Studio Report  
Department of Music  
University of California, San Diego

Peter Otto & Miller Puckette  
Department of Music  
University of California, San Diego  
pom@ucsd.edu

ABSTRACT

Since September, 1994, the faculty, staff and students of the Department of Music have been actively engaged in the revitalization and expansion of the Department's offerings in computer music and music technology. Newly created faculty and administrative positions, increased funding, and re-focused Departmental support have lead to the revitalization and enhancement of UCSD's long and varied history in the field of computer music.

This studio report includes a detailed description of the Department's facilities and equipment holdings. We discuss plans for program expansion and refinement, and the Department's program for professional recording is discussed. The authors comment on instruction and research and report on creative projects in the Department. Finally, a faculty and staff roster is included.

COMPUTER MUSIC INSTRUCTION

Computer music instruction at UCSD emphasizes research into new techniques for electronic music composition and performance, catalyzed through an active concert program emphasizing new works by students, faculty, and visitors. Areas of instruction and research include:

- new audio synthesis techniques
- audio signal processing
- psychoacoustics
- live improvisation with and by computers
- integrating audio and video
- electronic spatialization of sounds
- synchronization and control in live computer music performance

Advanced students are encouraged to apply for research support from UCSD's Center for Research, Computing and the Arts (CRCA). The Department's Recording and Research Committee grants limited access to faculty and research facilities on a case-by-case basis. Collaborative projects of special merit may be supported by the San Diego Super Computer Center.

The computer music program at UCSD particularly encourages work that overlaps with the other Music Department programs of study: Composition, Performance, and Critical Studies and Experimental Practices. Of particular interest are:

- analyzing and performing the electronic music repertory
- writing new music involving electronics

Curricula in the Department’s undergraduate music technology program and the Masters Degree in Computer Music are currently being revised. New guidelines and courses are expected to be implemented during the '95-'96 school year. An integrated "digital arts" curriculum is also under consideration.
Computer instructional facilities for UCSD music students include two multi-user laboratories, one with Macintosh-series computers, the other with workstations equipped for real-time audio and image synthesis and processing. An additional single-user facility is used for audio recording, editing and mastering.

**B104 - A New Computer Music Instructional Laboratory**

B104 was originally established in 1987 to support undergraduate and graduate studies in computer music. Extensively refurbished in 1994-95, B104 is a 906-square foot facility with recessed storage and printing areas, machine isolation, acoustical treatments, presentation and mixing station, ergonomic workstation components, high-resolution LCD projection system, and integrated digital and analog audio equipment for student access to audio processing, duplicating, mixing and high-quality quadraphonic audio monitoring.

Five NeXT workstation clients and a server are maintained with network connections, mass storage and archiving systems. The NeXTs primarily support music instruction, production and audio research activities using a wide array of software packages including the CARL software synthesis package developed at the U.C.S.D. Center for Music Experiment (CME) by Professor F.R. Moos, with D. Gareth Loy and Mark Dolson during the early 1980s.

B104 also houses three Sun Indy workstations. The facility is configured to support direct connection of musical instruments to the SGIs, for prototyping of performance and compositional routines using interactive real-time digital signal processing software.

**B108 - Recording and MIDI Project Studio**

The B108 Recording and MIDI Project Studio is a 900 square foot facility, including an isolation booth, absorption and diffusion treatments, data connections and audio tie-lines to B104 and Erickson Hall.

This studio houses a Macintosh computer for synthesis, recording, editing and control in music composition and performance. A Power Mac with two large hard drives, CD ROM, Digidesign AudioMedia sound card and Syquest 44Mb, a workstation (NeXT "Station") and many dedicated devices for music production and recordings are supported. New this year is a Tascam DA88 digital multitrack recorder with synchronization and digital I/O.

A general refurbishment of B108 will take place during 95-96, as time and funding permit. Planned improvements include Digital Audio Workstation upgrades, CD mastering capabilities and new audio and music software packages.

**B206 - Macintosh Laboratory**

This facility is 1950 square feet, with audio and printer connections to B104, and Depaenstall instructional LAN connections. B206 was established in 1990 to support many facets of the Music Department curriculum, and has been upgraded incrementally nearly every year thereafter. It is now composed of 19 Macintosh computer workstations (Mac SE/50's, Mac Centris 650s and Power Macs with large color monitors, etc.), most with a MIDI interface and Yamaha SY22/33 synthesizer. For instructional presentation the room utilizes an L.C.D. projection system and a classroom sound system.

The principal current uses of B206 are:

**Undergraduate Music Theory** - Professor G. Balzano use this facility to educate all entry level undergraduate music majors, and most minors. Offerings include music theory, ear training, and introductory composition.

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Acoustics. Undergraduate courses in Basic Acoustics and Psychoacoustics use this facility as a laboratory, primarily to teach audio perception, and digital audio theory and techniques.

Electronic Music. Undergraduate courses, and graduate seminars in electronic music production and Composition use this facility as a laboratory.

Music Notation. Students use software applications and an 11" x 17" laser printer for music notation and printing.

Library/Bibliography. Music 291, a graduate course on library resources and bibliography preparation, is taught in this facility, and graduate students subsequently use this as a general computing facility.

Extensive refurbishment of this facility is planned, and will commence in Fall, 1995. It is anticipated that as library, bibliographic and research resources become fully computer based, and as music scholarship and publishing increasingly utilize multi-media computing, B206 will evolve to play a central role in support of all aspects of instruction and scholarship within the Department.

**THE WARREN STUDIOS**

The Warren Lecture Hall and studio building is the fulfillment of the Music Department's dream to build a state-of-the-art musical recording and faculty research facility on campus at UCSD. Opened in 1992 (and under continual development since) the studios were designed to meet the following objectives:

- To serve as an unsurpassed facility for recording, mastering and occasional presentation of faculty, guest and student composition and performance projects
- To serve as a reference-critical listening space for the evaluation of audio production
- To support faculty research in psychoacoustics
- Computer music composition
- New musical technologies, including new research in musical spatialization

Incorporating two large recording studios (each measuring 50' x 60'), a control room (20' x 30'), isolated machine room, a seminar room, two practice studios, eight faculty offices, an electronics shop and staff office area, the facility supports live performances as well as six-camera video "shoots", with three simultaneous audio mixes from an array of sound sources. These independent sub-systems ("house" sound, CD/music mastering and TV/video feeds) enable complete systems isolation for optimized mixing, in support of the particular requirements of each media. A 120 dimmer grid with an automated lighting board supports "theatrical" lighting for performance, television and video production.

The recording facilities, designed by McKay, Conant and Brook, Inc., include an API Discrete console (48 dual input inputs/48 output buses with 4 stereo mix buses and 8 groups) with real recall and moving fader automation. A two thousand point patching system supports tape machine/noise reduction, auxiliary/cut facilities and studio-wide interconnections. House sync (for video), word sync (for digital audio) and SMPTE are distributed throughout the facility to lock all systems (console automation, tape decks, digital audio converters, digital audio workstations, video, MIDI and computers) to master signals.

Analog recording media includes a 24-track Studer A820 with Dolby SR noise reduction, 1" and 1/2" 8-track, 1/2" and 1/4" 4-track, 1/2" and 1/4" 2-tracks, all with DBX or Dolby A noise reduction. IEC (Europe and Japan) and NAB equalization are available in most formats.

Digital recordings can be mastered to DAT or directly to hard disk on an 8-track Sonic Solutions system with 8 GB of disk space. CD audio and CD ROM can be mastered "in house" using Sonic and Sony CD writing technologies. The studio's multi-channel audio monitoring systems are:
Quad-amplified ATC Control Room Monitors with Rowland Research and Bryston power amplifiers (5000W/peak power per channel),
Infiniary IRS Beta electrostatic speakers with servo sub-woofers,
Monitor Audio 7 near-field monitors.

The Control Room features highly refined acoustical qualities. Studio A uses variable wall and floor surfaces for diverse acoustical configurations. An excellent range of microphones support an unusual array of recording possibilities, and a selection of pianos, percussion instruments and electronic musical instrumentation is available. Currently five to ten CDs of contemporary works on a variety of labels are released yearly.

From earliest conception Studio A was designed to be a studio of fidelity and quiescence. The product of seven years of planning and craftsmanship, every piece of outboard equipment has been modified to conform to the grounding schemes of the studio to avoid system hum. All wiring was done by hand in-house using premium components, and under the supervision of our engineers. Warren studios are a collaborative project combining a wide range of knowledge and experience in acoustics, psycho acoustics, computer science, electrical and mechanical engineering, professional audio engineering, professional production, and most significantly, a shared musical mission.

Personnel

Staff and faculty who contribute to the overall computer music composition, research and music technology efforts include:

Gerald Balzano, Professor of Music
Brian Ferheyhough, Professor of Music
George Lewis, Professor of Music
F. Richard Moore, Professor of Music
Peter Osto, Director of Music Technology
Miller Puckette, Professor of Music
Roger Reynolds, Professor of Music
Randy Seeger, Professor of Music
Josef Kucera, Recording Engineer
Kathryn Martin, Facilities and Production Manager
Ronald Quillan, Electronics Engineer
Mark Danks, Research Assistant
Tim Labor, Research Assistant
Nathan Phillips, Teaching Assistant
Michael Theodore, Teaching Assistant

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