Center for Experiments in Art, Information and Technology (CEAIT): studio report

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ABSTRACT

CalArts' Center for Experiments in Art, Information and Technology (CEAIT) was founded in 1988-89 to encourage and nurture the development of applications for new technology in the performing arts and to assist in the development of new works of art which, by their innovative nature, direct the evolution of these media in the service of new aesthetic goals. CEAIT is intended to serve as a focal point for interdisciplinary collaboration in the arts. At present, these emphasize the potential manifested by recent developments in computer technology for creating working environments in which the artist user can interact spontaneously with artistic material in real-time and the computer's ability to respond in complex ways to subtle features contained in performance gestures. In addition, these media enable artists to interact with very large data bases for the purpose of creating images, making music, doing research, simulating theatrical situations, creating art through telecommunications and the manipulation of information, etc.

Though CEAIT originated from activities in CalArts' School of Music, it benefits from a board of advisors within the Institute who represent the Schools of Art, Music, Dance, Theater, and Film/Video. CEAIT is presently planning projects that involve all these areas in a three-tiered program of activities:

I. Creating an ongoing foundation to support development activities, both technical and artistic, fostering a stimulating learning environment and producing tools needed for artistic projects.

II. A program of residencies for artist-developers, workshops for invited participants, working conferences focused on specific development issues, and creating a testing environment for art works in their final stages of development and for products of the art technology and education industries.

III. A program of public presentations to include demonstrations of new developments, reports on work accomplished, performances of works in progress and high-profile productions of major artistic works that employ interactive media.

Finally, it is the intention of CEAIT to foster the development of affordable and accessible technologies which can help the artistic community participate in the evolution of our emerging global culture.

1. HISTORY AND ORGANIZATION

1.1 History

CEAIT originally grew out of activities initiated at CalArts by Morton Subotnick. From this time until the moment of its official introduction in the fall of 1990, several informal conferences were given that focussed on emerging applications. More formal symposia were also offered to introduce composers who were not then using technology to the possibilities offered by affordable computer workstations. (Early participants included Earl Brown, Tanya Leon and Libby Larson.) The success of these activities led to increased funding in mid-1990. During the past two years, an series of public events, residencies, performances and development projects have been carried out.

1.2 Organization

CEAIT is co-directed by D. Rosenboom and M. Subotnick. A Technical Assistant, M. Coniglio, Administrative Assistant and various other assistants, fellows and residents who may also be graduate students at CalArts are also part of CEAIT. A internal advisory board has been formed with representatives from all the schools within CalArts and other

constituencies in which technology is important. An outside board of advisors, consisting of leaders in related industries, sciences, arts, CalArts Trustees and fund raisers has also been formed.

3. PROJECTS

3.1 Composition Software for Children

A major, recent project has focused on developing computer assisted teaching software designed to introduce young children (ages 8-12) to specific notions about composition. A new program, dubbed *The Electronic Music Canvas*, presents the child with a blank canvas onto which distinct musical gestures may be entered, using either a MIDI keyboard or a mouse. Gestures can be easily moved along the two axes of the canvas, pitch and time, allowing the child to organize gestures as they desire. Musical operations can also be performed on gestures, (e.g. inversion, changes of tempo, etc.) Used in this way, one might describe the activity as "musical finger painting".

Upon observing children from three area schools using the software, we determined that more direction was needed to move the children toward the notions of composition mentioned above. To this end, an interactive scripting language was added. The scripting language is similar in style to that used in Hypercard, offering ease of use for those who do not generally write computer programs. This language allows manipulation of the materials created by the user. This means that the computer can generate examples (say an ABA form) from music created by the youngsters. This is done one step at a time, with each step offering the child an opportunity to make decisions about the example as it is created. Later trials with the children showed this to be a more effective and challenging method of leading them toward specific learning goals. We are currently working in collaboration with a teachers' college at Bowling Green State University to develop a complete curriculum for use with the software. In so doing, we expect to place the software in several local classrooms in Spring, 1993.

3.2 Body Movement Sensors

Clearly, the most severe limitations of current interactive music technology center on input devices. Specifically, input devices must have two basic qualities to be successful: transparency to the user and a high degree of sensitivity. The ability to make these devices for a reasonable cost is also important. The lower the cost, the wider the access to the devices.

We have begun work on a set of sensors to measure the movement of a performer's body. This work is an extension of a device created by Coniglio called *MidiDancer*. This device measured the movement of a dancer at primary limb joints and sent that information to a computer for use in generating music. The sensors used in the original *MidiDancer* were bulky and crude, consisting simply of a potentiometer attached to the limb to be measured. The new device uses flat plastic strips that can measure bending of a body part with better A/D conversion than used previously. Already, a glove has been built that uses these flex sensors with great success.

The final goal is to create a suit or unitard with several sensors that can be slipped on by any performer. Once the hardware has been completed, we will move to the second phase of this project, namely, to create software that can learn to recognize gestures made by the performer so that gestures can control output devices.

3.3 Interactive software - music cognition

Projects inspired by work in music cognition and neural information processing, have just begun. These are focused on creating interactive software, designs for musical input structures, audio and graphics computation and real-time digital signal processing. One result is the program HFG (Hierarchical Form Generator), reported by Rosenboom elsewhere in these proceedings.

3.4 Interactive access to large-scale musical data bases

A project has been conceived in collaboration with composer, John Cage and the Los Angeles Museum of Contemporary Art to create a mobile, museum sound installation in which audience members can use composing strategies based on chance procedures to assemble customized audio compositions that draw from material contained in very large-scale sound

and image data bases. These contents of these data bases would relate to the life and work of John Cage and related artists and musicians.

3.5 Experimental animation, hyper-media and music
Another project in its early stages involves the integration and linking of studios and software in CalArts computer music, hyper-media and experimental animation facilities. The current plan calls for this to be based on high-level, RISC computing platforms to create a system that can support serious, collaborative art work within the Institute.

3.6 Upcoming CD-ROM Project
In the near future, CEAIT will invite a group of artists interested in exploring the CD-ROM as a medium for the creation of artworks. Artists, including some advanced students from CalArts, will be drawn from several disciplines, including composers. animators, graphic designers and film makers. The artists, who will be encouraged to collaborate, will each create a short new work in an attempt to define the appropriate messages for the CD-ROM environment.

4. PUBLIC PROGRAMS AND RESIDENCIES

4.1 Public technology demonstrations
During the past two seasons, CEAIT has produced a series of demonstrations and performances in collaboration with the Electronic Café in Santa Monica aimed at familiarizing the public with emerging applications. Approximately ten such events have taken place. Each one has included demonstrations of new work from CEAIT, demonstrations by guest artist/developers, and a videophone link with artists or developers at another center in which related work is going on. Audience members have been able to interact with both the presenters the technology at each of these events. They have become quite popular. In addition to music, applications in theater arts, dance and video art have been shown.

4.2 Performances
CEAIT is currently sponsoring showcase performances in the Los Angeles area as well. In each case, these involve presentations of serious music and art work that makes use of new, technological media or has grown through related developments.

4.3 Residencies
To date, several important composers and artists have carried out short residencies at CEAIT. Some highlights have included, Trimpin, Robert Ashley and his performance company, Tod Machover, Trichy Sankaran, and numerous others. Upcoming will be be Salvatore Martirano and others.

5. FACILITIES
CEAIT has recently established a Development Laboratory within the computer music studios in the School of Music at CalArts, see Fig. 1. The Lab is devoted to explorations of new media and is intended to support primarily development work. As results emerge from this work, they are immediately applied in the rich, interdisciplinary art making context that CalArts offers. Much useful feedback to developers is provided in this way. These results are also integrated into the School of Music curriculum as appropriate.

6. INTEGRATING TECHNOLOGY AT CALARTS
One of CalArts' great strengths is its interdisciplinary environment. It has been CEAIT's intention of all along to grow into the role of helping lead an integration and coordination of technology within the Institute, see Fig. 2. This process is beginning and shows promise as an important component in CalArts' long-range planning process. CEAIT's internal and external advisory boards will play a significant role in this regard.

7. ACKNOWLEDGMENTS

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┌──────────────┐                      ┌──────────────┐
│   CEAIT      │←──────────────────→  │ Composition  │
│ Development  │                      │ w/Digital Audio│
│   Lab        │                      │ Workstations │
└──────────────┘    ┌──────────┐      └──────────────┘
      ↕             │  Roy O.  │             ↕
┌──────────────┐    │  Disney  │      ┌──────────────┐
│ Performers MIDI│←→│  Recital │←────→│ Recording &  │
│  Studio      │    │  Hall    │      │ Composition  │
└──────────────┘    │          │      │ w/Film/Video │
                    └──────────┘      └──────────────┘
┌──────────────┐                      ┌──────────────┐
│  Computer    │                      │ Introductory │
│  Assisted    │                      │ Workstations │
│  Instruction │                      │              │
└──────────────┘                      └──────────────┘
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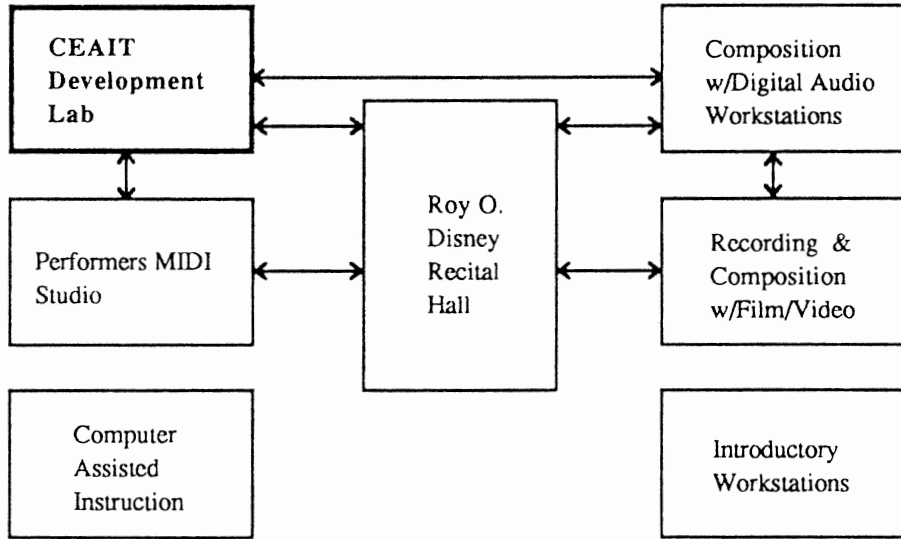
Figure 1 - School of Music and CEAIT Studios and Performance Space

Computer Music - Composition
& Interactive Performance

Experimental   Character
Animation   Animation

Computer Assisted   ⭕   Performing Arts Design and
Instruction   CEAIT   Technology

        Library/Information   Computer Assisted Art and
        Resources   Graphic Design

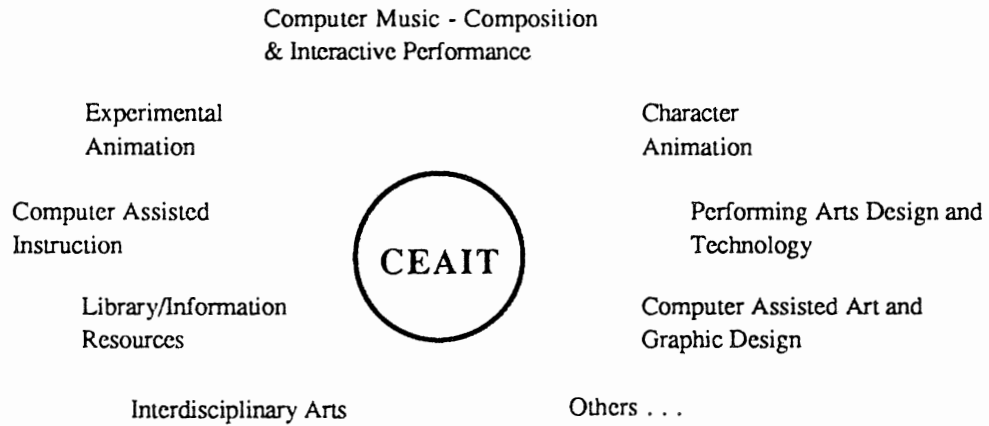   Interdisciplinary Arts   Others . . .

Figure 2 - CEAIT surrounded by some of
the technology-based programs at CalArts