MIDGRID
An Innovative Computer-Based Performance and Composition System.

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ABSTRACT: MIDGrid is a new musical instrument which the user controls by passing a computer mouse over a grid of cells on a computer screen. The cells are configured by the user so that they contain notes, chords or complete musical sequences. The player can be considered either as an instrumentalist playing notes or as a conductor controlling sequences somewhere between the two. The actual sound is played via an external MIDI sound module. Grid nodes can be individually triggered by notes played on an external MIDI device, thus enabling complex external control and even interaction between two MIDGrid systems.

MidGrid takes its name from the fact that it is a novel computer-based musical instrument whose player-instrument interface is a GRID of cells on a computer screen, and which controls an external sound-source via the standard MIDI interface.

The number of cells on the screen can be defined by the user and these can be configured to contain notes, chords (comprising many notes) or sequences. The cells are triggered by passing a cursor over them using a computer mouse.

The user of the system is able to merge the traditional roles of the performer and the conductor. When the grid consists of many boxes each containing a single note, the user may be considered a player-performer in the conventional sense. He or she moves the mouse and the notes are played according to the layout on the screen. However, as the proportion of chords and sequences on the grid increases, the player begins more and more to take on the role of a conductor.

The MIDGrid cells are used as a user-definable palette of musical structures.

MidGrid includes a real-time recording function which allows whatever is played on the grid for in an external MID controller such as an electronic keyboard to be recorded and the resulting sequence played into a new grid box. This is now a separate musical object which may be played, edited, replicated, and even played in canon with itself. It can also be played simultaneously with any number of other sequences, sounds and notes and the entire resulting musical piece stored as a new sequence in another grid box. This allows complex timbral and temporal musical structures to be added to the palette.

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Sequences, once recorded, can be edited in a variety of ways. If a cell contains individual notes or a chord, a cell editor can be used to change the pitch and/or channel or some variation of the component notes. Sequences can be edited with the "paint-roller" editor which allows the modification of notes and control data by graphical means. At any point during this process the sequence can also be altered using the 'conducting editor' which allows real-time modification of continuous parameters such as tempo, mix, volume, and stereo panning.

The grid, in addition to being played by the mouse, can be controlled by the process of "grid-mapping." Any grid cell can be "mapped" to any incoming MIDI note. For instance, it is possible to play a set of complex grid chords by pressing individual keys on an external MIDI keyboard. As another example, the human voice could be used to control tremendously complex sequences by mapping grid sequences to notes from a MIDI microphone.

MidiGrid is more than a conventional MIDI sequencer. It is a new musical instrument. As such it requires practice like any conventional instrument. It is therefore a system which becomes more powerful as particular players develop their own technique. The main difference between MidiGrid and traditional instruments is that the user-interface can be defined by the player.

Design Issues.

The design of MidiGrid was concerned with the investigation and implementation of a novel human-computer interface which would allow the power of the computer to be used in a flexible way - particularly in the area of live performance. In setting these objectives we were aware that we were embarking on an ambitious programme which had an in-built but interesting dilemma.

If we were to design a new musical instrument, perhaps we should not expect users (performers) to be able to perform proficiently until they have had sufficient practice. Comparing this to conventional instruments, this might take between five and ten years. On the other hand it would be regarded as totally unreasonable to expect the training period of a machine operator to extend over this interval. It would also prove difficult to demonstrate the capabilities of the instrument in its early years. We accept that this factor has to be taken into account if we are to produce an instrument which has sufficient capability of expression to retain aesthetic interest beyond the initial training period.

Some important questions which have arisen when constructing new grid patterns are:

How should the grid be set up? What notes should the grid contain? Is the mouse an appropriate performance medium?

Applications of MidiGrid.

Innovative Composition and Performance Techniques.

The system has proved useful as a general-purpose compositional environment. It can be used to interactively manipulate sequences played on other MIDI instruments and systems. Equally it allows free experimentation with chord structures and improvisations on note layouts which would be physically impossible on a keyboard.

Computer Music in Education.

MidiGrid is very easy to use as it is controlled entirely graphically. Its main advantage lies in its ability to be set up in an almost infinite number of musical configurations. Teachers can design grid-patterns with particular musical aims, or the pupils can freely experiment with their own patterns.
Music Therapy is the application of a whole variety of musical techniques in order to help people overcome physical, mental or emotional problems. Providing that somebody has created a set of grid patterns in advance, MidiGrid can be used as a tool which allows instant access to sounds without any required musical knowledge or training. The immediate sound response to the movement of a mouse (or an external key or pad if using 'mapping') has been shown to have very therapeutic effects and, for example, can form a stimulus for further movement.

Extending MidiGrid control through remote triggers.

Connecting two MidiGrid systems together can provide novel and complex musical controls for the composer. Two aspects of this which are particularly interesting are:

1) Embedded within triggers in sequential events are programming to initiate events (sequenced or not) on another MidiGrid system by using 'mapping'. Mirroring and iterating this process can lead to results which are 'closed' in the sense that musical passages repeat endlessly, or they may, with a suitable compositional design, lead to triggering an entire composition. Introducing live performers into the performance creates a more open, less determined situation of great interactive complexity, with machines and performers in partnership, initiating, controlling and modifying musical development.

2) Cleaning the MIDI buffers in performance introduces a further and most intriguing level of control. The system behaves in a chaotic manner, generating events with apparently self-similar structure. With a carefully designed MidiGrid panel, the performer now stochasticises the actual results from this chaotic and never entirely predictable music.

Conclusions.

MidiGrid has proved to be a novel and flexible tool allowing new forms of musical composition performance to take place. It is equally useful to the advanced musician or the complete beginner.

We are still learning how to play it!