

Tape Concerts: Centro di Sonologia Computazionale of Padova University (CSC)

At the CSC of Padova University, the following concepts were considered essential to the construction of an effective working system:

- use of available resources, even by users unacquainted with computer technology;
- adaptability for any project with special requirements;
- simultaneous utilization of resources by several users in different centers;
- listening turn-around time to be as fast as possible without limitation of operational possibilities;
- use of special languages for representing musical information at various degrees of abstraction.

In the development of the system we had also to take into account financial limitations and scarcity of staff. With these requirements and constraints, a system with fully integrated hardware and software is running at Padova that is both easy to use and flexible in application. A new system for real time synthesis employing the 41 processor interfaced to a PDP 11/34 is under development, in collaboration with LIMB of Venice Biennale and IRCAM, Paris. The hardware configuration is showed in figure.

The 41 digital sound processor, built by G. Di Giugno at IRCAM, is an improved version of 4C, with a large increase in memory, in basic functions and in operational capacity. The EV digital synthesizer, completely designed and built by the CSC, is a micro-programmable synthesizer.

A set of coordinated commands permits the composer and researcher to run program sequences easily with an operational consistency. Continually expanding libraries containing fully documented subprograms, scores and instruments are also directly available to the user. Different people may simultaneously use the whole system of programs, without interference even for several applications.

The operational levels regarding the different users' type and aim can be distinguished thus:

- batch level: system utilization from remote terminals or connected computers. The audio results are stored on disk or tape and listened to at an opportune moment.
- interactive level: the access to the computer is by video-terminal in time-sharing, with minimum loss of performance and resulting listening time.
- real-time level: programs are performed in real-time with direct action in any stage of the compositional process.

SOFTWARE AVAILABLE MUSICA

For batch synthesis the well-known programs MUSIC5, MUSIC360, and MUSIC4BF offer the advantage of a possible integration of uses. The two procedures MU45 and MU54 permit

the composer to create instruments by means of modules, obtaining very complex sounds and a large number of simultaneous voices.

ICMS

ICMS (Interactive Computer Music System), which operates in a multiprogramming environment, is available for interactive synthesis. The system features are:

- loading and control of operational parameters from a video terminal;
- real-time sound synthesis and timbral parameters modification;
- analysis of acoustic properties of the generated sounds, and immediate visual representation of the complete spectrum for any moment in time;
- storage and access to the library of any previously created or defined score of instruments;
- digital mixing of selected musical material;
- optional printing of any desired information.

Voice synthesis by means of a linear prediction algorithm allows for the definition of duration, pitch, intensity parameters, both at the phrase and at vocal elementary structure levels. ICMS provides an easy introduction to computer music even for non-specialists, and it has already been successfully used for a wide range of applications.

MUSICA and NOTE

The language MUSICA permits the transcription of any musical text in traditional staff notation into an alpha-numeric code isomorphic to the original. This program generates an operational score for synthesis programs by means of a translating procedure, and codes any other alpha-numeric information in order to modify the translating phase and to implement the operational score. The language NOTE interprets a symbolic score coded with the language MUSICA, and provides the operational score for MUSIC5.

EMUS

EMUS processes musical structures by means of a structural score. This program has three functions, non necessarily sequential:

- definition or generation of symbolically based material with numeric, graphic or pseudo-aleatoric methods;
- organization of such materials into hierarchical structures, which are then temporally distributed according to the composer's requirements;
- translation of the symbols contained in the temporal structure into the operational score.

The composer can control each function at any point in order to define precisely the final results without working at operational levels.

POD

POD is a sound synthesis program developed by B. Trux for PDP computer. It enables the user to work interactively with digitally synthesized sound material generated in real time. Normally the user does not deal with single sound events; his actions rather take the form of directing the flow of compositional procedures by making various selections and decisions.

ANALYSIS PROGRAMS

Besides the more specifically music programs there is a series of programs about acoustical analysis.

SPECTRE allows the spectral sound analysis through Fourier transform, the harmonic contents being given also in temperate scale. It allows also the harmonic grouping of each fundamental. So it can be utilized for complex, in particular multiphonic, sound analysis.

The VA17 system (VIDE, ASEQ, INTR) for interactive analysis and sound segmentation, analysis and synthesis program by means of linear prediction code techniques (LPC), other programs for digital signal processing are the result of research in speech synthesis.

MAURO GRAZIANI

"LANDING" (1982)

LANDING was realized at the "Centro di Sonologia Computazionale" (University of Padova). March to April, 1982.

In this work I used a computer both in composition and sound synthesis.

The structural aspects of this piece are generated by a program, called ALGEN, that prints out the score of structures of sounds which conform to criteria defined by the user.

In Landing, ALGEN is used to generate great masses of sounds that evolve and transform from one to the other.

Synthesis procedures are based on summation and multiplication of sine-waves, using MUSIC360 program for digital sound synthesis.

I wish to thank G. Tisato and the staff of the Computer Center of the University of Padova for their extraordinary cooperation.