THE NEW UPIC SYSTEM

Gérard MARINO
Jean-Michel SACHINSKI
Marie-Hélène SEREA

CNAMU
UNET Place E 655
3, avenue de la République
92131 ISSY-LES-MOULINEAUX
FRANCE

ABSTRACT: This paper briefly describes the main features of the new Upic system that will be demonstrated during the conference. The system is based on an AT 386 microcomputer connected to a real-time synthesis unit. The new software offers a mouse-controlled graphical interface and allows real-time drawing, editing and playing of a music page, as well as the recording of a performance.

INTRODUCTION

The Upic is a machine dedicated to interactive composition of music scores. A real-time version of the system was presented at the ICMC 86 in Köln. The final version that will be shown at the ICMC 90 runs on a different host-computer and uses the same real-time synthesis unit. The software has been completely redesigned and enhances the interactive capabilities of the machine: it now offers a "user-friendly" window-style graphical interface and a set of new and very powerful real-time facilities.

DESCRIPTION

The Upic is a music composing system that combines a graphic score editor, a voice editor and a powerful performance system, all sharing the same data. Therefore all draw and edit operations are available while the music plays. All the commands are mouse-driven. A menu command allows to switch the drawing input device from the mouse to the digitizer and vice versa.

A Upic score is a collection of notes that are called arcs. An arc is a frequency versus time curve. The frequency variations are continuous and can range over the whole ambitus. The duration can range from 6 ms to the total duration of the music page (1 h maximum).

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Tools are provided for obtaining quantified values of frequency and duration. In this way the notion of arc is an extension of the classical notion of note. Besides, each arc has a set of sound attributes that can be changed in real-time during playback.

Voice editing in the Upic includes redrawing and redefinition of waveforms, envelopes, frequency and amplitude tables, modulating arc assignment, and modification of audio channels parameters (dynamic and envelope). All these operations are feasible during playback and immediately heard.

Different sound interpretations of the same graphic score may be tested with the help of arc groups. Groups contain from one arc to the whole page and allow instantaneous and global modifications of sound parameters (waveform change, transposition...).

During performance the musician can switch from one page to another, and he may control the tempo and the play position by moving the mouse across the page. The resulting live interpretation may be recorded in an editable object called a sequence. The tempo and the position in the sequence is controllable while the sequence is being played.
PAGE DRAWING AND EDITING

A maximum of 4 music pages can be opened and displayed in moveable and resizeable windows. Opening a page stored on the disk loads it into the memory of the real-time unit. Therefore all the subsequent operations can be carried out while the page is being played.

Arcs can be drawn by using one of the drawing modes (free hand, broken line, etc...). If accepted, an arc is inserted in the page as soon as its drawing is over; if the 64 oscillators limit is reached, the arc will be refused. At any time, it is possible to modify the set of the default attributes (waveform, envelope, frequency table, amplitude table, weight, modulating arc, audio channel). One page holds 4000 arcs.

Usual editing commands (cut, copy, paste) are available. In each page, 4 groups of any number of arcs can be created by using different types of selection (block, list, criteria). Geometric operations like symmetry, rotation and vertical alignment can be applied to a group. Instantaneous modifications of the attributes (waveform, envelope, frequency table, amplitude table, weight, modulating arc, audio channel) of the arcs belonging to a group can be temporarily applied, and saved if necessary. Furthermore groups can be instantaneously muted, soloed and transposed.

VOICE EDITION

Each arc is associated with an oscillator which configuration is given by the following arc attributes: waveform, envelope, modulating arc, audio channel. Before being transmitted to the oscillator the graphic data of the arc and of the envelope are converted respectively by a frequency table and an amplitude table.

Waveforms and envelopes can be drawn or extracted from sampled sound, and normalized.

The conversion tables contents are defined either by a drawing or by a menu command and are redrawable.

The frequency table definition menu command lets the user set the boundaries of the ambitus (in hertz or half-tones) and the music scale parameters (tuning note and number of equal divisions in the octave). The frequency table can be inverted and can be made continuous or discrete. In the latter case, the steps are the octave divisions. When played with a discrete frequency table, the pitch variations inside the arcs follow the frequency steps of the table.

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PERFORMANCE

Only one page is played at a given time. The 4 pages can be chained or not. The user chooses which page to play just by clicking on it, he stops or restarts the progression of the performance, he defines the time limits of the performance with optional looping.

The tempo and play position can be defined by the mouse motions in the page or by entering their values. All kinds of motions (forwards, backwards, jumps, acceleration, slowing down) in the page are permitted. When not user-controlled, the page is played at a constant tempo.

A set of channel parameters (dynamic and envelope) is assigned to each page. The 16 output audio channels dynamic and envelope are real-time controllable during performance. As the channel envelope spreads over the whole page, it is therefore possible to weight locally arcs assigned to a given channel.

In the Upic, a sequence is the recording, during the performance (controlled or not), of all the successive positions in the page, with a 6 ms accuracy. It holds a maximum of 12 minutes of performance. It is displayable as a position versus time curve. Any piece of the sequence can be overwritten by a new recording or redrawn. The performance of a sequence is carried out inside its window with mouse motion controls (like the page). When 4 pages are loaded, the user has 2 sequences to work with.

STORAGE

Pages, waveforms, envelopes, conversion tables and sequences are stored in separate banks (DOS files) on disk. Banks are user-protected. Copying, renaming, and deleting objects and banks is possible.

The user can load objects that come from different banks. Saving an object can be done in any bank.

CONCLUSION

This paper has presented the principal characteristics of the Upic system. Additional commands are going to be integrated to the application, especially sampling utilities (record, play, simple edition functions). The synchronization of the performance with an external device as well as the communication between the Upic and MIDI devices is being studied. Tools will be provided to let another application access Upic banks data.

The system is being industrialized and will be put up for sale in 1991.

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