SIM - SYSTÈME INTERACTIF MUSICAL (CYBERSONGOSSE 7MI)

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ABSTRACT

Over the last thirty years, the International Institute of Electroacoustic Music of Bourges - "IMEB" has been developing music-related educational concepts and building a unique and original instrument named "Gmebogosse" then "Cybersongosse". This one-of-a-kind instrument designed to create sounds and electroacoustic music with easy manual control binds together a range of classic "studio" modules: recording, synthesis, effects, mixing and spatialized output... Being analogue at first, it has now turned into a fully digital workstation while retaining its playability and ease of use.

1. INTRODUCTION

The name "Cybersongosse" refers to both the hardware instrument itself and to all the pedagogic approach of its usage as an educational tool. Called "Gmebogosse" from 1973 to 1998, it is now known as the "Cybersongosse".
1° Multi - control electroacoustic workstation for sonic and musical work. The instrument is composed of two consoles acting as control surfaces connected to a computer (Mac or PC). Their various switches, rotary faders and sensors enable remote operation of commands and controls of sound processing.
Each console offers:
- External sources: 4 Inputs (Line or Micro)
- Internal sources: synthesis + 3 racks of 8 "digital tapes" sample slots.
These sources can be routed to 6 effects processors (filter, envelope, pitch-shift, delay, EQ and reverb) in serial or parallel mode.
They are mixed and spatialised in stereo or quadraphony.
All these functions are used for playing the pedagogical games and controlling the sonic and musical sequences. They are manually operated with 246 commands (switch, rotary or linear fader type) and motion capture devices which can be easily recorded, recalled and sequenced. Manually signifies that in an analogue way, each cause has immediate effect.
1 to 6 people can work simultaneously on each console.
2° Music and sound education, the instrument is supported with more than 300 individual and group games (auditory awareness, listening, sound memorisation, recognition, realization, improvisation…) organized in 3 levels (nursery, school age, adult). All these games, their functions and practice (rules, technic elements, used sounds) are described and commented in the user booklet.

Figure 1. Students in the studios RAIS working with Cybersongosse 6Mi (Berlin 2002).

The Cybersongosse offers a wide range of practical uses to aid in all creative, expressive and educational purposes where sound and music are involved. Its ease of use and short learning time makes it an excellent choice for all ages and any group-orientated pedagogic framework. Each pedagogic aspect is defined and explained but remains opened to personal experiments and practices.
The Cybersongosse instrumental and pedagogic “modular approaches” allow users to focus on any practice or level depending on their context and aims to retain full control and maximum flexibility.
Thus:
- There is neither determined social origin nor specific age required to practice on the Cybersongosse (children, teenagers, adults...) nor preferred background (school, community art center, hospital...)
- The creative, expressive, learning and discovering steps of use can be practiced at different levels with seamless interaction:
1 - sound expression: radiophonic style, improvisation, sound stories and sceneries… (learning from hands-on experience)
2 - musical creation: opened to everyone but requiring further knowledge (timing constraints, modes of expression)
Thus “musical education” appears either by collective playing, either by applied-knowledge during a course of study for young musician lead by an instructor.

2. PRECEDENT INSTRUMENTS

The "Gmebogosse" pedagogy started back in January 1973. The first instrument being finished in December 1972.
A second model was built in 1974, very close in design to the first version.
A third one was designed in 1977 within the framework of the "Fond Intervention Culturelle" - F.I.C. 10 units were produced. At this time started the training workshops for teachers of the Cher and other French Departments.
From this time, two kind of sessions have been co-existing:
- GMEB from single sessions to full-time workshops, with children and teenagers, the Cybersongosse has been put effectively in use at schools around the Region Centre, in France and abroad (in Argentina, Moldavia and Germany recently).
- Teachers after a short training at IUFM, they can conduct its use in their own class. Several user groups were formed in the Region Centre to share instruments between schools
Other activities are also developed by various facilities such as those in Amiens or La Rochelle...
A fourth model prototype built in 1985 was driven by a Thomson TO7 micro-computer. Despite being critically acclaimed, it never received financial help, hence was not produced in series. A new version was designed and twenty units produced in 1988-1989 (from which 6 were acquired by the municipality of Bourges and 2 by the "Département du Cher").
These units modified with mini discs replacing the tape-decks are still in use today proving that their robust and effective design keep users interested, teachers and youngsters alike.
Teachers willing to adopt the instrument and to lead its educational use benefit from a regular help from the Institute with the lending of support material: newsletter, information sheets, specific CDs with sound-games or commented musical extracts.
The Cybersongosse design has always been pushed further with the children in mind.
With 7 models, it has been constantly evolving by integrating new audio technologies as they emerged while retaining its ease of use and philosophy. The educational aspects of listening and the practice of sound and music have been explained and detailed in the user manual. The supporting audio games have been developed and refined over the years to acknowledge users feedback such as teachers reports and children tastes for specific sounds, techniques available on each successive models.
This continuous interwoven relationship between the instrument, games and technological progress used in a wider social context lead the development team to design a quadraphonic digital model in 1998. This new instrument with its full new set of support games on digital media was achieved late 1999 and renamed to "Cybersongosse 6Mi".
More than one hundred daily sessions are organised each year at schools and high-schools, and twenty-three international workshops already happened.

3. CURRENT DIGITAL INSTRUMENT: LE 7 MI

The 7Mi version introduced in beta phase during the festival "Synthèse" in June 2002 to celebrate the 30th anniversary of its ancestor has been finalised in June 2003. This version is composed of two consoles - each one holding a complete synthesis ensemble, microphone, 3 racks of digital sample-players, 6 effects processors, one mixer and an array of motion capture devices - linked to a Mac G5. On both, every ensemble, processing, mix operate in real-time: 28 sources played and recorded via a 20 voices spatialized mixer with 4 individual groups and 6 sends to effects in serial or parallel mode.

Figure 2. Frontview of the main surface control and mixing desk.

Both consoles can be played simultaneously and operated by one or several people.
The structure has 3 levels:

3.1. 1st Level: real-time / manual control

- 8 sound sources (2 mic/line inputs or 1 mic and 1 scratch, 2 oscillators, 3 racks of sample slots: 2 mono + 1 stereo) operated on:
1 processing chain with 6 different effects: filter, enveloppe, pitch-shift, delay, EQ, reverb played solo or simultaneously
7 insert channels
4 loudspeakers output for spatialised-mixing, 2 for control and recording: 20 volume faders and 12 rotary panpots
- Real-time playing via dedicated controllers (130 switches, 116 faders and 8 sensors) for direct interactive learning (hands-on experiment)
- Direct-sounds and recorded sounds (memory banks) triggered manually or sequenced.
- Immediate sound recording at any time
- Non destructive editor for looping, time-stretching, pitch-shifting, reverse playing any recorded sound.
- No computer screen required for this level but a graphic pad to select sound memory banks and synthesis matrix routing.
- Final editing on 4 tracks recorder

3.2.2nd Level: real-time / consoles & graphic pad with computer display
- 8 sensors with motion capture assignable to any sound parameter.
- Controller and command - routing matrix.
- The screen is used to visualise the current assigments freely modified thanks to a graphic pad

3.3.3rd Level: non real-time / memory banks, graphic pad with computer display
- 8 sequencers recalling motion captures (dynamic) with visual feedback
- 4 graphic sequencers
- 8 memory banks per control to store user defined presets (static)
- 32 sound memory banks with visual feedback - (2 x 8 mono, 2 x 8 stereo)

This new fully digital 7Mi is very flexible and offers the new possibilities for the artistic sound creation.
Its ease of use and fast responsiveness are valuable assets in the context of sound manipulation, the musical expression. It stimulates the creative and analytical mind. The wide range of musical possibilities makes it a tool of choice for any educational program.
This workstation can be played solo or together as a group.
The Cybersongosse 7Mi has always been and will remain an instrument designed to be played by people of all ages: children, youngsters, adults and professional performers.
(A software only version will be available in january 2005).

4. REALIZATION

4.1. Hardware
The control surface is built at the IMEB by its technical director, Jean-Claude Le Duc. This control surface includes:

27 linear faders
88 rotary faders
90 switches (2 positions)
26 switches (3 positions)
2 switches (4 positions)
3 two dimensional sticks
2 touch sensitive sensors
8 inputs for motion capture devices

allowing for 307 different interactive access upon the on-going sound generation (see Figure 2).

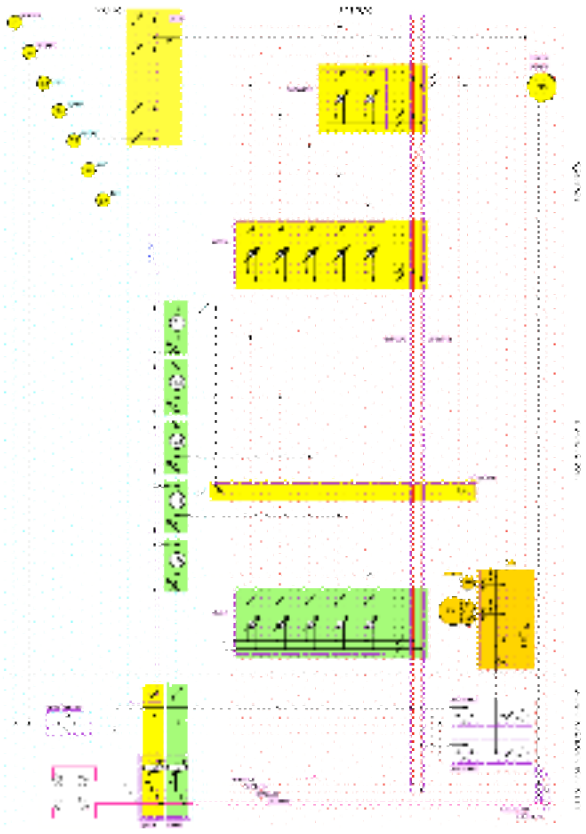

Figure 3. Diagram of the audio network used in Cybersongosse 7Mi.

4.2. Software
The software was developed by its music computer research responsable Alexander Mihalic with Max/MSP 4.3.1 and 4.5 on a Mac G5 running at 1.8 GHz.
The patches were also tested on the PC environment to assure full compatibility.
The complexity of the design has led the development team to choose a modular, object-oriented approach instead of the usual main patch and subpatch schemes.
The program is made of families of independent modules for audio routing and control messages. Each family runs as a standalone unit and can be edited without altering other parts.
Each family shares the same structure: standalone modules with audio inputs/outputs and send/receive channels to control of parameters.
The program runs simultaneously a hundred processes exchanging more than a thousand messages. This complex informational structure implies a rigorous parameters name definition. All patches and files are defined and named according to this norm.
For instance:
EFFECTS[SIG]_Trp[Ctl]_Pitch[RangeUp]
Is a message for the Effects category, adressing the Pitch-Shifting module to control the maximum range of shifting.

This kind of meta-language, such as those found in high-level object-orientated environments allows for cross-platform evolution and further developments.

5. CONCLUSION

The key benefit from the instrument resides in its compact design and modular concept despite of its high number of assigned controllers like those found on analogue instruments. It can be operated without the consoles (like software-based virtual instruments) even if this reduces its major advantages.
Even though the first models were targeted to educational projects, the new 7Mi is a multi-purpose standalone unit designed to suit every professional studio work or live electronic performance.

Design: Christian Clozier

Development team: Jean-Claude Le Duc -hardware

Alexander Mihalic - software

Production: IMEB © 2003-2004