

The Music Cre8tor: an interactive system for musical exploration and education

Jane Rigler
Co-designer, Coordinator
25 Monroe St.
Brooklyn, NY 11238
(917)826-9608

Zachary Seldess
Programmer/Co-Designer
16 Ocean Parkway #a18
Brooklyn, NY 11218
(718)928-8387

ABSTRACT

The Music Cre8tor is an interactive music composition system controlled by motion sensors specifically designed for children with disabilities although not exclusively for this population. The player(s) of the Music Cre8tor can either hold or attach accelerometer sensors to trigger a variety of computer-generated sounds, MIDI instruments and/or pre-recorded sound files. The sensitivity of the sensors can be modified for each unique individual so that even the smallest movement can control a sound. The flexibility of the system is such that either four people can play simultaneously and/or one or more players can use up to four sensors. The original goal of this program was to empower students with disabilities to create music and encourage them to perform with other musicians, however this same goal has expanded to include other populations.

Keywords

Music Education, disabilities, special education, motion sensors, music composition, interactive performance.

1. INTRODUCTION

The Music Cre8tor is an interactive music composition system controlled by motion sensors initially designed for the needs of people with disabilities to be used as an educative, therapeutic and emotionally rewarding artistic outlet for this population and their teachers, therapists and parents. This system was built to allow the physically and cognitively challenged population to create new music by using motion sensors which are held or attached to a person's wrist, arm, leg, etc. The sensitivity of each motion sensor is designed to be individually modified (i.e., calibrated) for each person so that even the slightest movement can be tracked and become a control for composing music in real-time electronically. Up to four people can play simultaneously, each person experiencing the cause and effect of their movements which directly correspond to rhythm, melody and the basic elements

of musical composition. Another example is that one person can hold or control up to four sensors, each sensor being a different instrument (sound source or timbre). We have achieved the goal of creating a useful and fun new instrument to the extent that children and adults can easily play with this software with little knowledge of how it works.

2. SET-UP

All musical aspects of the Music Cre8tor were programmed in Max/MSP. A stand-alone file has been designed for use in any computer without the need for specific software. The computer hardware requirements for using the Music Cre8tor are: 700 MHz processor or faster, 128 MB of RAM, 60 MB of hardware space, 1024 x 854 screen resolution, USB port and cable (2.0 preferred). This program is both Windows XP and Mac OS compatible.

At the time of this paper, the Music Cre8tor system includes a custom-made sensor interface box, 4 sensors, a midi-interface and a tutorial guide/instructions as well as free demonstrations by the designers.

2.1 Design

After several years of testing with children and their teachers, the current version has been designed for intuitive functionality. The screen design simulates a look that could be a cross between an MP3 player and a tape recorder. Design modifications are constantly being updated as testing with both students and their teachers is an on-going process.

3. FUNCTIONALITY

The Music Cre8tor requires the collaboration of both a guide (one who enters data to establish parameters in the system, i.e., a player, teacher, student, parent) and a player (i.e., student, adult, teacher, parent, etc.). In some cases this could be the same person. In some situations, the guide will encourage the player to make a series of decisions regarding instrumentation. For example, a player must first decide which category of instruments to play: melody or rhythm. After this, the player must choose the type of melody or rhythmic instrument (for example: a MIDI melody instrument, one of 127 choices; or a computer-generated oscillator). Once this has been determined, the player may then move the sensor to listen/react to the results.

All instrument sounds start when the sensor is moved, shaken, agitated or wiggled and stop after the sensor is inert for a second, depending upon the tempo chosen by the player.

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The main tempo, tonal center and volume may be entered into a global control panel by the guide or player, but the rhythmic relationship of notes (half notes vs. 16th notes) is completely controlled by the player(s) movement of the sensor. In other words, whether the pitches rise or fall, start or stop, or contain rhythmic complexity or not, is determined by the movements of the player(s) holding the sensor(s).

Music can be created spontaneously in real-time as well as recorded for play-back for either documentation, performance, or composition. This program encourages spontaneous music-creating but also promotes the composition process, which arises out of the structure and form performed.

4. RESEARCH and DEVELOPMENT

The Music Cre8tor hopes to expand upon a variety of other pre-existing interactive sound devices and programs by providing new sonic and artistic options as well as more economical choices for users. Other interactive electronic devices use motion sensors to generate MIDI tones. The SoundBeam [1] from the UK, as well as the MidiCreator [2] are two such instruments that have had a profound impact on the special education population. The Music Cre8tor has increased artistic options by adding other musical instruments (timbres), as well as developed a design for the possibility of deeper kinesthetic relationships between the player, the sensor(s) and the resulting sounds. Furthermore, the Music Cre8tor requires minimal computer system requirements and speakers, thereby reducing the additional costs of buying extra sound modules, tone generators and other gadgets. If the user(s) already own a computer and a simple sound emitting system, then they can immediately begin to participate.

There are known interactive musical devices in which the user controls a pre-recorded sound file by moving a motion sensor (i.e. in the shape of a baton), which triggers real-time transformations for the tempo and volume of a pre-recorded soundfile [3]. The Music Cre8tor expands upon this idea by incorporating a Restart Sensitivity Threshold, where upon the playback behavior of the soundfile is directly manipulated by the sensor activity of the player(s). In other words, if the player agitates the sensor more vigorously than "normal" then the soundfile will restart at the beginning. This generates a rhythmic activity similar to the "scratching" effect of a DJ on a vinyl record. A new rhythmic pattern is created out of the pre-existing soundfile.

This is just one of several variants in the methods of playing and using the Music Cre8tor from other interactive sound devices currently available.

Further tests have shown that this device is also effective for the cognitively involved student as well as emotionally distressed young adults. Future tests will incorporate the blind and deaf population as well.

The Music Cre8tor has been tested in public schools in both Alaska and New York with positive feedback from teachers, administrators and of course, students. Reflecting upon the

video documentation taken at such demonstrations show students engaged, focused, smiling and actively participating in the music. Tests show that students recognize their own chosen instrument, and make cognizant choices about the form, structure and rhythm of the music. Students who have shown discipline problems in the past have engaged positively with the Music Cre8tor demonstrations and encouraged other students to participate.

5. RESULTS AND CONCLUSIONS

The interesting aspect of this new instrument is that it can be modified for each individual's sensitivity of movement. In this way a person can learn how to use this musical instrument much in the same way a non-disabled person can learn a musical instrument. A person with limited mobility can immediately experience the cause and effect of sound being created by a particular movement (e.g., slow movements = slow moving sounds). Based on observation of the student's pace the teacher can adjust this instrument's sensitivity to match the learning curve of the student, thereby making it more challenging if/when the student is able, or more sensitive if not.

This particularly useful therapeutic and educative aspect of the Music Cre8tor exceeded our expectations laid out in the original concept. What was at first conceived as a fun, educational tool has, through development, transformed into a valuable instrument for experiencing the relationship between kinesiology, sonic creation and perception of the world around us. Therapists, teachers, physical educators, parents and administrators have all expressed interest in the development of this instrument.

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7. REFERENCES

- [1] <http://www.soundbeam.co.uk/>
- [2] <http://www.midicreator.co.uk/>
- [3] http://en.wikipedia.org/wiki/Wii_Music