

CCRMA Studio Report

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Abstract

What's new and changed during last year at ccrma. People, equipment, activities, research, music.

1 The cast

The Stanford Center for Computer Research in Music and Acoustics (CCRMA) is a multi-disciplinary facility where composers and researchers work together using computer-based technology both as an artistic medium and as a research tool (correct, but sort of stuffy: in other words, we use computers, we do research, we do music, we have fun). CCRMA is located on the Stanford University campus in a building that was refurbished in 1986 to meet its unique needs. The facility includes a large multi-channel/ multimedia experimental space with adjoining control room/all digital studio, a recording studio with adjoining control room, a couple of general purpose analog/digital studios, several work areas with workstations, synthesizers and speakers, a seminar room, a reference library, classrooms and offices. For a detailed tour and more information feel free to visit us in the World Wide Web at "<http://www-ccrma.stanford.edu/>". The Overview section will give you a fairly detailed review of the latest research and music.

The CCRMA community consists of administrative and technical staff, faculty, research associates, graduate research assistants, graduate and undergraduate students, visiting scholars and composers, and industrial associates. Stanford departments actively represented at CCRMA include Music, Electrical Engineering, Mechanical Engineering, Computer Science, and Psychology. CCRMA has developed close ties with the Center for Computer Assisted Research in the Humanities (CCARH), recently affiliated with the Department of Music.

Staff & Faculty: Chris Chafe-Associate Professor of Music, Director; Jonathan Berger-Associate Professor of Music (Interim co-Director 98/99); Julius Smith-Associate Professor of Music and Elec-

trical Engineering (Interim co-Director 98/99); Jay Kadis-Audio Engineer/Lecturer; Fernando Lopez-Lezcano-Systems Administrator/Lecturer; Heidi Kugler-Secretary; Max Mathews-Professor of Music (Research); John Chowning-Professor of Music, Emeritus; Leland Smith-Professor of Music, Emeritus; John Pierce-Visiting Professor of Music, Emeritus; Jonathan Harvey-Professor of Music; Eleanor Selfridge Field-Consulting Professor of Music; Walter Hewlett-Consulting Professor of Music; William Schottstaedt-Research Associate; Gary Scavone, Technical Director (and Post-Doctoral Fellow in Acoustical Research); Dan Levitin, Lecturer; Marina Bossi; Lecturer.

2 The activities

Center activities include academic courses, seminars, special interest group meetings, spring and summer workshops, and colloquia. Concerts of computer music are presented several times each year, including an annual outdoor computer music festival in July. In-house technical reports and recordings are available, and public demonstrations of ongoing work at CCRMA are held periodically. Research results are published and presented at professional meetings, international conferences and in established journals including the Computer Music Journal, Journal of the Audio Engineering Society, and the Journal of the Acoustical Society of America. Compositions are presented in new music festivals and radio broadcasts throughout the world and have been recorded on cassette, LP (ok, ok, not recently), and compact disk.

3 The toys

Currently supported platforms include NeXT computers (for old time's sake), Intel PC's running both NextStep and Linux (currently RedHat 6.x), Silicon Graphics workstations and Macintosh computers. All platforms share accounting information and files over the network through several servers.

Over the last year we have added 6 more fast machines to the network, 6 HP Pentium II-450 and III-500MHz (some of the older NeXTs are being mothballed to make space for the speedy newcomers). Both Linux powered PCs and SGIs has proven to be extremely popular during the past years, specially because of the matlab package, the lisp compositional environment and the snd sound editor. The main servers are O2 workstations connected to a switched 100Mb/s network (all new machines talk 100Mb/s). We are now connected to the Stanford University Network at 100Mb/s, including high speed access to the new Internet 2 GigaPop nodes. The combination of network, workstation and server changes have had a very positive impact in the performance of all machines. Supported software in the unix world includes the CCRMA Lisp Environment (which includes Common Music, Common Lisp Music and Common Music Notation), the Snd sound editor, the MusicKit and associated programs (in NEXTSTEP only) and tons of utilities and packages for research and music creation. The Macintosh world has a full complement of MIDI based tools and is used for MIDI applications, notation and digital mixing (with hardware assist from Dyaxis II and 16 and 24 bit ProTools systems in three of the four studios). What used to be the MIDI Studio is being converted to a general purpose studio by Jay Kadis and will include a 24 bit fully loaded ProTools system and MIDI tools. Two new G3 Macintoshes have been added to our setup, fitted with ProTools Toolboxes, Max with MSP and a full complement of MIDI tools. MIDI systems include Yamaha, Roland and Korg equipment including Yamaha DX, TX, SY, TG and VL synthesizers, KX88 keyboard controller, Disklaviers, Korg WaveStations and WaveDrum, E-mu samplers and digital delays and effect processors. Also available are IVL pitch trackers, a Buchla Lightning MIDI controller, several Mathews Radio Drum controllers, MIDI patchers and drum machines from Yamaha and Roland. Studio E has a 16 channel ProTools system with a core card, several DSP Farm cards, Two SampleCell II cards and an 888 interface and Genelec 1030's for high quality monitoring. Another ProTools system with one DSP Farm card and an 882 interface will live alongside the Dyaxis II system in Studio D. All three studios now have Teac DAx8 multichannel digital recorders. CCRMA's recording studio has become a central part of the Music, Science and Technology program, as it is heavily used by students studying audio recording technology. The studio is currently centered around a Biamp Legend 20x16 console and patchbay (but will be upgraded shortly to an all digital mixing system) with two Tascam DA-88s, a Tascam 80-8 w/ dbx, and a Yamaha DMR-8 providing both analog and 16- and 20-bit digital recorders. A Spectral Translator format converter

allows digital transfers between the different digital recorders. (An ADAT-XT is available for transfers and two Nakamichi MR-1s allow cassette recording.) Monitor systems include Westlake BBSM-10s powered by Hafler P235s and JBL 4206s powered by a QSC 1080. Outboard gear includes Teletronix LA-2A, dbx 166, and Behringer Composer compressors, Yamaha SPX-90IIs, a Yamaha SPX-1000, a Korg A-1, two Yamaha D1500 delays, two Rane GE-30 graphic equalizers, and Yamaha Rev-7 and Lexicon 224XL reverbs. Microphones include a Neumann TLM-193, AKG C-414s and C-460s, Electrovoice RE-20s, Sennheiser MD-421 and MD-504s, a Beyer M-500, and several Shure Beta-57s and SM-57s. Also available in the recording studio is a Yamaha DC-7 Disklavier piano.

4 Serious stuff

This array of brief research summaries will give you an idea of the current crop, and who's doing it:

4.1 Computer Music Hardware and Software

- The MusiCloth Project, Lonny Chu
- The CCRMA Music Kit and DSP Tools Distribution, David Jaffe and Julius Smith. Work is in progress by Stephen Brandon at the University of Glasgow to port the Music Kit to OPENSTEP. Leigh Smith is working on a port of MusicKit to Apple's PPC/OS X Server.
- Mi_D; Tobias Kunze
- PadMaster, an Interactive Performance Environment. Algorithms and Alternative Controllers; Fernando Lopez-Lezcano
- A Dynamic Spatial Sound Movement Toolkit; Fernando Lopez-Lezcano
- grani, a granular synthesis instrument for CLM; Fernando Lopez-Lezcano
- ATS (Analysis/Transformation/Synthesis): a Lisp environment for Spectral Modeling; Juan Pampin
- Ashes Dance Back, a collaborative work with Jonathan Harvey; Juan Pampin
- Computer-based implementation of Karlheinz Stockhausen's piece Mantra; Juan Pampin
- Spectral User Interface (SUI): real-time spectral transformations in ATS; Juan Pampin
- Stanford Computer-Music Packages for Mathematica; Craig Sapp

- Graphical Additive Synthesis; Craig Sapp
- The Synthesis ToolKit (STK); Pery Cook and Gary Scavone
- Common Lisp Music, Snd and Common Music Notation; William Schottstaedt
- Common Music; Heinrich Taube
- New synthesis and algorithmic composition technique based on classical and quantum mechanics; Bo Sturm
- A Speech Feature Based on Bark Frequency Warping - The Non-uniform Linear Prediction (NLP) Cepstrum; Yoon Kim
- Real-time Controllers for Physical Models; Chris Chafe
- The Touchback Keyboard; Brent Gillespie
- Updates on the Radio-Baton Program; Max V. Mathews

4.2 Physical Modeling and Digital Signal Processing

- Physical Modeling of Brasses; David Berners
- Numerical Integration of Partial Differential Equations; Stefan Bilbao
- Vicarious Synthesizers: Listening for Timbre; Chris Chafe
- Synthesis of Transients in Classical Guitar Sounds; Cem Duruoç
- Computation of Reflection Coefficients for an Axisymmetrical Horn by Boundary Element Method; Shyh-Kang Jeng
- Scalable Audio Models for Data Compression and Modifications; Scott Levine
- Articulatory Singing Voice Synthesis; Hui-Ling Lu
- Perceptual Audio Coding Based on the Sinusoidal Transform; Juan Pampin and Guillermo Garcia
- Sig++: Musical Signal Processing in the C++ language; Craig Stuart Sapp
- Acoustic Research and Synthesis Models of Woodwind Instruments; Gary Scavone
- FFT-Based DSP and Spectral Modeling Synthesis; Julius Smith
- Digital Waveguide Modeling of Acoustic Systems; Julius Smith
- Signal Processing Algorithm Design Stressing Efficiency and Simplicity of Control; Timothy Stilson
- Antialiasing for Nonlinearities: Acoustic Modeling and Synthesis Applications; Harvey Thornburg

4.3 Psychoacoustics and Cognitive Psychology

- Neural Network Models of Musical Cognitive Activities; Jonathan Berger, Daniel Lehmann, and Dan Gang
- New Text on Psychoacoustics; Perry Cook
- Absolute Pitch, Absolute Tempo, Absolute Loudness; Daniel Levitin

4.4 Machine Recognition in Music

- Statistical Pattern Recognition for Prediction of Solo Piano Performance; Chris Chafe
- Optical Recognition of Printed Music: A New Approach; walter Hewlett

4.5 Historical Aspects of Computer Music

- Impact of MIDI on Electroacoustic Art Music; Alex Igoudin

4.6 Computer Assisted Music and Acoustics Research

- The Center for Computer Assisted Research in the Humanities (CCARH)
- The Musical Acoustics Research Library; Gary P. Scavone and Max V. Mathews

5 Noisy stuff

Recent pieces composed by ccrmalites:

- **Celso Aguiar**: “All blue, I write with a blue pencil, on a blue sky” for quadraphonic tape; “Monologue for Two” for flute and clarinet
- **Oded Ben-Tal**: “*Medea*” (1998) for three singers and chamber ensemble; “*In memory of Federico Garcia-Lorca*” (1998) - four short pieces for percussion solo.
- **Jonathan Berger**: “Miracles and Mud” (1999) for String Quartet; “Of Hammered Gold” (1999) for computer, harpsichord, Baroque flute, Baroque oboes, Baroque violin and gamba (Chamber Music America Millennium Commission); “Arroyo” (1998) for motion detected dancer, computer and instruments; “Elegy” (1998) for alto and chamber ensemble; “Con Carne” (1998) for Disklavier and pianist; Jonathan Berger is a National Endowment for the Arts Fellow, 1996-1997 and recipient of the Chamber Music America Millennium Commission.
- **Chris Burns**: “Calyx” (1998); “Escuela” (1999)
- **C. Matthew Burtner**; “Kunikluk” for ensemble and noise generator (1999); “Rhythm/Noise Study (in Metal)” for computer-generated tape (1998); “Frames/Falls” for amplified violin, amplified double bass, and computer-generated tape (1998); “Portals of Distortion” for nine tenor saxophones (1998); a solo CD of new music by Matthew Burtner, “Portals of Distortion: Music for Saxophones, Computers, and Stones” was released in January, 1999 by Innova Records (Innova 526).
- **Joanne D. Carey**: “Adventures on a Theme” (1997)
- **Chris Chafe**: “Whirlwind I and II” (1998); Push Pull (1995); Between the Sheets (1997); Chris Chafe is an awardee of National Endowment for the Arts Composer’s Fellowship 1982-1983, 1994-95; Green Faculty Fellowship 1995-96; Resident Artist, Banff Centre, 1998-99.
- **Ching-Wen Chao**: “Soundstates” (1998) for percussion and tape
- **Janet Dunbar**: “Songs of the Sea” (1997-8) for soprano, performance poet, keyboard, guitar, cello and CD
- **Nicky Hind**: “Cosmos” (1997)
- **David A. Jaffe**: “OTHER WORLDS: An homage to Carl Sagan”, concerto for Zeta electric/MIDI violin and symphonic band; “The Seven Wonders of the Ancient World”, a seventy-minute concerto in seven ten-minute movements for Boie-Mathews Radio Drum-controlled Disklavier.
- **Tobias Kunze**: “Protozoo” (1997), live Stereo Sound Processing WP
- **Jun Kim**: “Eum-Yang” (1998)
- **Seungyon-Seny Lee**: “Chuk-won” (1998)
- **Fernando Lopez Lezcano**: “iCEsCcR-rEeAaMm” for four channel tape; “House of Mirrors” for PadMaster, midi instruments and soundfile playback
- **Charles Nichols**: “Regulate Six” for MIDI violin and computer (1998)
- **Juan Carlos Pampin**: “Skin Heads” (1998) for percussion trio and computer generated sounds; “Interstices” (1997) for string quartet; “Toco Madera” (1997) for wooden percussion (duo) and computer generated sounds; “Metal Hurlant” (1996) for metallic percussion and computer generated sounds
- **Bob Sturm**: “Resurrection” (1998); “50 Particles in a Three-Dimensional Harmonic Potential: An Experiment in 5 Movements” (1999)
- **Kotoka Suzuki**: “Eclipse” (1996)
- **Sean Varah**: “Outside the Box” (1998) for flute clarinet, piano, percussion, violin and cello; “Borderline” for cello and tape (1998); “Slipping Image” for mixed quartet and tape (1998); he is currently working on a commission from the CBC for a piece for flute and tape for the Canadian flautist, Robert Cram to be premiered in April, 1999.
- **Marek Zoffaj**: “In Principio Erat Verbum” (1998) for tape