When I was a student composer working as a graduate assistant in Columbia University’s Electronic Music Center, we were still using what were called “classical analog studio techniques.” A composer would record electronic sounds on analog recording tape, then cut and splice the tape to order the sounds in time. A minute of music might require many hundreds of such splices, and if you made a mistake there was no such thing as an “undo” command! Digital synthesis required the use of a mainframe computer and writing pages of FORTRAN code with a long turnaround time between writing the code and hearing the sounds—assuming your code was bug-free enough to let you hear something.

While there was a certain beauty to the hand-crafted approach of the analog studio, and the digital realm had vast possibilities for those with sufficient patience to get the computer to cooperate, two developments in the 1980s revolutionized electronic music: First, limited versions of the digital synthesis techniques that had previously required a mainframe computer began to become available in commercially available synthesizers, and second, synthesizer manufacturers agreed on a protocol to let the new digital devices communicate with each other and with a desktop computer. Called MIDI (Musical Instrument Digital Interface), this protocol and its associated software quickly opened up new possibilities for controlling timbre and ordering sounds in time.

The Presser Electronic Music Studio here at Penn, which I direct, features a MIDI workstation that links a Macintosh with various synthesizers and signal processing devices. My own compositional work in the Presser Studio has focused on the creation of pieces that combine electronic sounds with conventional acoustic instruments. For example, in 1993 I completed a piece called Secret Geometry for piano and electronic sound on tape. The tape plays back simultaneously with the live pianist’s performance, both parts being fully notated in the musical score. (A compact disc recording of the piece on the CRI label, played by Aleck Karis, has been recently issued.) There is already a significant tradition of this kind of piece, going back to such works of the late 1950s as Deserts by Edgard Varese and Kontakte by Karlheinz Stockhausen. My mentor at Columbia, Mario Davidovsky, is one of the best known practitioners of the tape-and-live-performer medium; he won the Pulitzer prize in 1970 for his Synchronisms #6 for piano and tape.

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Sacra Conversazione

The composition of mine that will be heard on campus next September 30 as part of the ENIAC celebrations is called Sacra Conversazione, and was composed on a commission from the Fromm Foundation. It is scored for flute, clarinet, piano, percussion, violin, cello, and tape. Playing the piece at Penn will be the group for which it was written, the New York New Music Ensemble.

The title of the composition derives from a genre of painting called a sacra conversazione or “sacred conversation,” which depicts a group of saints, sometimes from various time periods, generally with the Virgin and child. When I came across this genre of painting I immediately thought of the title as a splendid metaphor for the interplay of instrumental voices that constitutes chamber music, and the idea of bringing together saints from disparate eras seemed to echo my desire to utilize a wide range of expressive idioms in my music.

The piece is in five movements. The odd-numbered movements of the work are based on pre-existing sacred melodies: The first movement treats a song simply called “Canon” from the 19th-century American shaped-note hymn collection Southern Harmony. A Bach chorale, itself a harmonization of an earlier melody by Joachim Magdeburg, is at the core of the third movement; the chorale title could be translated as “I won’t let go of God.” In the last movement the cello sings a Gregorian Advent hymn known in English as “Dear Maker of the Starry Skies.”

The second and fourth movements present a series of virtuoso solos for each member of the ensemble, plus an opening tutti (a passage for the full ensemble) and a closing solo for the tape. Over the course of the two movements, each of the eight short sections is presented three times, with the gradual addition of increasingly dense layers of counterpoint and ornamentation.

Throughout, the electronic sounds on tape serve to amplify and extend the instrumental textures, at times shaping the smallest musical elements, and at other moments offering quasi-orchestral gestures.

Software and sound

In the process of working on a piece such as Sacra Conversazione I chiefly rely on two types of software. The first is Galaxy Plus, an editor/librarian program marketed by Opcode. It is possible to alter the timbre and attack and decay characteristics of a synthesizer sound using the editing functions on the synthesizer itself, but most people find it much easier to employ a third-party editor (continued on next page)
program that lets them work in the far more comfortable environment of their computer screen rather than a tiny LCD panel on a synthesizer. In creating timbres for *Sacra Conversazione*, I used some sounds that resembled the acoustic instruments that would be playing live with the tape. For example, I used a number of percussion-like sounds. However, I manipulated some of these sounds so as to have characteristics that a real percussion instrument could not, such as a special tremolo or an unusual attack. In the piece I might meld the electronic and acoustic sounds by having the percussionist play a single short note on the marimba simultaneously with an electronic marimba-like tremolo that quickly fades out on the tape. In this way I can create hybrid sounds that modify and extend the natural characteristics of the acoustic instruments.

The second type of software I employ is a sequencer called Performer, by Mark of the Unicorn. Sequencers get their name from the old analog synthesizer device that could fire off a series of control voltages in a predetermined sequence, thus permitting the composer to program a series of pitches or timbre changes or other events. Today’s sequencer software functions as a virtual multi-track tape recorder, a kind of word processor for notes. The file that contains the data for my piece contains not digital audio but a string of MIDI commands—turn this note on, turn this note off, change to this timbre, etc. (There are sequencers that can record digital audio as well as MIDI data.) These commands are ordered in time by relating them to the computer’s internal clock, although you can supply an external pulse if you like. New notes can be added to the sequence by playing them in on a synthesizer keyboard, or by typing in the appropriate data. The data can be manipulated by the program in various ways, although the familiar cutting and pasting functions are probably the most commonly used. Nuances of tempo, changes in volume, shifts in meter, all of these and more can be a part of the sequence.

The latest addition to the Presser Studio has been in the realm of software synthesis. When I was a student, you needed a mainframe to run such a program, but now it is possible to do software synthesis on a desktop with a machine such as our recently acquired Silicon Graphics Indy. Vastly more flexible than MIDI equipment, software synthesis gives the composer the chance to build sounds from the ground up if desired. Sophisticated manipulations of existing sounds are also possible, including preparing digital recordings of live performances. My students and I look forward to working with the Indy and expanding our sonic horizons even further.

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