LUMINOUS FLUX [2.0]

new + historic works from the digital art frontier

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The Carl & Marilynn Thoma Art Foundation maintains a growing collection of computer, light-based and electronic artworks from pioneering experimenters and contemporary innovators in the field of digital art. The group exhibition *Luminous Flux v2.0* features technological artworks spanning over fifty years, illuminating the diverse creativity of this progressive art genre. *Luminous Flux v2.0* is the second iteration, and a refresh, of our original exhibition at Art House, an exhibition space in Santa Fe, New Mexico, dedicated to sharing works from the Thoma Foundation collections.

With the digital boom, artists immediately grasped the potential of electronic media, often before it became commercially available. They applied cutting-edge computer engineering and software coding skills, such as algorithms, circuits, digital video, Internet search engines and interactive biometrics, in order to create visual expressions.

The earliest works in the exhibition, drawings from the 1960s by Desmond Paul Henry, made use of a pre-digital, analog computer. The artistic impulse to collaborate with machines continued through the 1970s with Jean-Pierre Hébert's precisely coded algorithmic drawings, and into the present as digital media becomes more ubiquitous and complex. A special focus of this exhibition is how artists create images and visual experiences in the digital age. As many of these artworks heighten or alter perception using new technologies such as LEDs, custom-built circuits and the virtual world within the computer screen, it can be said that artists invent new ways of seeing.

The title and concept of *Luminous Flux* derives from physics; it is the measure of light energy, or brilliance, perceived by the human eye from a light source. The exhibition adapts this term in order to highlight the interactive experience of engaging optically stimulating artworks. In other words, the artwork is complete when a viewer experiences it.

–Jason Foumberg, Thoma Foundation curator

Exhibition runs July 24, 2015 through Spring, 2016.
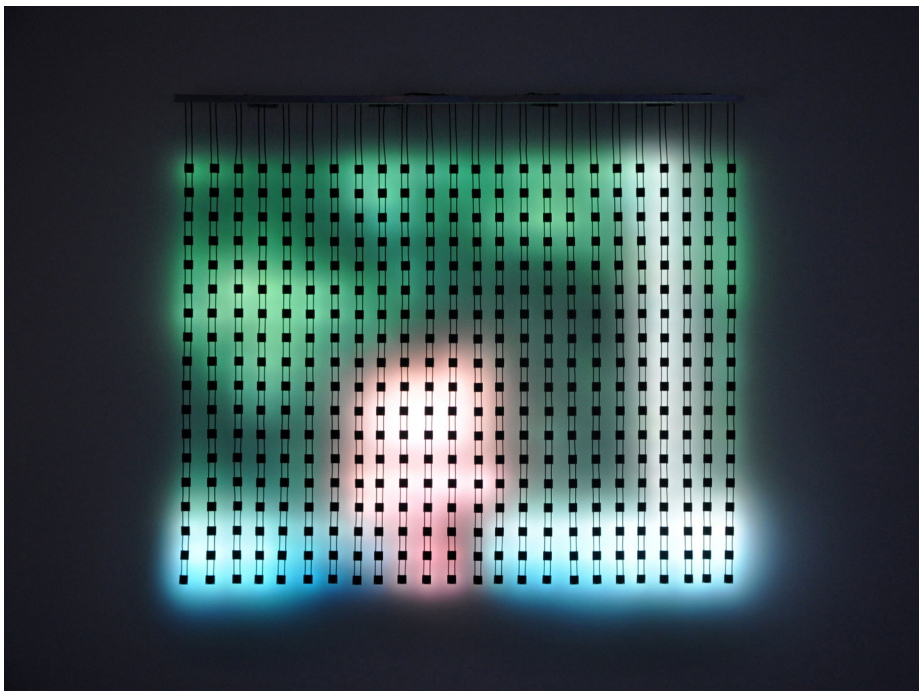
Jim Campbell (American, born 1956)
Home Movies, Pause, 2014
LEDs, metal, wire and custom electronics
66 x 76 x 3 inches

Technicolor footage from family videotapes, including the artist's own and some found on eBay, play in Jim Campbell's *Home Movies, Pause*, an electronic moving image made of LED (light-emitting diode) bulbs. Suspended, the LEDs project light directly onto the wall, resulting in a cinematic presentation of Campbell's vintage videos.

Home Movies, Pause playfully adapts the concept of pixel resolution. Whereas a typical HDTV contains two-million pixels, Campbell's artwork contains only several hundred. This is part of his "Low Resolution Series" in which he fragments the image nearly to the point of dissolution, yet relies on the viewer's perceptual intelligence to link the bits of moving light into a composition—to fill in the gaps. Despite this low-res trick, *Home Movies, Pause* is actually high-tech. Campbell worked for nearly a quarter-century as an electrical engineer in the Silicon Valley technology industry. As a light animation, *Home Movies, Pause* may resemble how memories are replayed in the mind's eye. Campell is a leading figure of the Bay Area's light and tech art movement.
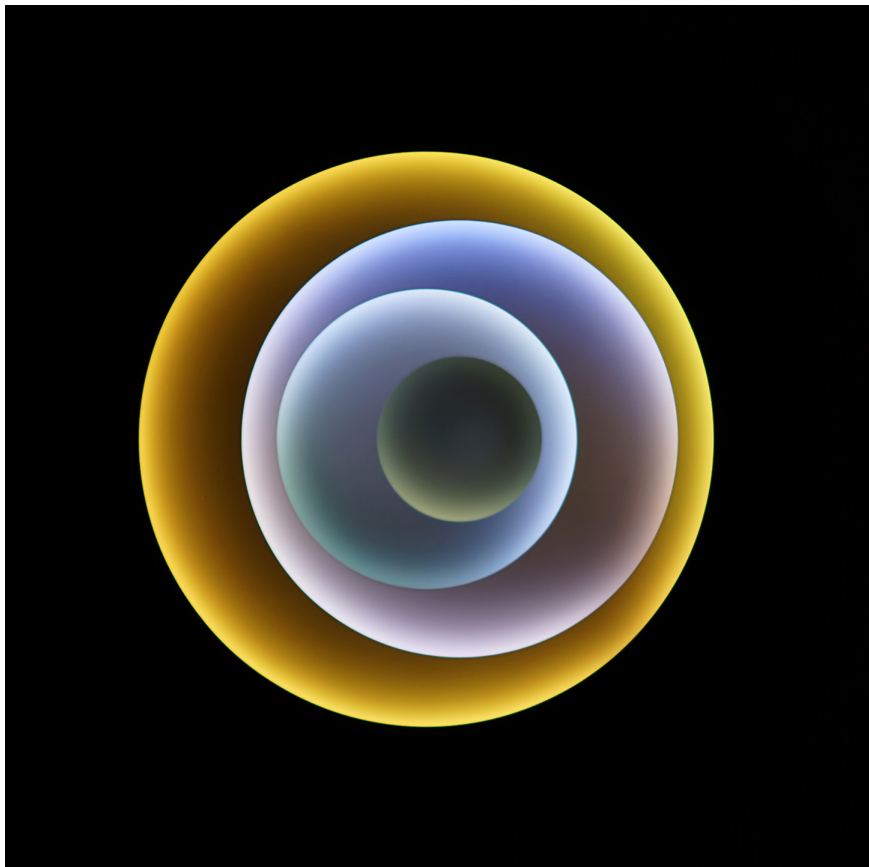
Craig Dorety (American, born 1973)
*Offset Circles – Yellow Flowering Tree Against Blue Sky*, 2014
LEDs, custom electronics and Alupanel
24 x 24 x 3 inches

To create this animated lightbox sculpture, Craig Dorety digitally stretched and distorted a photograph of a yellow flowering tree (found via Google search) into a pixilated abstraction. Dorety fed that newly created color map into the lightbox, composed of nine sandwiched screens and bands of curvilinear LEDs. Dorety relates this process to a filmstrip, where the pixels of flowers pass through the LEDs one line at a time, thirty times per second.

Dorety, a trained mechanical engineer who creates his own electronic devices and tools, has contributed mechanical designs and project assistance to Jim Campbell since 2007, and they collaborated on a work in 2014.

In an interview, Dorety described his inspiration for the series: he was attempting to replicate visual hallucinations experienced during ocular migraines. It is no coincidence that the artwork's nested spiral design echoes that favorite composition of Op painters, as Dorety extends that tradition of geometric, perceptual abstraction through new visual technologies, a practice especially prominent in the Bay Area, where Dorety lives and works.
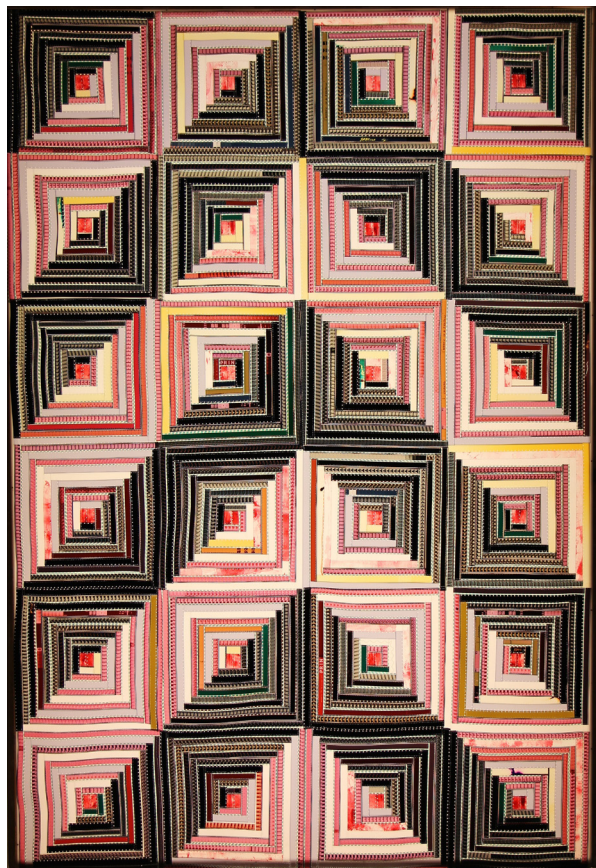
© Sabrina Gschwandtner, Courtesy of Shoshana Wayne Gallery, Photo: Tom Powel

Sabrina Gschwandtner (American, born 1977)
Camouflage II, 2015
16mm film, polyester thread, lithography ink and lightbox
73 x 48.5 inches

Since 2009, Sabrina Gschwandtner, a founding editor of *KnitKnit* magazine, has been creating "film quilts" on lightboxes. She sews 16mm footage from found documentary films into quilt-like patterns. *Camouflage II*, for example, replicates the traditional sunshine-and-shadow American quilt motif, with stitched filmstrips in place of fabric swatches.

The content of the filmstrips relates to textile history and production. In *Camouflage II*, an educational film about the Bradford Dyeing Company in Rhode Island, a company that provided camouflage fabric to the U.S. military for many years, is combined with an instructional children's film about shadow puppets.

The filmstrip colors have been digitally "dyed" by the artist, akin to the textile dyeing process explained in the camouflage documentary. "In combining the two films," wrote the artist in a statement, "I wanted to represent the idea of camouflage in multiple ways, and acknowledge that whenever you shed light on something, you also make a shadow." *Camouflage* was first created in 2012; this second version features new colors and has been transferred to stable, archival material.

"My impulse here was to preserve the content and the imagery," she said of the film quilts in a 2013 interview with *Bomb* magazine. "That's really a quilting impulse: preserve and reuse."
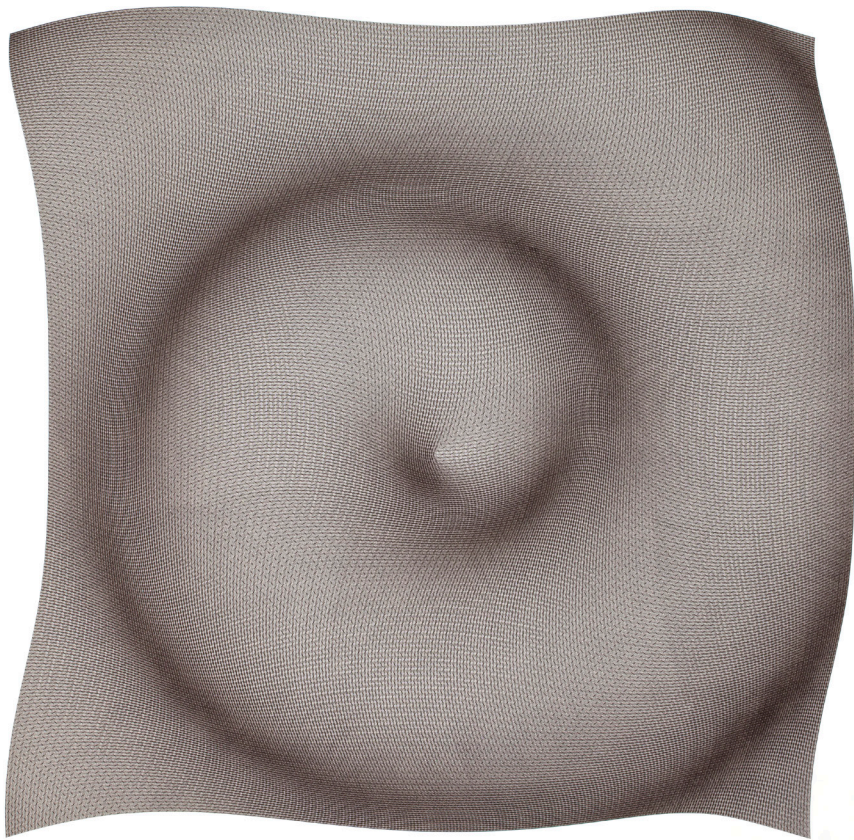
Spiral Dilation, 1988, 38 x 36 inches, China ink on HP drafting paper© Jean-Pierre Hébert, Photo: Michael Tropea

Jean-Pierre Hébert (French, born 1939)
6 pen and ink drawings (on a drafting plotter) on paper, 1975–1992
Various dimensions

Jean-Pierre Hébert is among the earliest of the modern computer artists. He is renowned for programming complex drawings from mathematical instructions called algorithms. His customized computer code generates intricate line drawings, and each is unique, produced on a drafting plotter with pen and ink on paper, an early form of computer printing. The drawings in the Thoma Collection are some of Hébert's first successful experiments with the emergent technology.

Painting and drawing since adolescence, Hébert combined his engineering training with an early love of Piet Mondrian and the Bauhaus to create geometric abstractions with computer code with more precision than is possible by hand. "Drawing should become a pure mental activity," he wrote in a recent statement, "rather than a mere gestural skill." At the heart of his creative technological pursuit is the visual expression of mathematics in the natural world, as seen in fractals, wave patterns and the laws of physics.

Hébert evolved his output in tandem with quickly advancing computer technologies. Early encounters with computer science at IBM in the late-1950s and Hewlett Packard, in Paris, in the 1970s, led him to experiment with drafting plotters, which he used to test the algorithms that danced in his intellect. Each drawing was created with a single continuous line, weaving intricate illusions across the paper's surface.

Today, Hébert continues to work with algorithms, inkjet printers and kinetic sculpture. He is the Artist in Residence at the Kavli Institute for Theoretical Physics at UC Santa Barbara, and he was awarded a Distinguished Artist Award for Lifetime Achievement in Digital Art, from SIGGRAPH, in 2012.

Rafael Lozano-Hemmer (Mexican, born 1967)
Pulse Index, 2010
Plasma screen, computer, digital microscope, industrial camera, metal enclosure and custom software
63.5 x 37.25 x 7 inches

Pulse Index invites you to scan your fingerprint and to record your heartbeat. These biometrics are then added to a visual database of past users' fingerprints. Only the last 509 participants are saved; each new fingerprint bumps off the oldest collected one. Accumulated, they form a group portrait. Lozano-Hemmer was born in Mexico City and teaches at Harvard University. He likens his artwork to throwing a party, and parties, he says, are only as good as the people who show up.
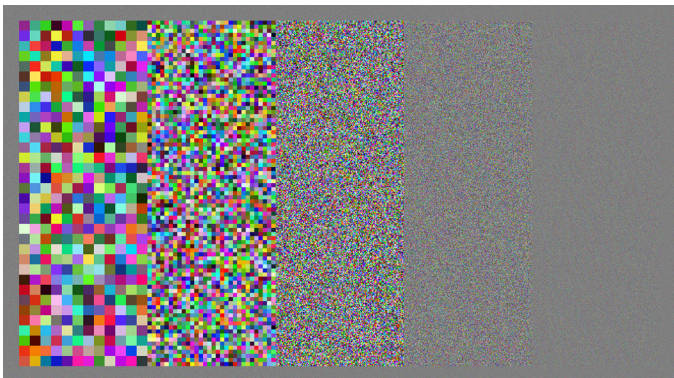
Method Random 4, 2014
Chromogenic print on Kodak Endura paper
32 x 55.25 inches

Method Random 4 is a field of pixels designed by an algorithm. Lozano-Hemmer borrowed an historical algorithm, which was written in the 1960s and intended to produce a random order of numerals for the purposes of cryptography. The efficacy of this well-known algorithm is today known to be flawed, which is what attracted the artist to the vintage algorithm. He assigned each numeral in that code a color to generate this optically buzzing abstraction. The artwork reveals how an obsolete technology can be rescued to serve aesthetic purposes. The artwork, in essence, was programmed to create itself.
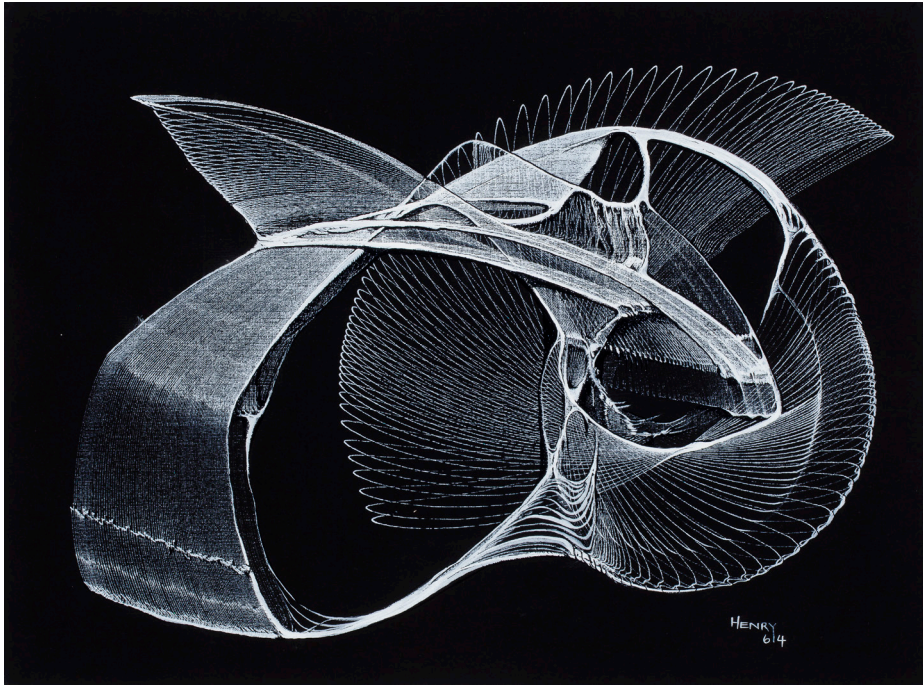
058-2-64, 1964, 20 1/2 x 15 1/4 inches, White India ink on black cartridge paper. © Desmond Paul Henry, Photo: Michael Tropea

Desmond Paul Henry (English, 1921–2004)
12 ballpoint pen (black and various colors) drawings, some hand-embellished with white and black India ink, on paper, 1961–68
Various dimensions

In 1960, Desmond Paul Henry devised a way to record, with pen and paper, the hypnotic movements of a bombsite plotting instrument that he purchased from an army surplus shop. The WWII veteran modified that analog computer—an apparatus originally used to calculate weapons deployment—into a machine for creating systematic drawings. Henry's drawing instrument is regarded as an early instance of analog computer art, emerging on the cusp of the modern art-and-technology revolution.

Henry's drawing machine could not store information, as modern computers do, so he did not employ algorithms. Instead, Henry mechanically altered its motors and gears to self-generate line shapes and parabolas. Even a loose screw would dramatically affect the machine's graphic output—an unpredictability cultivated by the tinkering artist. Henry called his finished drawings Ideographs. Over 25 years he produced about 800 unique drawings from four machines. Some of the drawings are hand-embellished.

In 1968 he was included in the highly influential group exhibition *Cybernetic Serendipity* at the Institute of Contemporary Art in London, which brought international attention to computer art. While Henry continued to build new machines and create new drawings during the next several decades, his work was not exhibited nor recognized again until a posthumous retrospective at the Museum of Science and Industry in Manchester in 2011. For most of his life, Henry was a notable academic scholar of Medieval philosophy and logic.
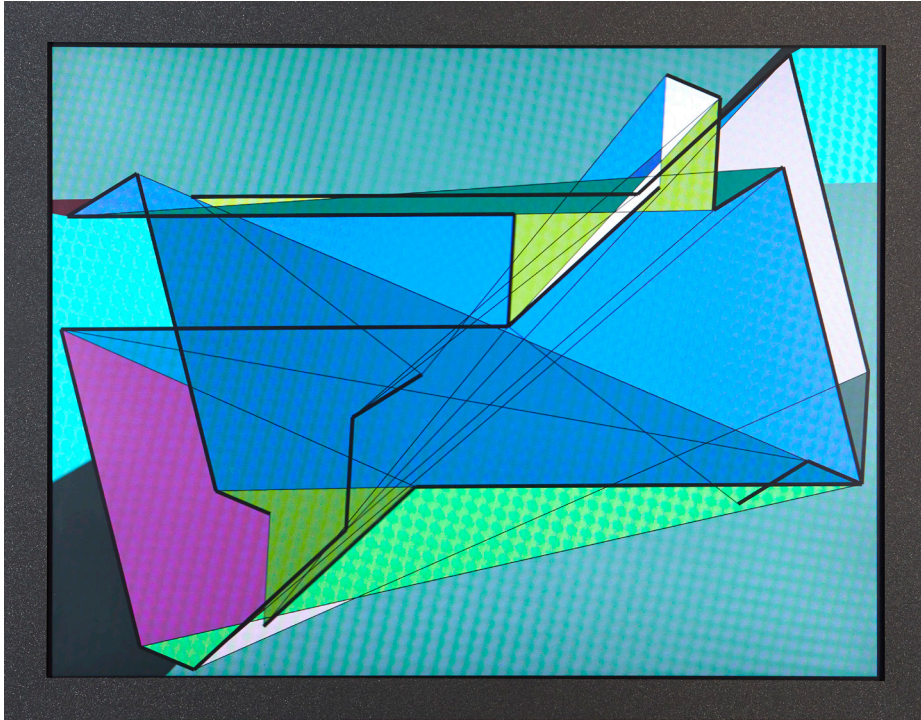
Manfred Mohr (German, born 1938)
P-777B, 2000
LCD screen, computer and custom software
12 x 14 x 3 inches

The software animation *P-777B* represents the theory of a parallel, or alternate, universe. Computer artist Manfred Mohr depicts an infinite space, filled with endless possibilities and encounters, as a digital animation that is programmed to never repeat, given the number of lines, intersections, colors and pathways produced by the artist's custom algorithm. Mohr visualizes a parallel universe, also known as the sixth dimension, using a hypercube, a geometric structure that resembles a cube within a cube.

Exploring the infinite dimensions of the hypercube has been Mohr's lifelong re-search. He produced the world's first museum exhibition of computer-generated art in 1971 in Paris. Since then, he has become a leading proponent of algor-ithmic art and theory, garnering international acclaim for his groundbreaking artistic collaborations with computers.

His earliest works were generated as drawings, from punchcards, a plotter and paper before computers and display monitors were commercially available. *P-777B* from 2000, however, represents a turning point in Mohr's career at which he embraced the display screen as an intrinsic part of his artwork, containing an image within the object in which it was created. It is also the first time that Mohr has used color in his work.

Mohr is a futurist. Instead of feeling alienated from rapidly growing computer technologies, he embraces the dream that humans and computers can evolve in tandem, conversing in "the machine-man dialog," Mohr wrote in 1973.
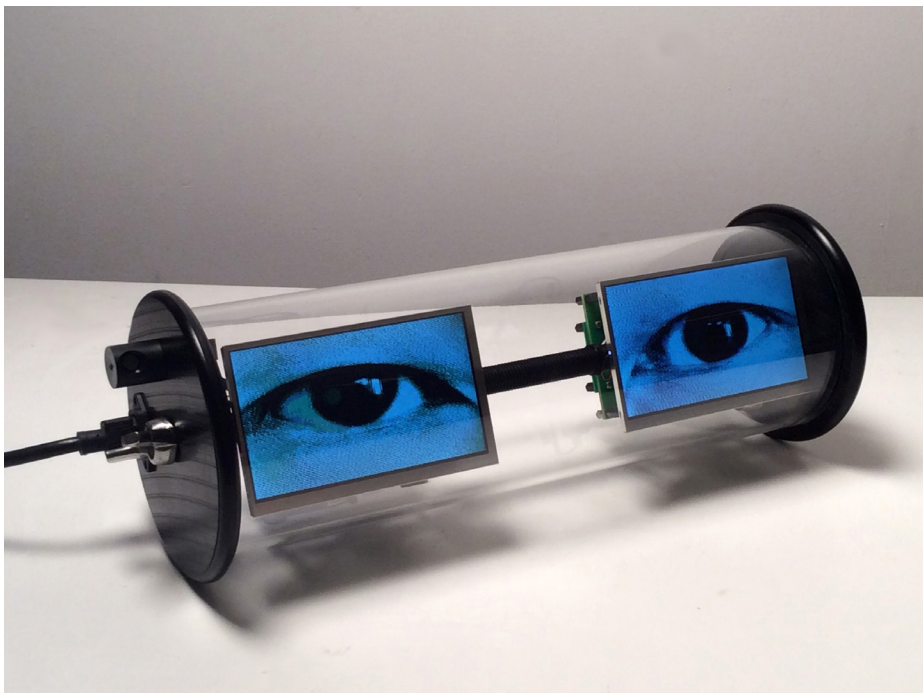
Alan Rath (America, born 1959)
Electric Eyes, 2014
Acrylic, Delrin, Nylon, FR-4, custom electronics and LCD monitors
8 x 21 x 8 inches

Alan Rath often embeds video of his wife's eyes within his electronic sculptures, as in *Electric Eyes*. Her pupils behave with frenzy, as if malfunctioning. Captured on two LCD screens, and encapsulated within a transparent tube like a specimen, the gesturing eyes communicate a loss of control, even anxiety.

Since the mid-1980s Rath has produced many variations of these disembodied eye sculptures, which have become signature objects in his widely recognized career. The electronic eyes are a commentary on the dangers of human-machine co-evolution. "We are cyborgs already," said Rath in a 1998 interview with *SFGate*. "Our consciousness is fundamentally altered because we grew up in an artificial environment." Rath does not seem to embrace the relentless power of technology in our lives, even if it is "a reflection of the people who make it," he concluded. Despite the dystopian view, Rath manages to eek out a bit of humor in his pseudo-robotic artwork.

Peter Sarkisian (American, born 1965)
Ink Blot, 2011
Powder coated steel and aluminum, ink bottle, tinted polymer resin, notepad, computer, video projection and audio
26 x 16 x 13 inches

A 4-minute journey begins when a small man slithers out of an ink spill. His body becomes a brush, and his trail is an ink painting. He struggles to reach his goal, a nearby notepad, as big as a mattress. He lays down there. His whole body, stained with black ink, then dissolves like water in sunlight. This looping display of augmented reality recalls the uphill plight of Sisyphus, updated to comment on the voracious cycle of technology's progress and obsolescence.

The artwork was created using a technique called video-projection mapping, in which the path of the digital image is carefully charted across real objects. "I try to create a perceptual trap that the viewer falls into," said the artist of his artwork in a 2010 interview. The combined video and sculpture produces an illusion of virtual space. "I think that state of confusion is important," said Sarkisian, "because it makes seeing [the artwork] truly experiential." Sarkisian studied photography and film direction, and he lives and works in Santa Fe.

Björn Schülke (German, born 1967)
Spider Drone #3, 2013
Wood, brass, steel, mirrors, camera, screen display, propeller motors, paint, sensors, LED and custom electronics
27.5 x 15.75 x 13.75 inches

Is Björn Schülke's *Spider Drone* a surveillance predator or a protector? That ambiguity excites the artist who is based in Cologne and has debuted a new kinetic drone sculpture nearly every year since 1990. He was first inspired by President Ronald Reagan's Strategic Defense Initiative, an ambitious military technology development program conducted by satellites, spacecrafts and space telescopes, and dubbed "Star Wars" by its critics. Schülke's drone has built-in motion sensors to track the viewers' movement, reflect their image in its live digital video feed, and react. Using switches, timers, relays and custom circuits, Schülke's drone seems to make its own decisions, sometimes even doing nothing, a response the artist finds humorously poignant. The spider drone, although whimsical, reminds that we are always under surveillance, our identities continually extracted as data, whether we like it or not.
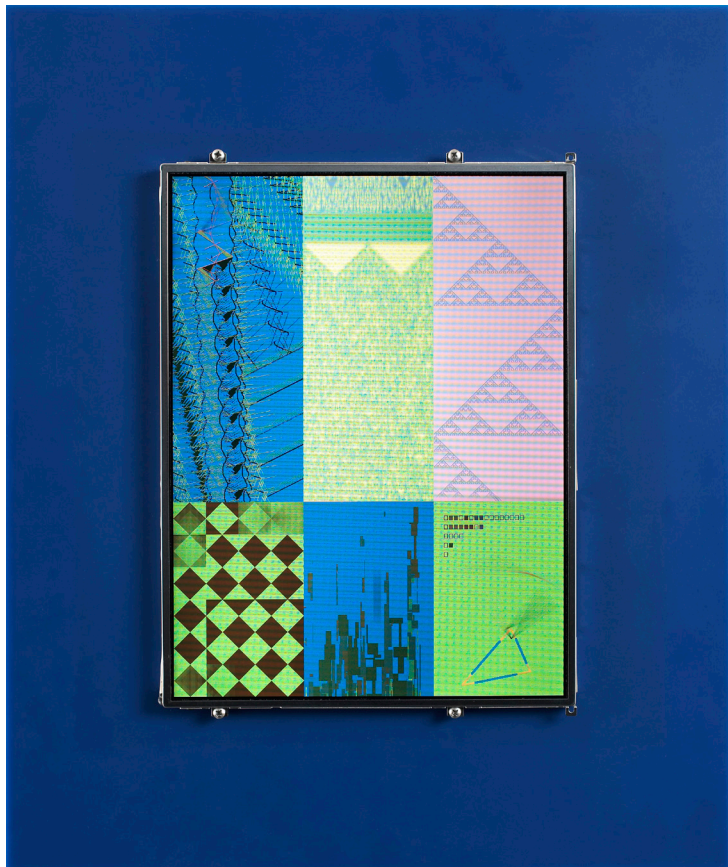
John F. Simon, Jr. (American, born 1963)
Automata Studies, 2002
Custom software and Macintosh G3 Powerbook
19 x 16 x .5 inches

The patterns you see in John F. Simon, Jr.'s digital animation will never end, and they will never repeat. Simon titled *Automata Studies* after a seminal 1956 Princeton publication on the emergent field of cybernetics, or artificial intelligence. Simon says his image behaves "more like a plant than a painting," operating on a level of consciousness associated more with robotics than with art. He coded a generative algorithm to create an infinitely evolving composition, or a microsystem, of self-sufficient imagery.

Simon's mother was a mathematician, and he earned a master's degree in planetary sciences before becoming an artist and software engineer. "When you first start writing software, you think it's like math," Simon said in a recent interview. "It's more like creative writing; it's like sitting down with a blank piece of paper and writing a story."

Simon first sketches with pen on paper the ideas for his digital artworks. He then translates his handmade drawings into code. By using traditional tools to begin his work, Simon connects with twentieth-century masters of abstract art, and he feels an artistic kinship with innovators of geometric abstraction such as Piet Mondrian. Simon has worked with the electronic musician Björk, and was in the 2002 SITE Santa Fe exhibition.

Anne Morgan Spalter (American, 1965)
Topío: Digital Video Coffee Table, 2014
Digital video, monitor and table
20 x 33 x 54 inches

Both a functional table and a digital video monitor, *Topío* displays Anne Morgan Spalter's *Bora Bora: Palm Fronds.* The artist records scenery during her international travels, then abstracts her footage using motion graphics editing software. A former mathematician, the artist relates her artwork to fractals.

Topío is a Greek word (ΤΟΠΙΟ) meaning land or landscape. As if seen through a kaleidoscope, the palm fronds and sky of Bora Bora, a tropical resort island in the Pacific Ocean, spin. The radial-symmetry effect creates an instant relationship to non-Western art historical traditions of Buddhist mandalas and Islamic floral motifs. "Based on original footage shot in Bora Bora," writes the artist, "the regular leaf structure of palms trees and strong island lighting help create endless geometric investigation of the green palette."

Spalter is also a digital artist educator and advocate. She authored a comprehensive manual, *The Computer in the Visual Arts*, in 1999, and she was on the board of the Digital Art Museum, Berlin.

Siebren Versteeg (American, born 1971)
LIKE, 2014
Internet connected computer program with live recursive Google image searches
25 x 41 inches

On the left screen, an algorithm randomly generates an abstract digital painting. Every sixty seconds, a screen capture of the painting is uploaded to Google's reverse-image search tool, an internet algorithm that returns a visually parallel image, or likeness, from its database of billions of images, on the right screen. The artwork performs in real-time, meaning its painting and search results are produced live, never to repeat. The technology behind the reverse image search quickly analyzes and maps an image's distinctive structures, such as lines and textures, to produce a mathematical model.

Siebren Versteeg's clever artwork replicates a familiar viewing experience in art galleries: viewers tend to identify representational imagery in abstract pictures. *LIKE* humorously removes the viewer from that equation by interpreting the digital painting via algorithm. This conversation between algorithms evokes a goal of the robotics industry: to enhance machine-to-machine learning in the search of advanced artificial intelligence. Vertseeg has successfully created an independent, sophisticated art viewer within the artwork itself.
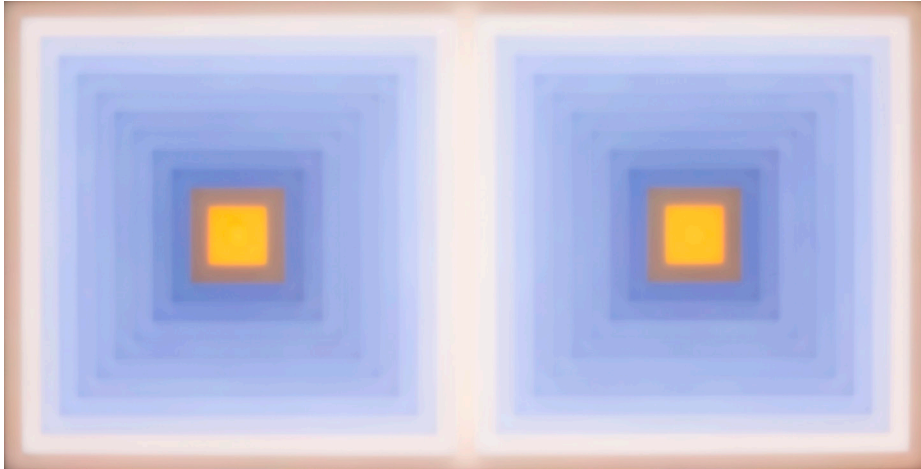
© Leo Villareal, Courtesy of CONNERSMITH, Photography: James Ewing

Leo Villareal (American, born 1967)
Double Scramble, 2013
LEDs, computer, custom software, wood and Plexiglas
37.5 x 73.5 x 3.75 inches

Leo Villareal's *Double Scramble* is a direct response and homage to Frank Stella's 1968 Day-Glo stripe painting of the same title. After meeting Stella, Villareal was inspired to update the minimalist painter's masterwork by creating an animated light version, and honoring the double-concentric-square composition, a favored motif among hard-edge painters since Josef Albers. *Double Scramble* employs hundreds of LED bulbs and custom electronics programmed to continuously change its color gradient.

Stella's original painting version of *Double Scramble* served as set design for dancer Merce Cunningham's performance artwork, also called *Scramble*, with dancers wearing monochromatic costumes. Villareal's *Double Scramble* brings together color relationships and movement in his single work, much like the original staging of Stella and Cunningham's collaboration.

Like many artists working with digital media, Villareal had his start in Silicon Valley's technology sector, at a think tank called the Interval Research Corporation. He studied at Yale and NYU's Interactive Telecommunications Program.

Despite his high-tech output, Villareal aims to connect with viewers on a fundamental level. Light, he said during a 2013 interview, "is very universal and powerful, the way a campfire has this hypnotic power and people are attracted to it." He annually attends the Burning Man festival in Nevada's Black Rock Desert where he first conceived of creating programmable and psychedelic light artworks.

About the Thoma Foundation:
The Carl & Marilynn Thoma Art Foundation recognizes the power of the arts to challenge and shift perceptions, spark creativity and connect people across cultures. We lend and exhibit artworks from our collection and support innovative individuals and pivotal initiatives in the arts.

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