



Center for Computer Research in Music and Acoustics

In 1964, while pursuing graduate studies with Professor Leland Smith, John Chowning began the work in computer music at Stanford using Music IV with help from Max Mathews of Bell Telephone Laboratories. Initial experiments were carried out with the help of the Computer Science Department on their time-sharing computer system. Together, Chowning and computer science student David Poole put together the first on-line computer composition and synthesis system, with technical help from Computer Science and Electrical Engineering. As a result, John Chowning wrote the first programs for moving sound sources through a four-speaker space.

In 1966, the Stanford Artificial Intelligence Laboratory moved to the D.C. Power Laboratory Building on Arastradero Road. It was at this same time that Chowning joined the music faculty teaching music theory and computer music, and the first course in computer-generated music was offered. Exploratory work on musical timbres began in 1967 and led to the discovery of the use of frequency modulation (FM) for sound synthesis by John Chowning with the help of David Poole and engineering graduate student George Gucker. The technology was commercialized by Yamaha Corporation, resulting in the DX-7 (1983), the first commercial digital music synthesizer.

Early compositions from CCRMA included: "Sabelithe I" for sound and 3 performers by John Chowning in 1966 (never completed due to the Artificial Intelligence Laboratories move to the D.C. Power Laboratory Building); "Rondino" for stereo tape, by Leland Smith in 1968; "Pour" for sound and recorded voice, by Martin Bresnick in 1969; "Fragment" for stereo tape, by Martin Bresnick in 1970; "Sabelithe II" for quad tape, by John Chowning; "Machines of Loving Grace" for bassoon and narrator with stereo tape and "Rhapsody for Flute and Computer" for flute and stereo tape, by Leland Smith in 1971; "Turenas" for quad tape, by John Chowning in 1972; "A Little Traveling Music" for amplified piano and quad tape, by Loren Rush in 1974; a realization of Robert Erickson's "Loops" by John Grey in 1974; and "Song and Dance" for orchestra and quad tape, by Loren Rush and commissioned by the San Francisco Symphony in 1975.

Because of their growing reputation, members of the computer music group at Stanford were asked by Pierre Boulez in 1973 to participate in the planning stages of his music research institute being formed as part of the Centre Pompidou in Paris. In August 1975, the IRCAM group came to Stanford to participate in a special workshop on computer music. The research relationship and exchange between the two centers has continued over the years.

In 1974, John Chowning, Loren Rush, John M. Grey, and James A. Moorer submitted an application to the National Science Foundation (NSF) to support research at a new Center for Computer Research in Music and Acoustics (CCRMA). Other funding included a gift from Mrs. Doreen B. Townsend and a grant from the National Endowment for the Arts for computing equipment for musical purposes. To be able to speed up music synthesis, CCRMA commissioned a real-time digital synthesizer from Systems Concepts designed by Pete Samson (called the Samson Box) which came online in 1977. Although a part of the Music Department at Stanford, CCRMA continued to share facilities and computing equipment with the Stanford Artificial Intelligence Laboratory (SAIL) of the Computer Science Department. The founding co-directors of CCRMA were faculty members John Chowning and Leland Smith and research associates John M. Grey, James A. Moorer and Loren Rush. The first computer music concert ("An Evening of Computer Music and Film") was held August 10, 1976 at Dinkelspiel Auditorium and in 1978 CCRMA presented a concert of computer music at the Stanford Museum of Art.



Concert 1

Friday, February 2, 2024 | 7:30 PM

Catching Sparks

NOLAN MIRANDA

Developed and premiered at ZKM Karlsruhe, 2023

Catching Sparks is a collaborative, improvisatory interactive installation designed for participants with or without musical training. Catch sparks! Pass them to co-conspirators? Use them; express yourself. What happens when many play together?

Please visit the installation in the foyer.

Many thanks to all those in the CCRMA Staff and Bing Staff who have helped in the production of this concert!

The program cover art was created with an AI image generator based on the poster of the 1974 film *Man on a Swing*.

CCRMA *Brief History* excerpt on the last page written by John Chowning et al.

Thank you for coming!

Please join us again for these upcoming concerts in the CCRMA Stage:

Amirtha Kidambi and Luke Stewart

THU FEB 8 | 7:30pm

Ensemble Adapter | Stanford Graduate Composers

SUN FEB 11 | 7:30pm

Miya Masaoka

WED FEB 14 | 7:30pm

Synthetic Realms

THU FEB 22 | 7:30pm

Quarantine Sessions #118

SUN FEB 25 | 1:00pm

Ludmila Yurina

THU MAR 28 | 7:30pm

All events will also be live streamed on CCRMA LIVE:
ccrma.stanford.edu/live

Directions and parking: ccrma.stanford.edu/about/directions

For more information visit ccrma.stanford.edu

If you would like to stay up to date with our events, please subscribe to our mailing list: ccrma-mail.stanford.edu/mailman/listinfo/events

STANFORD'S LAND ACKNOWLEDGMENT STATEMENT

Stanford sits on the ancestral land of the Muwekma Ohlone Tribe. This land was and continues to be of great importance to the Ohlone people. Consistent with our values of community and inclusion, we have a responsibility to acknowledge, honor, and make visible the University's relationship to Native peoples.

www.stanford.edu/native-peoples-relationship

interview about FM synthesis was recorded Jun 17, 2015, in Barcelona, <https://rwm.macba.cat/en/sonia/sonia-212-john-chowning>. He taught computer-sound synthesis and composition at Stanford University's Department of Music. In 1974, with John Grey, James (Andy) Moorer, Loren Rush and Leland Smith, he founded the Center for Computer Research in Music and Acoustics (CCRMA), which remains one of the leading centers for computer music and related research. Although he retired in 1996, he has remained involved in activities at CCRMA. In 2019 he initiated a long term project to recreate, by means of computer modeling, the acoustics of the Chauvet Cave in France as they were when the exquisite 32,000-year-old wall paintings were created.

Aliona Ciobanu is a designer and artist based in Den Haag. Currently, she is doing her second degree in graphic design at The Royal Academy of Arts. Besides studies, Aliona is actively engaged in the professional and artistic fields. She works at the intersection of technology and material research, conceptual thinking, developing new methodologies, and exploring sound and interactive media as an instrument for non linear storytelling. As a freelance designer she used to work with non-governmental, cultural organizations and festivals.

Pamela Martínez is a Venezuelan filmmaker and sociologist who loves dancing salsa! She is interested in systems of care, migration, and transitional justice.

Nolan Miranda is

Mike Mulshine is a composer-songwriter-performer and music technologist whose work interrogates traditional musical relationships and centrally values the expressive and cathartic aspects of creation. He produces interactive audiovisual works that aim to expose accessible, engaging, and empowering new modes of experiencing or (co-) creating media. These range from web-based interactive albums to physical sound installations and experimental compositions that blend vernacular and formal elements. He is currently pursuing a PhD in Computer-Based Music Theory and Acoustics and a Diploma in Music Composition at Stanford University.

Agata Tabacu is a Romanian animator, model maker, and illustrator, working with analog techniques, but with a passion for stop-motion. She has created animations for NGOs, brands, and events since 2018. Starting in 2021, she facilitates stop-motion animation workshops for children for the Transylvania Film Festival. Agata also has a successful customized puppet-making boutique business in Romania. Currently, she is based in London, UK finishing her Master Degree in animation at The Royal College of Art.

Dilmana Yordanova is a multimedia artist whose training is embedded in the extensive range of artistic resources of the late 90's. As a visual artist, she's been interested in renewing artistic language and mastering both traditional and new means. Appealing to painting, photography, installation, video, VJ-ing, interactive installations, 3D video mapping and architecture video projections in order to express the similar subject. In her study years, Dilmana Yordanova took part in several exhibitions of national and international contemporary art.

PROGRAM

Turenas (1972) JOHN CHOWNING

Soft Touch (2023) CONSTANTIN BASICA
Please note that the piece contains a few anatomical illustrations and descriptive terms from a human anatomy book. Viewer discretion is advised.

imperfect misdemeanor (2022, spatialized 2024) NOLAN MIRANDA

Invisible Forces (In Pandora's Hands) (2023) CELESTE BETANCUR GUTIÉRREZ
 Celeste Betancur Gutiérrez, performer

I N T E R M I S S I O N

All Of It (2023) MIKE MULSHINE
 Pamela Martínez, performer
 Mike Mulshine, performer

i grew many limbs under the rubble (2023) DOGA CAVDIR

Meteora (1987) JONATHAN BERGER

Aphasia (2010) MARK APPLEBAUM
 Mark Applebaum, performer

Face Coverings Are Strongly Recommended. We encourage you to continue wearing masks for the comfort of our audience members, staff, and artists.

To Ensure a More Pleasant Experience for All: No food, drink, or smoking is permitted in the concert space. Cameras and other recording equipment are prohibited. Please ensure that your phone, other electronic devices, or watch alarm are all turned off. Thank you.

PROGRAM NOTES

Turenas | John Chowning

This was the first widely presented composition to make exclusive use of frequency modulation synthesis, discovered by Chowning in 1967. FM synthesis, which is integral to *Turenas*, was a gift from nature and hence the title derived from its possessive form. *Turenas* also makes use of a program, developed by the composer over a period of four years, for creating the illusion of sounds in motion through a quadraphonic sound space.

Leland Smith's program, Score, and the composer's spatial and synthesis algorithms, were used to create the input data for MUSIC 10, that was run on a Digital Equipment Corporation (DEC) PDP-10 computer. The samples were written on a disc and then converted to an analog signal and recorded on a 4-channel tape recorder in a separate step. In 1978 *Turenas* was regenerated on a real-time digital synthesizer designed by Peter Samson (the Samson Box), and in 2009 Bill Schottstaedt (CCRMA) created a software emulation of the Samson Box that allowed *Turenas* to be recomputed to meet current audio standards. It is this version that is presented here.

Present at the premiere of *Turenas* in Dinkelspiel Auditorium, Stanford University on April 28, 1972, were the composers Martin Bresnick, Andrew Imbrie, Gyorgy Ligeti, Loren Rush, Leland Smith and Ivan Tcherepnin, who wrote the following notes in 1973 for a concert at Harvard University.

This computer generated tape composition makes extensive use of two major developments in computer music pioneered and developed by John Chowning, working at Stanford's Artificial Intelligence Lab. The first involves the synthesis of moving sound sources in a 360-degree sound space, which takes into account the effects of the Doppler shift. The second was a breakthrough in the synthesis of "natural" (as well as almost "supernatural") timbres in a simple but elegant way, using accurately controlled frequency modulation. This is the technical background, but the piece is not about that background.

The title "Turenas" is an anagram of "Natures", evoking the way sounds "tour" through the space, transparent and pure, produced by the most technologically sophisticated means yet tending to sound perfectly natural, as if a dream could come true.

— Ivan Tcherepnine (1943-1998)

of the Rome Prize. He was the founding co-director of the Stanford Institute for Creativity and the Arts (SICA, now the Stanford Arts Institute) and founding director of Yale University's Center for Studies in Music Technology. Described as "gripping" by both the New York Times and the Chicago Tribune, "poignant", "richly evocative" (San Francisco Chronicle), "taut, and hauntingly beautiful" (NY Times), Jonathan Berger's recent works deal with both consciousness and conscience. The Kronos Quartet toured recent monodrama, *My Lai* internationally. Thrice commissioned by The National Endowment for the Arts, Berger's recent commissions include The Mellon and Rockefeller Foundations, Chamber Music Society, Lincoln Center, and Chamber Music America. Upcoming commissions include an oratorio entitled *The Ritual of Breath*, and *Leonardo*, for baritone and chamber orchestra. In addition to composition, Berger is an active researcher with over 80 publications in a wide range of fields relating to music, science and technology and has held research grants from DARPA, the Wallenberg Foundation, The National Academy of Sciences, the Keck Foundation, and others.

Celeste Betancur Gutiérrez: I am an enthusiastic dancer and a life improviser, currently a second year PhD student at CCRMA.

Doga Cavdir is a Copenhagen-based sound and performing artist and researcher who integrates body movement and expression into music performance. Her artistic process actively engages with kinesthetic, immersive, and shared experiences for inclusivity as a way to bridge diverse abilities. As a woman artist from Turkey, her work is strongly influenced by the ongoing tension between autonomy, expression, and the body. She explores our embodied, lived presence in a technology-mediated world through body movements as she designs and performs with her custom-made instruments solo and in collaboration with dancers. She is a recipient of the 2021 Diversifying Academia, Recruiting Excellence (DARE) fellowship from Stanford University where she completed her PhD at the Center for Computer Research in Music and Acoustics. She received MacDowell Fellowship and Leanordo@Djerassi artist residencies to be completed in May and September 2024, respectively.

John Chowning was born in Salem, New Jersey in 1934, spending his school years in Wilmington, Delaware. Following military service and four years at Wittenberg University in Ohio (B. of Mus), he studied composition from 1959-61 in Paris with Nadia Boulanger. He received the doctorate in composition (DMA) from Stanford University in 1966, where he studied with Leland Smith. With the help of Max Mathews of Bell Telephone Laboratories and David Poole of Stanford, in 1964 he setup a computer music program using the computer system of Stanford's Artificial Intelligence Laboratory. Beginning the same year he began the research that led to the first generalized surround sound localization algorithm in the digital domain. Chowning discovered frequency modulation synthesis (FM) in 1967. This breakthrough in the synthesis of timbres allowed a very simple yet elegant way of creating and controlling time-varying spectra. Inspired by the perceptual research of Jean-Claude Risset, he worked toward turning this discovery into a system of musical importance, using it extensively in his compositions. In 1973 Stanford University licensed the FM synthesis patent to Yamaha in Japan, leading to the most successful synthesis engine in the history of electronic musical instruments. An

ABOUT THE ARTISTS

Mark Applebaum, Ph.D. is the Edith & Leland Smith Professor of Composition at Stanford University. His solo, chamber, choral, orchestral, operatic, and electroacoustic work has been performed throughout North and South America, Europe, Australia, Africa, and Asia, including notable commissions from the Merce Cunningham Dance Company, the Fromm Foundation, the Spoleto Festival, the Kronos Quartet, Chamber Music America, Ensemble Talea, and the Vienna Modern Festival. Many of his pieces are characterized by challenges to the conventional boundaries of musical ontology: works for three conductors and no players, a concerto for flutist and orchestra, pieces for instruments made of junk, notational specifications that appear on the faces of custom wristwatches, works for an invented sign language choreographed to sound, amplified Dadaist rituals, silent “potential” music that allow listeners to infer sound, a chamber work comprised of obsessive page turns, and a 72-foot long graphic score displayed in a museum and accompanied by no instructions for its interpretation. His TED talk has been seen by more than five million viewers. Applebaum is also an accomplished jazz pianist and builds electroacoustic sound-sculptures out of junk, hardware, and found objects. At Stanford Applebaum is the founding director of [sic]—the Stanford Improvisation Collective. He is a member of the board of trustees at Carleton College and has served on the board of Other Minds.

Constantin Basica is a Romanian composer living in the San Francisco Bay Area, whose current work focuses on symbiotic interrelations between music, video, and performers. His works have been performed in Europe, North America, and Asia. He earned a DMA in Composition at Stanford University, and he also holds an MA in Multimedia Composition from Hamburg University of Music and Theatre (DE), as well as two BA degrees in Composition and Conducting from the National University of Music Bucharest (RO). Constantin has been collaborating with other artists and researchers on projects involving Artificial Intelligence and music improvisation. Currently, he is a postdoctoral scholar, lecturer, and the concert coordinator at Stanford’s Center for Computer Research in Music and Acoustics (CCRMA).

Alexandru Berceanu is a director in mixed media active in the use of new technologies and media in performing arts. Alexandru Berceanu is the creator or co-creator of several installations, the most important of which are *Alb Imprint* at the Mobius Gallery, 1958-1958 at Atelier 35, *Lost Interferences*, *Who am I?*, an H3 production with the Odeon Theater or exhibited works in VR national and international, as well as the graphic novel *Mickey on the Danube*. Alexandru is looking for new healing narratives, relating through play and interactivity through artistic and interdisciplinary neuroscience-performance arts research.

Jonathan Berger is the Denning Family Provostial Professor in Music at Stanford University, where he teaches composition, music theory, and cognition at the Center for Computer Research in Music and Acoustics (CCRMA). Jonathan is a 2017 Guggenheim Fellow and a 2016 winner

Soft Touch | Constantin Basica

Please note that the piece contains a few anatomical illustrations and descriptive terms from a human anatomy book. Viewer discretion is advised.

Concept and text: Alexandru Berceanu
Animation: Aliona Ciobanu, Agata Tabacu
Video: Dilmana Yordanova
Performer: Ana Costea
Music: Constantin Basica

Soft Touch is an immersive and interactive installation that premiered in Bucharest, Romania in Fall 2023. For this concert, a selection of excerpts has been transformed into a fixed media piece. The original three-screen immersive projection has been reduced to one screen, but the sound—originally in stereo—has been spatialized for the GRAIL 20-speaker array enveloping the audience in Bing Concert Hall.

Soft Touch is an exploration of human fragility through the perspective of memory, object gesture, image, and sound. The installation, conceived and directed by Alexandru Berceanu, brings together more than ten physical objects that become part of a fabric of memory through haptic interactions developed by Grigore Burloiu. The immersive image projected on several screens is developed through a process of autoethnography starting from dreams, memories, and nightmares, which was animated and developed into video content by Agata Tabacu, Aliona Ciobanu, and Dilmana Yordanova. The interactive projection system was developed by Răzvan Pascu. In the installation, Andrei Mitișor created two kinetic objects. The sonic space in *Soft Touch* was developed by Constantin Basica using concrete sounds and electroacoustic music, which creates a counterpoint to the narrative and visual layers.

Soft Touch recreates a space of sensitive memory that subtly brings into discussion the opposition between rigid and hard technology, and the soft, organic, and implicitly fragile biology. Traveling from the earliest memories to the most intense nightmares, through personal archival images, memorabilia, and an interactive video system, the installation invites discovery of the subtle and illusory fabric through which experience is filtered and webs of meaning are produced.

imperfect misdemeanor | Nolan Miranda

this time, jazz moves in circles.

thanks to saxki nakajima, mark “bass” rau, and michael drums.

***Invisible Forces (In Pandora's Hands)* | Celeste Betancur Gutiérrez**

Pandora hears her dreams, they talk to her in mysterious voices and unknown languages. Is she in control? Are you in control? sounds and voices everywhere, maybe we are part of her dreams too...

This piece was originally composed to be performed at Bing Concert hall (2023) by the Stanford Laptop Orchestra, and it requires for the audience to be connected using any internet/audio capable device such as phone, tablet or laptop.

You can choose to participate in two ways, streaming or interactive.

Streaming mode

(I will live code some visuals and audio on your device but you don't have controls):

<https://ccrma.stanford.edu/~celeste/slork/ide/streaming.html>



Interactive Mode

(I will suggest some audio textures but you can play and change them on the fly):

<https://ccrma.stanford.edu/~celeste/slork/ide/interactive.html>



***All Of It* | Mike Mulshine**

All Of It tries and fails to embrace everything all at once. It reflects a period of hypermobility, departure from routine, and varied and dynamic understandings of home. It is an evolving tape and live performance piece that eagerly embraces new mediations, accretions, and depletions.

***i grew many limbs under the rubble* | Doga Cavdir**

i grew many limbs under the rubble is composed for a kinetic sound installation as part of the series "The Earth that Vibrates." The piece reflects the devastating, and still on-going, affects of February 6 earthquakes in Turkey in 2023. The piece is composed for the piano by bowing the piano strings with different materials and techniques. It was premiered at Headlands Center for the Arts on May 21, 2023 for the installation that includes the composition, six pairs of rocks and debris, and Headlands' historic gymnasium. Each pair of rocks is originally connected to each other with a mono-filament, hanging a smaller rock in the air and navigating the listeners into the space where reverberation qualities are distinct. The sound pressure and airflow swing the rocks offering a complex, kinesthetic listening experience where the space acts as a room-size sound board adding its own acoustic qualities.

***Meteora* | Jonathan Berger**

Meteora is a monastery near Delphi dramatically situated on the summits of three enormous erratics. Created at CCRMA, *Meteora* was awarded a Bourges Prize in 1987.

***Aphasia* | Mark Applebaum**

Aphasia, conceived originally for singer and two-channel tape, was commissioned by the GRM, Paris and composed for virtuoso singer Nicholas Isherwood. The tape, an idiosyncratic explosion of warped and mangled sounds, is made up exclusively of vocal samples—all provided by Isherwood and subsequently transformed digitally. Against the backdrop of this audio narrative, the singer performs an elaborate set of hand gestures, an assiduously choreographed sign language of sorts. Each gesture is fastidiously synchronized to the tape in tight rhythmic coordination.