CCRMA ROSTER

PPN	Name

Staff & Faculty

JC	John Chowning, Director
PAT	Patte Wood, Administrative Director
HMK	Heidi Kugler, Secretary
MVM	Max Mathews, Professor (Research)
LCS	Leland Smith, Professor
JRP	John Pierce, Visiting Professor Emeritus
EDS	Earl Schubert, Professor Emeritus
BMR	Bernard Mont-Reynaud, Senior Research Associate
CC	Chris Chafe, Technical Coordinator/Research Associate/Lecturer
BIL	Bill Schottstaedt, Research Associate
JOS	Julius Smith, Research Associate/Lecturer
EG	Emmanuel Gresset, Research Assistant
TVR	Tovar, Programmer/Analyst
JAY	Jay Kadis, Audio Engineer

Student Research Assistants		Degree
PRC	Perry Cook	PhD EE
DK	Douglas Keislar	PhD Music
STK	Stanislaw Krupowicz	DMA Music (Composition)
DKM	David Mellinger	PhD CS
XJS	Xavier Serra	PhD Music
BOB	Bob Shannon	PhD EE

Graduate Students			Project
ECB	Emily Brant	DMA Music (Voice)	Computer Music Seminar
	Michael Cohen	PhD Computer Science	MIDI Seminar
EZC	Estrella de la Cruz	DMA Music (Composition)	Composition
GRD	Glen Diener	PhD Music	Research
YIE	Young-Iee Eom	Masters Music(Composition)	Computer Music Seminar
JON	Jonathan Franklin	PhD VTSS	Computer Music Seminar
HMH	Martin Herman	Music/U.C. Berkeley	Computer Music Seminar
HBH	Harlan Hokin	DMA Music (Voice)	Research
	Brent Johnson	PhD EE	Signal Processing Seminar
RSK	Richard Karpen	DMA Music (Composition)	Composition
LEH	Ben Knapp	PhD EE	Research
TOS	Steven Lakatos	PhD Music	Research
CCL	Chris Lanz	DMA Music (Conducting)	MIDI Seminar
LFT	Alfred Leung	PhD Music	Research
	Todd Mozer	GSB	MIDI Seminar
DCO	Chris Overton	Math	Computer Music Seminar
DVO	Daniel Oppenheim	DMA Music (Composition)	Composition
DAV	David Perry	PhD Psychology	Research
AMI	Ami Radunskaya	PhD Math	Research
TKA	Alex Tkaczevski	DMA Music (Composition)	Computer Music Seminar
CYW	Cheng Wang	DMA Music (Composition)	Composition

XSK	Xu Sika	Masters Music (Composition)	Computer Music Seminar
DDZ	David Zicarelli	PhD Hearing and Speech	Research

Undergraduates

	Robert Armas	Undeclared	MIDI Seminar
	Joseph Belfiore	Undeclared	MIDI Seminar
WCC	Wendy Chow	Symbolic Systems	Computer Music Seminar
	Gregory Cohen	Undeclared	MIDI Seminar
PVC	Peter Commons	EE/Music	Computer Music Seminar
DJC	Daniel Culbert	CS/work study	MIDI Seminar
SCD	Scott Douglas	EE	Computer Music Seminar
SBF	Steven Fram	Philosophy	Computer Music Seminar
TFG	Tim Gallagher	Undeclared	MIDI Seminar
	Peter Habicht	Undeclared	MIDI Seminar
	David Hornik	Undeclared	MIDI Seminar
	Martha Horst	Music,VTSS	Computer Music Seminar
DEB	Deborah Jue	Undeclared	Signal Processing Seminar
ABS	Andrew Leary	Music/work study	Computer Music Seminar
	Jeffrey Neal	Undeclared	MIDI Seminar
	Eric Ranelletti	Undeclared	
SAV	Sean Varah	Music/CS	Computer Music Seminar
	William Wallace	Music	MIDI Seminar
	Carl Wescott	Undeclared	MIDI Seminar
	Timothy Westergren	PolySci	MIDI Seminar
CPW	Chanel Wheeler	Computer Science	Computer Music Seminar

Visiting Scholars/Composers

JWB	James Beauchamp	Professor; University of Illinois (sabbatical Jan-June)
BRG	Jonathan Berger	Assistant Prof. Music; Yale University (sabbatical 87)
AB	Al Bregman	Professor of Psychology, McGill University (sabbatical 86-87)
	Diana Deutsch	Professor of Psychology; UC San Diego 1988 (spring 88)
PEF	Pablo Furman	Visiting Professor,Music; UC Berkeley 1988
GEG	Guy Garnett	Visiting scholar
JEG	Johannes Goebel	Composer; German government fellowship (1987-88)
JH	Jonathan Hallstrom	Professor of Music, Colby College, Rockefeller fellowship
DAJ	David Jaffe	Composer
FLM	Fred Malouf	Composer
JRM	Janis Mattox	Composer; NEA fellowship
MMM	Mike McNabb	Composer
	Simon Millward	Composer; English fellowship (1987)
DEX	Dexter Morrill	Prof. of Music; Colgate University NEA fellowship
IJM	Ira Mowitz	Composer; Guggenheim fellowship (Sept. 87 for 1 year)
ARP	Arnaud Petit	Composer; French fellowship (March 88 for 1 year)
MUZ	Loren Rush	Composer
TAK	Teiichi Takenaka	Prof. of Music; Japanese fellowship (Sept. 87 for 1 year)
LEO	Leonello Tarabella	Italian fellowship
HKT	Rick Taube	Composer; Rockefeller fellowship
PAW	Pascal Willequet	Visiting scholar; French Government/Renault fellowship
AYW	Amnon Wolman	Composer; Lecturer, UC Berkeley

EDUCATION

CCRMA is an interdisciplinary center administered by the Music Department at Stanford University. Classes and seminars taught at the center are open to registered Stanford students. The facility is also available to registered Stanford students for research projects which coincide with ongoing work at the center. Prospective graduate students should apply to the degree program at Stanford most closely aligned with their specific field of interest, i.e. music theory or composition, computer science, electrical engineering, psychology, etc., and should check with both CCRMA and their major department to make sure that there is a faculty advisor available to oversee the kind of work the student wishes to pursue. Acceptance in music theory or composition is largely based upon musical criteria, not knowledge of computing.

Admission requirements for degree programs can be obtained directly from each department.

CCRMA also offers summer workshops which are open to anyone wishing to apply.

Academic year curriculum:

MUSIC 120 INSTRODUCTION TO MUSIC SYNTHESIS AND PROGRAMMING USING MIDI-BASED SYSTEMS. (C. CHAFE)

Composition projects demonstrate participants' own software for voicing and controlling MIDI synthesis.

MUSIC 154 INTRODUCTION TO COMPUTER MUSIC (C. CHAFE)

Survey of recent compositions and computer based techniques used in music.

MUSIC 220 COMPUTER-GENERATED MUSIC

220A Fundamentals of Computer-Generated Sound (J. CHOWNING)

Introduction to computer-sound generation, composition, acoustics, and computer programming.

220B Compositional Algorithms, Psychoacoustics, and Spatial Processing (J. CHOWNING)

Use of a high-level programming language as a compositional aid in creating musical structures. Studies in the physical correlates to auditory perception, and review of psychoacoustics literature. Simulation of reverberant space and control of the position of the sound within the space.

220C Research (J. CHOWNING)

Research projects in composition, psychoacoustics, or signal processing.

220D Music Typography on the Computer. (L. SMITH)

MUSIC 320 SEMINAR IN SIGNAL PROCESSING FOR MUSIC RESEARCH (J. SMITH)

320A The Discrete Fourier Transform

Fundamentals of spectrum analysis for discrete-time signals. Topics: sampled signals, complex variables, geometric projection, orthogonality, the DFT, and Fourier theorems relating to time-shift, convolution, correlation, aliasing, signal power, symmetries, and bandlimited interpolation.

320B Applications of the Fast Fourier Transform (FFT)

Spectrum analysis and digital filtering using the FFT. Topics: convolution, recursive and nonrecursive filter structures, z-transforms, transfer function analysis, frequency response, time-varying filtering, choice of DFT windows, and use of the DFT to implement nonrecursive filters by means of the overlap-add or filter-bank summation techniques.

320C Recursive Digital Filtering

Analysis, design, and implementation of recursive digital filters. Concepts: difference equations, impulse response, transfer function, frequency response, poles and zeros, stability, phase and group delay, partial fraction expansion. Schur algorithm, physical simulation, and structural/numerical issues.

MUSIC 420 ADVANCED SEMINAR IN SIGNAL PROCESSING FOR MUSIC RESEARCH

420A Acoustical Signal Processing

Classical acoustics translated into a digital signal processing framework. Topics: mass-spring oscillation, the mass-spring chain, the wave equation for the ideal flexible string and acoustic tubes, traveling waves, wave impedance, scattering theory, signal energy and momentum, digital filter counterparts, allpass techniques, and efficient physical modeling using delay lines, scattering junctions, and low-order digital filters.

420B Nonlinear Modeling

Computational models for woodwinds and strings. Physically meaningful synthesis algorithms are built by coupling a "negative-resistance device" (woodwind reed or bow-string interaction) to a linear filter (which models a woodwind bore or vibrating string). The models are designed to capture only the "audible physics" of a musical instrument with a computationally simple algorithm.

420C Linear modeling

Techniques for system identification and linear prediction. Computational methods are described for designing digital filters which automatically adjust free parameters to match physical measurements of linear resonating components of musical instruments. A special case is linear predictive modeling of speech.

Special workshops during the Summer:

SYNTHESIS AND COMPOSITION ON SMALL ADVANCED SYSTEMS (C. CHAFE, J. CHOWNING)

The course includes a detailed exploration of the theory and programming of the YAMAHA "X" series digital synthesizers of which the DX7 will serve as the basis of instruction. Discussion will include computer based modular systems having MIDI inter-connections into which the digital synthesizers can be effectively integrated. Lectures on digital synthesis, Frequency Modulation theory, DX7 programming, relevant acoustics and psychoacoustics, and composition using small computers are given on weekday mornings with "hands-on" application sessions in the afternoons. The course is designed for composers and keyboard players who have had some previous experience with an "X" series synthesizer.

SYNTHESIS AND COMPOSITION ON A REAL-TIME DIGITAL SYNTHESIZER PROCESSOR (W. SCHOTTSTAEDT)

This course is based on the use of CCRMA's unique digital synthesizer-processor, designed by Peter Samson and of the compositional program Pla, written by Bill Schottstaedt. Lectures on digital synthesis, Pla, acoustics and psychoacoustics are given on weekday mornings with free access to the CCRMA system at other times. The course is designed for composers who wish to complete a two- or four-channel computer-synthesized piece which is recorded onto tape.

MUSIC PRINTING ON SMALL COMPUTERS (L. SMITH)

This workshop concentrates on the use of the MS computerized music printing system which has been developed at Stanford over a period of more than ten years and has produced a wide variety of musical publications. In addition to the main instruction, lectures are given on problems in real-time computer graphics and the history and practice of music typography. This workshop is designed for composers who wish to be able to present their music in copy that equals the quality of professional publication. Also attention is given to musical scholars who might wish to produce a body of musical examples for their dissertations, etc. Small graphics systems similar to the IBM PC are used. Each student should be able to produce several pages of high-quality hard copy during the session.

ACTIVITIES

Regular activities at CCRMA include monthly demonstrations of ongoing work open to the public and regularly scheduled seminars under the title of "Odd Thursdays." Topics presented at Odd Thursdays are related to work of interest to the CCRMA community. Odd Thursday presentations during the academic year 1986-1987 included talks by Marc LeBrun of Symbolics, Inc.; Albert Bregman, Visiting Professor of Psychology from McGill University; Stephen Pope, Research Scientist from Xerox PARC; John Stautner of Compusonics; Jim Angell, Professor of EE at Stanford; Vincent Salmon; Barry Vercoe, Professor at MIT Media Lab; Diana Deutsch, Professor of Psychology, UC San Diego; Richard Lyon, Researcher at Schlumberger Palo Alto Research; and Mitch Weintraub. Presentations were also made by National SemiConductor and IMS, Inc.

Special presentation/concerts were also given by Gordon Mumma, composer; Steve Reich, composer; Stefano Scodanibbio, double bass player and composer from Italy; Laura Chislett, flutist and expert in extended flute techniques from Australia; Marek Kielczewski, composer from Krakow, Poland; Johannes Goebel, composer and builder of instruments from Hannover, Germany; and Gerhard Staebler, composer and organist from Essen, Germany.

The First Annual CCRMA Associates Meeting was held at CCRMA at the end of May, 1987. Member companies represented included Apple Computer, Dynacord, Roland Japan and U.S., Sequential Circuits, Symbolics, Xerox PARC, and Yamaha. The three-day seminar included demonstrations, presentations of ongoing work by research staff and graduate students, a dinner and concert with guest speaker John R. Pierce, a banquet dinner with guest speaker Pete Samson, and informal discussions.

Other activities included presentations to the Knights Fellows program at Stanford; the Computer Science Forum; the Humanities Center Conference on Humans, Animals, Machines: Boundaries and Projections; the Audio Engineering Society; the Music Library Association; the College Music Society; the Society for Motion Picture and Television Engineers; the Stanford Club of Palo Alto; and the Stanford Mothers Club. The Music Guild at Stanford sponsored a special workshop on computer music for local high school students.

VISITORS

Many people come to CCRMA to visit the center, talk with people, give lectures, get information, etc. Here is a representative list of some the visitors during the past two years.

Jean-Francois Allouis, IRCAM
Milton Babbitt, composer, Princeton
Nikolai Badinski, composer
Jean-Baptiste Barriere, IRCAM
Leslie Bassett, composer, Michegan
Charles Boone, composer, San Francisco
Henry Brant, composer, Santa Barbara
John Seeley Brown, XEROX PARC
Don Buchla, Berkeley
Ellen Buchwalter, Rockefeller Foundation
Claude Cadoz, ACROE, Grenoble, France
Laura Chislett, flutist, Australia
Marek Cholonewski, Polish composer
Gayle Curtis, Veterans Administration Rehabilitation
Giovanni Debiasi, CSC Universita di Padua, Italy
Diana Deutsch, USCD faculty
Marcella DuCray, harpist, San Francisco
Richard Felciano, composition faculty, UC Berkeley
Dave Finley, Floating Point Systems
Mr. Fujimora, Yahama
Adrian Freed, IRCAM and Droidworks
John Gatts, YIC, Buena Park
Gordon Getty, composer
Stan Getz, saxophonist
Michael Gordon, composer
Robert Gross, Lucasfilm
David Haynes, IMS Inc.
William Hewlett, CCRH
Karl Hirano, Yamaha, Japan
Anthony Holland, composer, Swarthmore
Heinz Holliger, oboist and composer, Swizerland
Daniel Kolbialka, violinist, San Francisco Symphony
Stanley Jungleib, Sequential Circuits
Hiro Kato, Yamaha, Japan
Gary Kendall, Northwestern University
Mark Koenig, YIC, Buena Park
Marc LeBrun, Symbolics
Mark Lentczner, Apple Computer
Gary Leuenberger, Yamaha
D. Gareth Loy, CARL, UCSD
Annie Luciani, ACROE, Grenoble, France
Fred Malouf, Sequential Circuits
H. Matsuoka, Roland, Japan
F. Richard Moore, CARL, USCD
Jim Mothersbaugh, Roland, Los Angeles
Lyman Miller, Hewlett-Packard
Carl Muller, Xerox PARC

Gordon Mumma, composer, U.C. Santa Cruz
Mr. Nagai, Yamaha, Japan
David Oppenheim, Opcode Systems
Larry Oppenheim, composer
Arvo Paert, composer, Estonia, Russia
Vince Perry, Sony
Rudolf Rasch, psychoacoustician and musicologist
Steve Reich, composer
Dirk Reit, composer, West Germany
Roger Reynolds, composer and faculty, UCSD
Vince Salmon, acoustic consultant, San Francisco
Peter Samson, Systems Concepts
Andrew Schloss, faculty, Brown University
Gerald Schrutz, Dynacord
Stefano Scodanibbio, bassist, Italy
Peter Setz, Karlsrue, GA
Wayne Slawson, UC Davis
Brian Smith, Xerox PARC
Dave Smith, Sequential Circuits
Gerhard Staebler, composer from Germany
Michael Stillman, Djerassi Foundation
Allen Strange, composer, San Jose State University
Hans Tchernig, Dynacord
Mark Tsuruta, Roland, Los Angeles
Barry Vercoe, MIT
Alejandro Vinao, composer, Argentina
Andy Voekel, Symbolics
Mr. Wang, Director Peking Opera
Mitch Weintraub, SRI
Alexander Wiyic, composer from Belgrade
David Wessel, IRCAM
H. Yasunaga, Roland, Japan

RECENT GRANTS RECEIVED BY CCRMA

System Development Foundation, "Computer Research in Music and Acoustics," September 1, 1982 for 5 years, $2.3 million (for operating support, equipment, and development of 68000-based computer music workstations).

System Development Foundation, "Benchmark Computer Music Works," September 1, 1985 to August 31, 1987, $158,680.

NSF MCS-82-14350, "An Intelligent System for the Knowledge-Driven Analysis of Acoustic Signals," July 1, 1983 for 2 years, $354,954 (research support).

Rockefeller Foundation, "Support for Visiting Composers," January 1985 to August 31, 1987, $36,000. To support two visiting composers at CCRMA.

NEA A84-005025, "Music Recording Project: works from CCRMA," July 15, 1984 to May 31, 1986, $2,900.

NEA A84-174522, "Centers for New Music Resources," September 1, 1985 for 1 year, $8,000 (for audio equipment).

NEA A85-179564, "Centers for New Music Resources," September 1, 1986 to August 31, 1987, $7,800.

NEA 86-3170-0823, Special Projects, "Wynton Marsalis Collaboration," $10,000.

NSF DCR 86-13574, "The Intelligent Analysis of Composite Acoustic Signals," May 1, 1987 for 3 years, $391,128.

NEA 87-3165-0693, "Centers for New Music Resources," September 1, 1987 to August 31,1988, $7,500.

Equipment Grants

Six LM2 Lisp Machines from Symbolics—long term loan.
One LM2 Lisp Machine from Hewlett Packard—gift.

Two 1109 Lisp Machines from Xerox PARC—long term loan.
One Series 8000 Laser Printer from Xerox PARC—long term loan.

One Imagen Laser Printer System from Imagen.

Small systems MIDI-based Yamaha studio from Yamaha—long term loan.
Small systems MIDI-based Yamaha equipment for teaching—long term loan.

From Apple Computer, Inc.:

Five Macintosh plus Computers with 40 megabyte SCSI hard disk drive
Four Macintosh II Computers with 40 megabyte hard disks and color monitors
One Imagewriter II
One Laserwriter Plus
Appleshare and Appletalk networks
Ten Deluxe MIDI interface 2.5
Assorted software in support of research