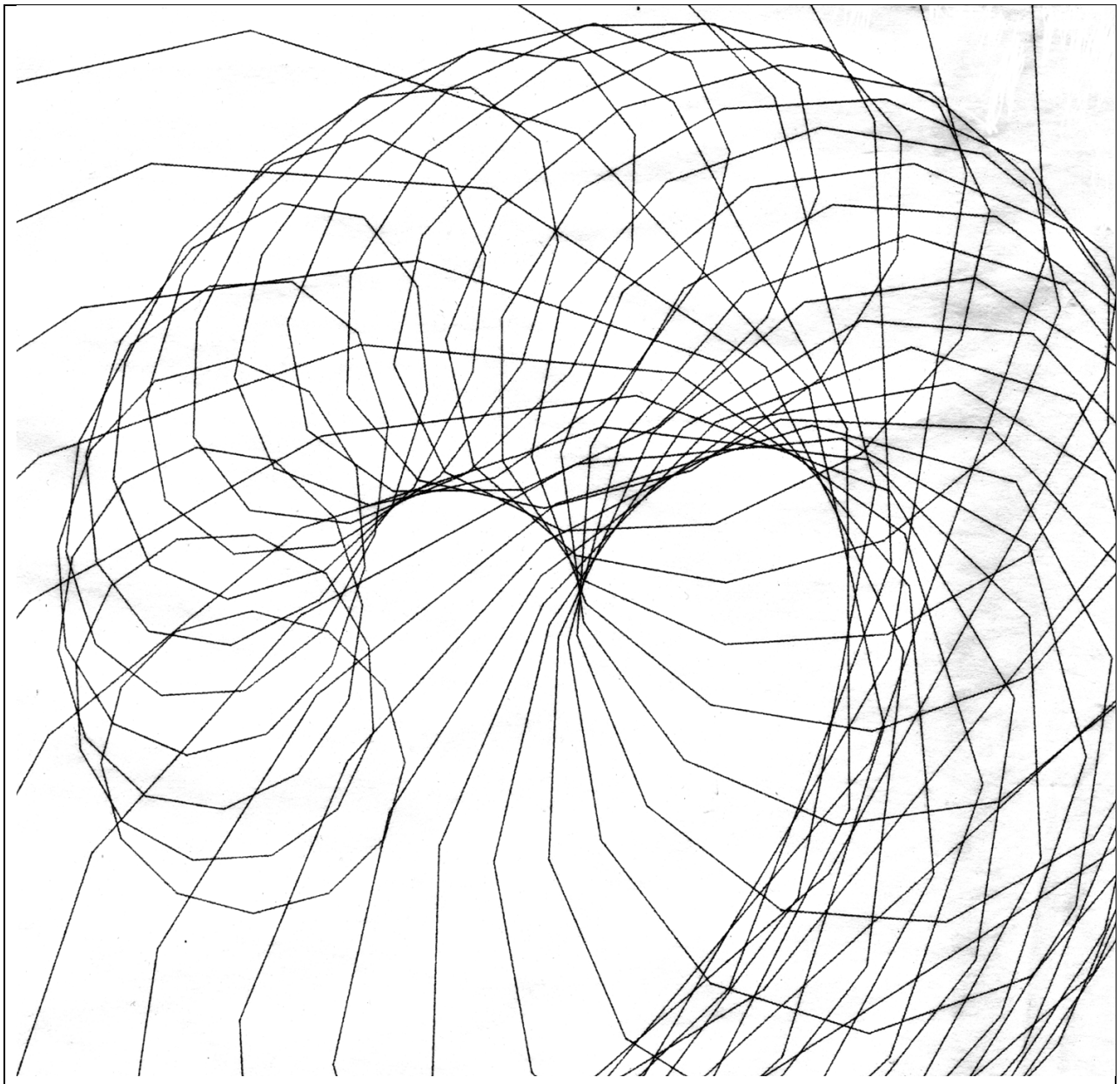

Image 2: Bruce Wands, “Heartline”, New York, NY, 1976 – 12x12 inch plotter drawing, IBM 360.

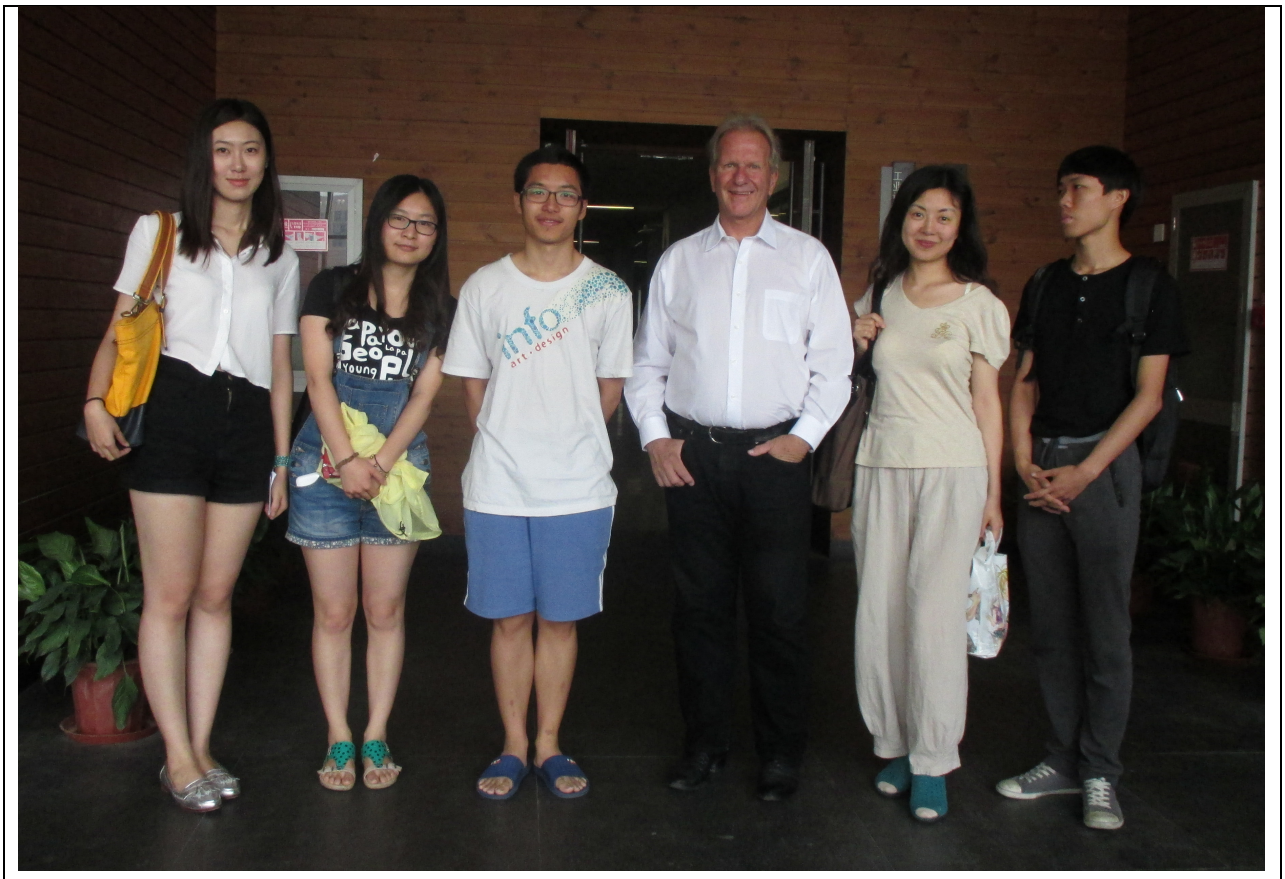

Image 3: Bruce Wands, “Wands with Students in China”, Beijing, China – Digital photograph

Image 4: Bruce Wands, “Digital Salon”, New York, NY, 2002 – Digital photograph.