The Gassmann Electronic Music Studio
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HISTORY
The composer Remi Gassmann of Laguna Beach, California bequeathed his estate to the University of California, Irvine (UCI) for the expressed purpose of establishing an electronic music studio in UCI’s School of the Arts. This author was recruited in 1996 to join the faculty of the UCI Music Department and to establish and direct the new Gassmann Studio. The studio was opened for activity early in 1997.

In 1997 the author also founded the Gassmann Electronic Music Series, a full season of concerts, lectures, and demonstrations focusing on music and computers. The series is now entering its fourth season, with continually growing audiences.

In 1999 a new home for the Music Department was constructed in the School of the Arts: the Music and Media Building. In addition to offices and classrooms, this building includes a 54 sq. meter acoustically-treated room for establishing a laboratory for experimentation and research in live computer music performance, an adjacent 108 sq. meter laboratory for experimentation in motion capture, and a laboratory for design and implementation of internet art environments.

In 2000 the original Music Building is being refurbished to institute a technology-enhanced classroom for computer music instruction and production, an acoustically-treated orchestral rehearsal and recording studio, and an expanded Arts Media Center for music listening, video viewing, and computer arts activity. Simultaneously the School of the Arts is building the new privately-donated Donald R. and Joan F. Beall Center for Art and Technology. The School also has several other computer arts classrooms and studios for design, video, and internet development.

Thus, the Gassmann Studio is now one component of a dynamic and rapidly expanding center for digital arts research and production in the UCI School of the Arts, consisting of dedicated facilities for music, dance, visual arts, scenic design, video, and internet art. This provides unprecedented opportunities for interdisciplinary collaboration.

OBJECTIVES
The Gassmann Studio has established as its mission to promote three main objectives in its computer music activities: creative experimentation, interdisciplinary work, and the use of computers in live performance.

Experimentation. The University of California exists not only to teach an established body of knowledge, but also expressly to conduct research and investigation of new ideas. Computer music is an inherently new field, but one can nevertheless strive to look ever forward and help chart the course of future developments. This involves devising new technology by collaborating with experts in computer science, engineering, and private industry. It also involves developing new multimedia artistic works by collaborating with other departments in the arts. Because of the emphasis on performance and composition in the UCI Music Department, the Gassmann Studio is focused primarily on artistic and musical exploration; a primary objective is to devise new forms and new media of expression involving music.

Interdisciplinarity. Contemporary electronic and computer technology has led to increased integration of various art forms in today’s culture. For example, most popular music artists now create not only CD recordings, but also video productions which involve music (both acoustic and electronic), dance, lighting, cinematic technique, and computer visual effects. Theatre, dance, and opera productions make increasing use of computer-controlled lighting, image projection, and sound spatialization. Computer software of all kinds, particularly for communication of information, is increasingly integrating interactive navigation, computer graphics and animation, and music/sound. Thus, as a pedagogical philosophy, educators must continue to strive for the high quality of technique, skill, and knowledge associated with specialization, and at the same time must provide students the opportunity for education in diverse related arts, letters, and sciences which will adequately prepare them to work in this intensely multi-media, multi-disciplinary professional world. Collaborative teams of technical and creative specialists will most likely continue to be the most common model for accomplishing interdisciplinary work, but such teams are more effective when the members are also well versed in the specialties of their collaborators.

Furthermore, to the extent that an art is created, described, or mediated by computers, the computer data is a common medium of communication, readily translatable into a format that is useful to an artist in another discipline. For this reason, computer-based and computer-mediated arts provide an additional tool to aid in collaboration. An example of this is the use of movement by a dancer, captured by a motion-capture or video-tracking system, providing control data for music synthesis software and...
for digital animation and video processing. The computer data stream is the common medium of communication that permits these various arts to have a coherent and tangible integration and relationship.

**Performance.** The members of the faculty involved in computer music at UCI are all active performers as well as composers. They are unified in their belief that live music contains a dimension of immediacy and communication not found in pre-recorded music, and that computer music is enlivened by human gesture, refined virtuosity, and musical/social interaction. The School of the Arts has well-respected departments of Drama, Dance, and Visual Arts (including video and performance art). A performance orientation in computer music best serves the goal of collaboration between these strong departments, which have live performance as a central focus. Because most university programs in computer music have as their primary focus composition and/or technological research, performance is a new niche of specialization that gives UCI a unique identity among California universities.

**MUSIC FACILITIES**

The original facility of the Gassmann Electronic Music Studio consists of a state-of-the-art Macintosh-based studio for digital recording and MIDI composition, an SGI workstation for music software development, a considerable array of electronic music performance equipment for live performances, and a classic studio of refurbished electronic music synthesizers from the past (e.g. Moog and Buchla) with MIDI-CV conversion available. The studio is designed as a traditional project studio for recording, composition, and production, and is also ideal for development of software for algorithmic composition and digital signal processing.

The emphasis on creative experimentation in live performance—which often involves activities beyond the traditional studio tasks of composition, recording, and production already adequately supported by the original Gassmann facility—suggested the establishment of a second laboratory which would be different from the traditional computer music studio model in several respects. Unlike a conventional hard-wired studio, it would be reconfigurable to encourage experimentation with different configurations of equipment for different creative projects. It would have sufficient open space for rehearsal of performance works, and the equipment would be readily transportable to nearby concert venues such as the University’s concert hall. The challenge for this new laboratory has therefore been to organize it so that it is sufficiently versatile and so that some or all of it is quickly and easily movable to another location. At the same time, it has been imperative to make it a space in which users can accomplish their work without spending excessive time troubleshooting equipment and connections, and one in which the digital connections are always reliable and of high quality for professional-level experimentation and production.

Thus, the new computer music performance laboratory in the Music and Media Building is designed using an unconventional paradigm. It is a studio for creative research and experimentation in realtime computer music performance, including realtime digital processing of live vocal and instrumental performance (both with commercially-designed hardware/software and with software developed in-house), realtime multi-channel sound spatialization (using computer-controlled digital mixing, distribution, and reverberation), realtime random-access playback of audio samples (recorded beforehand and/or during the performance) controlled by computer, use of interactive improvisation software designed to respond to audio and MIDI signals generated by live performers, use of unconventional MIDI control devices, interpretation of video signals for use in controlling audio hardware/software, and performer-controlled video and animation. The lab design also provides for digital audio post-production (editing, mixing, and mastering) for stereo recordings, as well as for experimentation with quadrophonic sound diffusion and new multi-channel immersive recording formats such as 5.1. Unlike the traditional computer music studio, this lab is designed with adequate space for a small ensemble of live performers and for experimentation with gestural and movement control. The lab also has a window and an electrical access panel to the adjacent dance/video motion capture studio, and audio/video trunk lines to the orchestral studio.

It’s now realistic for a computer music studio composed of commercially-available professional and semi-professional hardware to deal with audio exclusively in the digital domain. Live acoustic input is converted to 24-bit digital data immediately at the microphone pre-amplifier stage, and need never be reconverted to analog until it is sent to the loudspeakers. The audio data is routed by the digital mixer (with format conversion as necessary for compatibility between different equipment), is processed in real time in the Macintosh G4 workstation with MSP as well as with outboard effects processors, and is also easily captured for non-realtime use such as sampling or editing. Additional realtime control information comes from alternative MIDI controllers, video tracking, and other experimental sources such as the motion capture system in the adjoining studio.

Also in progress is the design of a state-of-the-art computer-mediated teaching facility for computer music and for other types of computer-aided music instruction in areas such as music theory, keyboard skills, composition, and improvisation. The facility uses 17 88-key digital pianos (Yamaha) and 17 computer workstations (Apple), all linked in an audio monitoring network (Yamaha) and a computer video network (ACS).

**PROJECTS**

The Gassmann Studio has hosted performances and presentations by both established and emerging figures in computer music performance, including David Cope, Cécile Daroux, Pedro Eustache, Mari Kimura, Amy Knoles, Joan La Barbara, George Lewis, Laetitia Sonami, Morton Subotnick, Mark Trayle, Nicolas Vérin, Robert Winter, Pamela Z, David Zicarelli and many others.
Most recently the Gassmann Studio has supported several interdisciplinary artistic projects by UCI faculty: 1) an electronic music score composed for a theatrical production of the ancient drama *The Castle of Perseverance*, 2) sound design and composition for a multimedia theatrical production of *Alice in Wonderland* including dance, computer music, live vocal processing, video, and projected 3D animations, 3) engineering and production of *Artful Devices*, a CD of music for piano and computers by Christopher Dobrian, and 4) *Microepiphanies*, a multimedia digital opera composed and programmed by this author in which all sound, lighting, and scenic projections are controlled by networked computers in response to actions by the live performers onstage.

Current research focuses primarily on the use of new sources of gestural input for influencing music, sound, video, and animation in real time. An important subset of this investigation is experimentation with video tracking and motion capture as a source of musical control. A team of dancers, musicians, and computer programmers is working with the Vicon 8 eight-camera infra-red motion capture system in pursuit of four different goals: 1) to provide 3D point data for input to animation software, 2) biomechanic analysis of movements in dance and martial arts, 3) remapping coordinates of body parts to inspire novel choreography, and 4) realtime use of movement data as a source of control input for sonic and musical parameters.

FUTURE

Since 1996 the Gassmann Electronic Music Studio has evolved rapidly: from its initial hiring of a director, to an active one-room project and production studio, to an organization of activity involving professionals from around the world, and now recently to a multi-studio facility supporting a variety of exciting new experimental arts activities. In addition to the Gassmann Studios, the UCI School of the Arts has computer studios for computer art, video, motion capture, and internet art, a Media Center for viewing and listening, three computer-mediated classrooms for computer arts pedagogy, and the newly donated Beall Center for Art and Technology.

The future of this extensive center for computer arts, however, lies not in expansion of its physical infrastructure, but rather in its virtual expansion as an emerging center of ideas and production in the arts. To this end, both the Gassmann Studio and the Beall Center will be continually inviting a diverse selection of performers, exhibitors, and scholars for presentations and residencies, thus continuing to expand scope of the centers’ activities well beyond their physical walls. The other obvious means of virtual expansion is the internet. The Gassmann Studio will be expanding its web site—which is currently a strictly informational site regarding the local facilities and activities—to become a site for free exchange of research and creative ideas, to make available relevant work produced and presented at UCI, and eventually to host entire works designed specifically for network-related music and multimedia.

1 http://www.uci.edu/
2 http://www.arts.uci.edu/
3 http://www.arts.uci.edu/music
4 http://www.arts.uci.edu/dobrian/gassmann.htm
5 http://www.arts.uci.edu/dobrian/gemseries.htm
6 http://www.arts.uci.edu/music/facilities.htm
7 http://beallcenter.uci.edu/
8 http://www.arts.uci.edu/dobrian/gassmann.equip.htm
9 http://www.arts.uci.edu/dobrian/artfuldevices.htm
10 http://www.arts.uci.edu/dobrian/microepiphanies.htm