

# Studio Report: The Music Technology Program at Ball State University, Muncie, Indiana

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## Abstract

*The Music Technology program and studios at Ball State University have recently moved into a greatly expanded and updated facility encompassing two large recording studios and control rooms, digital audio workstation rooms, two computer labs, SACD mastering facility, and critical listening room. Program development, begun in the early 1970s, has been updated to offer a B.M. degree in Music Technology with minor options in applied physics and computer science. The Music Technology program serves approximately seventy students with four faculty members and a staff systems engineer. Computer music, composition and recording are the primary activities of the program.*

## 1 Introduction

Ball State has been home to a music technology program since 1983, with the origin of the program dating back to the early 1970s. Created as an integral part of the composition area, the program has flourished into a comprehensive undergraduate audio technology degree with approximately seventy students, four faculty members, and a staff systems engineer. Having previously occupied a two-story residence on the edge of campus for thirty-three years, the Music Technology studios have recently moved into a new facility of almost 10,000 square feet (929 m<sup>2</sup>) near the center of campus. The degree features a rigorous math and science component in addition to a standard array of music courses. The program and the studios support a wide range of creative, research, and recording activities.

## 2 History

The Music Technology program at Ball State University has steadily evolved since 1970. In that year, Cleve Scott was hired to direct the New Music Ensemble, develop an electronic music studio and author an electronic music curriculum. In 1971 the electronic studio was moved from the music building to a two-story residential space on the edge of the Ball State campus. Early major purchases included an Arp 2500 synthesizer and a D17B inertial

guidance computer from a Minuteman III missile. In 1973 the electronic music studio was renamed the Electronic Systems for Music Synthesis.

In the early part of the 1970s fundamental courses in electronic music were added to the B.M. degree. These courses included classes in introductory and advanced electronic studio techniques and electronic music literature. Classes in acoustics, perception, and recording techniques were added in the late 1970s.

Music Engineering Technology as a degree was first offered as Option C under the Bachelor of Music in Music Composition in 1983. After an external review in 1987 by James Beauchamp and Gary Nelson, the curriculum was revised to include a minor in applied physics, and the program was then offered as a Bachelor of Music with an emphasis in Music Engineering Technology (MET) in 1989. By this time the program's facility had expanded to include a recording studio, three electronic music studios, library, technical workshop, and faculty office. In 2004 the program was revised once more, and now includes minor options in computer science and web technology in addition to applied physics. With this last revision, and after consulting with interested parties at Ball State, the program changed its name to Music Technology.

Throughout its history, the studios and the associated New Music Ensemble and New Music Festival have hosted many prominent performers and composers, such as Milton Babbitt, Otto Luening, Herbert Brün, Pierre Boulez, Paul Lansky, Pauline Oliveros, Salvatore Martirano, Vladimir Ussachevsky, Lou Harrison, Morton Subotnick, David Cope, Randolph Coleman, Bertram Turetzky, John Sampen, Beverly Grigsby and Deborah Kavash.

In 1999, planning began for a new Music Instructional Building, in part to house an expanded Music Engineering Technology program. Construction started in the autumn of 2002 and was completed by autumn 2004.

Jody Nagel was hired in 1992 to teach both MET and music theory courses, and Michael Pounds joined the MET faculty in the autumn of 2000. Cleve Scott retired in 2001 and Keith Kothman was hired as the MET director. Joseph Harchanko came in 2002 to teach MET and music theory

courses, and to teach courses in an interdisciplinary digital media minor. In addition to the faculty, the studios have also employed a full-time staff engineer to maintain and install hardware and software.

### 3 Curriculum

Music Technology at Ball State is an undergraduate degree program. Graduate students wishing to emphasize technology must be admitted into the Composition or Music Theory program. Graduate composers may choose to specialize in either acoustic or electro-acoustic composition, or a combination of the two. In conjunction with the Electronic Art program, an intermedia (or integrated electronic art) Master of Arts degree is under development.

The undergraduate curriculum has always featured a blend of science and music. Originally this blend featured a minor in applied physics/electronics, with an emphasis on analog hardware systems both in music and science. As computer music technology has evolved to a nearly ubiquitous state, minor options in computer science and web technology have been added. The web technology option should not be confused with a simple web design degree. This option focuses on networked database programming and Internet program-ming from server-technology perspectives.

Music Technology has always been viewed as an extension of composition. With its emphasis on creativity, composition guides the students into an exploratory mindset. With the constant evolution of technology, an appreciation of exploration, innovation, and discovery provides students with the necessary skills for continued success in the discipline, regardless of whether they choose to pursue composition as their primary professional activity after graduation. Along with the composition focus comes a full complement of standard music classes and applied performance expectations.

The actual Music Technology curriculum focuses on four main areas: theoretical and historical aspects of sound and music, computer music, recording, and composition. Each student takes a set of core courses in each area, and then proceeds to finish with guided specializations, usually in two areas. All students have an exit requirement of either a composition recital or senior research project.

The theoretical portion of the degree includes courses in acoustics, perception, basic electronics, and the history of electro-acoustic music. Recording classes are offered at the introductory and advanced level, with an additional requirement for individual projects working with a variety of performers, genres, and styles. Computer music comprises a three-course sequence that starts with basic digital manipulation and editing techniques, moving through advanced synthesis and signal processing topics, software-based systems, and interactive computer music. Additional advanced topic offerings occur on a changing basis. Composition classes include work in both the electronic and

acoustic domains. As already indicated, composition is the central activity of the computer music sequence and Music Technology as a whole. Students choosing the composition recital as their exit requirement are expected to show significant accomplishment in both these areas of composition.

### 4 The New Music Instruction Building

Ball State's new Music Instruction Building, which opened for use in the fall of 2004, provides the School of Music with a new 600-seat performance hall, ensemble rehearsal spaces, faculty studios, practice rooms, and new facilities for the Music Technology program. The new Music Technology studios include six recording spaces, two large recording control rooms, five digital audio workstation rooms, an SACD (Super Audio Compact Disc) mastering/postproduction studio, two multi-workstation computer labs, a room for critical listening of stereo or multi-channel audio, and an office/workshop for a systems engineer. CSO Architects of Indianapolis and Michael Dennis and Associates of Boston provided the architectural design, with acoustical consultation from Roger Noppe of Purcell, Noppe and Associates of Los Angeles. Ball State's Cleve Scott (former director of the Music Engineering Technology program), Jeff Seitz (systems engineer), Keith Kothman (current director), and Michael Pounds (assistant director) provided substantial input and direction for the design of the Music Technology studios throughout the design process. David Carroll and Associates provided systems integration design and installation.

A number of noteworthy features have been incorporated into the design of the building. Great care has been taken in the design to maintain acoustical integrity and sound isolation. The performance hall is structurally separated from the rest of the building to provide sonic isolation, and the acoustical properties of the hall can be modified using adjustable wall treatments. Practice rooms, ensemble rooms, faculty studios, and the Music Technology studios are all constructed on raised floors that are isolated from the building structure using various neoprene pad systems. Walls and ceilings are built on the floating floors, thus creating isolated rooms within rooms. Heating/cooling ductwork has been carefully designed to dampen noise and prevent sound leakage from other rooms through the use of exclusive air ducts to each studio. The shapes of the rooms in the Music Technology studios have been designed specifically to control reflections of sound, and absorptive and diffusive acoustical treatments have been integrated into the design of each room. Recording spaces feature hardwood floors, diffusion millwork and RPG Golden Pyramids for ceiling clouds

Several technical features were incorporated in the Music Technology studios. Twisted conductors in heavy gauge conduit in the structural floor and the Equi-tech balanced power system will minimize electrical interference

between the AC power and audio system, therefore increasing the overall dynamic range of the audio system. Audio cables travel from room to room using vibration isolated conduits between the structural and floating floor systems. In addition, a hallway access floor system connects between each room for present and future needs. Recording studio microphone panels use Signal Transport modular connector systems. To avoid possible interference from lighting systems, only remote-dimmer incandescent fixtures were used. Studio access is controlled via a secure card reader system, allowing access to the studios twenty-four hours a day, seven days a week.

There are two rehearsal spaces for large ensembles, one of which has been designed to also function as a small recital hall. These rehearsal rooms, the performance hall, and the Music Technology studios are all interconnected by a network of analog and digital audio lines incorporating CobraNet<sup>®</sup> technology to distribute digital audio over Ethernet. Thus, microphone signals in the main hall or in the rehearsal spaces can be recorded in the main control room of the Music Technology studios. Within the Music Technology studios, each of the control rooms and digital audio workstation rooms can receive microphone signals from the recording spaces, and signals can be routed between all the studios.

There is also an extensive computer network within the building, featuring gigabit Ethernet to desktop systems, and network routers to isolate the Music Technology studios from other network traffic in the building. The main control rooms along with an adjacent classroom feature Internet2 capabilities for advanced distance learning activities.

A substantial technology equipment budget was set aside for hardware and software within the building. The Music Technology studios are based primarily around Macintosh computers, using Digital Performer, Max/MSP and an assortment of plug-ins and other software for composition and signal processing applications. Recording tasks are accomplished primarily using Digidesign Pro Tools systems. Each of the studios is equipped with a large control surface or a digital mixing console. Several of the studios have 5.1 surround sound monitoring (various speaker models), while the critical listening room is equipped with high-end consumer Tannoy stereo monitors as well as eight movable Tannoy System 800 monitors with a subwoofer for multi-channel monitoring or sound diffusion rehearsal. The mastering/postproduction studio includes a SADIE system for SACD mastering and authoring, and Minnetonka Audio's DiscWelder Chrome for DVD-Audio authoring and production. Much of the hardware for the larger studios is installed in two separate machine rooms to isolate machine noise from the listening environments. In addition, Music Technology's microphone collection has been increased substantially with numerous models from various professional manufacturers.

The performance hall is well equipped for various recording tasks and performances that involve music

technology. In addition to a recording booth at the back of the hall, there is a permanently installed "front-of-house" mixing station in the center of the hall. Both locations are based around Sony DMXR100 digital mixing consoles and together are capable of recording and playing back a variety of audio formats. The booth includes a small Pro Tools system, and as mentioned previously, for large multi-track recordings, microphone signals can be routed to the main control room in the Music Technology studios. The front-of-house mixing position is ideal for sound diffusion presentations of electro-acoustic music. The new equipment for the hall includes 10 Genelec 1037C monitor speakers and two Genelec 7071A subwoofers that can be augmented by six Mackie SR1530 Mackie loudspeakers and two Bob Carver Sunfire subwoofers. The design of the hall includes permanently installed audio lines that terminate at wall panels throughout the hall for easy setup of sound diffusion systems.

## 5 Activities

Regular activities of the Music Technology program include four electronic music concerts yearly, guest composer and artist presentations, professional audio guests, and in conjunction with the Music Theory and Composition area, a yearly New Music Festival. The electronic music concerts feature the works of faculty, students, and guest composers working in a variety of media genres, including recently increased activity in interactive performance and video. Video work includes pieces by Music Technology composers, guests, and collaborations with faculty and students in the Electronic Art program at Ball State. Collaborations between faculty and students from Music Technology and Electronic Art have been numerous and very successful, forming the basis for ongoing development of a Masters program in intermedia/media arts. In addition to collaborative media work, some students in the Music Technology program have enrolled in video and 3-D animation courses in Electronic Art, producing solo works for mixed media. John Fillwalk, director of the Electronic Art program, and Keith Kothman recently completed an interactive audio and video installation, *Stand*, for the Indianapolis Museum of Contemporary Art. In the spring of 2005 Ball State will host the Society for Electro-Acoustic Music in the United States National Conference.

Other recent works by faculty and students include:

- *Still Transformations* (solo audio) by Michael Pounds.
- *Polis* (video) by Joseph Harchanko and John Fillwalk.
- *Survey* (video) by Keith Kothman and John Fillwalk.
- *Forgotten Dreams* (double bass, interactive computer processing, and 8-channel tape) by Jason Bolte.

- *Annihilate Locus Communis* (interactive computer music) by Aaron Brocken and Justin Darrow
- *Aesma Dava* (solo audio) by Stacy Borden
- *Interludes* (video) by Keith Kothman and John Fillwalk.
- *Interactus* (saxophone, digital tape, and interactive computer processing) by Josh Arnold.
- *Arrogant Computer* (animation) by Mike Szolek and Justin Morris.

Activities related to recording and production are also strong. Music Technology students have won awards in the AES Student Recording Competition, and have obtained positions at the Banff Centre for the Arts, Tanglewood, New Line Cinema, Digidesign, Stormfront Studios, Warner, and Bose. Ball State maintains an active student chapter of the Audio Engineering Society.

## 6 Conclusions

Substantial progress has been made in the development of the Music Technology program and studios at Ball State University. The studios occupy a large, modern space, fully integrated into the School of Music, and the program has developed prominence within the campus community, state, and beyond. Activity in computer music and intermedia has increased significantly in recent years, and the creation of an integrated Master of Arts degree in electronic media is under way. Keeping with its roots, the program continues to remain active in recording, new media, and the presentation of new music.

## 7 Acknowledgements

The development of the Music Technology program and its major new facility owes its success to a number of people and organizations. Without the vision and tremendous effort of the previous director, Cleve Scott, it is unlikely that we would be talking about Music Technology at Ball State. The administration of Ball State University deserves special mention as well. From the President and Provost down through the College of Fine Arts and School of Music administrations, the Music Technology program has enjoyed significant financial support and attention. Notable people include current Provost and Acting President Beverly Pitts, Vice President for Business Affairs Thomas Kinghorn, College of Fine Arts Dean Robert Kvam, and School of Music Director Peter McAllister. The Center for Media Design at Ball State University has also provided significant financial support for equipment and program activities. Outside of Ball State, Sweetwater Sound and its President Charles Surack have provided high-profile support that has encouraged our state government to fund the program, even during these lean economic times.