

The Augmented Composer Project: *The Music Table*

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Abstract

The Music Table enables the composition of musical patterns by arranging cards on a tabletop. An overhead camera allows the computer to track the movements and positions of the cards and to provide immediate feedback in the form of music and on-screen computer generated images. Musical structure is experienced as a tangible space enriched with physical and visual cues about the music produced.

1. Introduction

Using *The Music Table*, a player can compose musical patterns by arranging cards on a tabletop. An overhead camera allows the computer to track the movements and positions of the cards and to provide immediate feedback in the form of music and on-screen computer generated images. The *Music Table* provides both tactile and visual representations of music that can be easily manipulated to make new musical patterns. It can enable inexpert music makers to experience their own music as patterns in musical space. The overlapping tactile and visual representations of the music help reinforce one another in a way that leads us to believe that augmented reality can provide a form of interaction and representation not possible with mouse, keyboard and screen. By giving the player a physical model of the music, the abstract nature of music can be experienced on an intuitive level.[1]

2. The System

The software component of the system is in two main parts. The Music Table program itself handles the camera-based tracking of the cards, the rendering of VRML objects, and the compositing of CG graphics into the original video image. To do this, it uses the Augmented Reality Toolkit programming libraries [2] devised by Hirokazu Kato and supported by a lively community of programmers. The sequencer for midi events is built in the PD music programming environment [3] and receives data from the Music table program via MIDI and via UDP sockets. This use of MIDI is a carry-over from the Augmented Groove, an earlier project that

used the same marker tracking technology to mix live dance music tracks and effects via midi.[2]

When a card is placed on the table, and its tracking pattern becomes visible to the computer, the software recognizes the position of the card on the table. A card's position on the axis running toward or away from the user determines the pitch of the note to be played. Its position from left to right determines its timing in a looping timeline. Several cards combined make up new musical patterns.

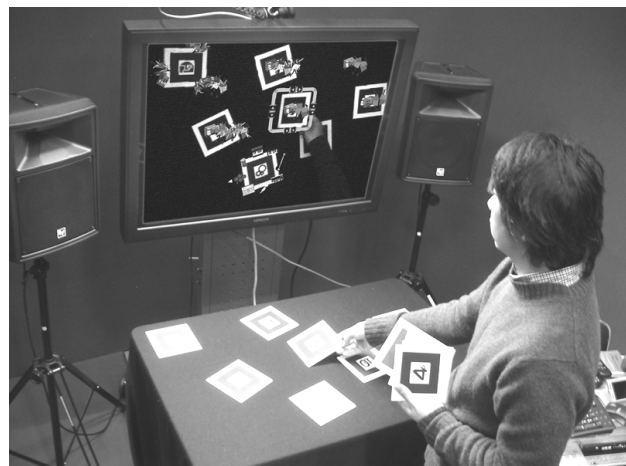


Figure 1. The Music Table.

Once a musical pattern is made on the table, a *copy card* is used to copy the phrase to a special *phrase card*. The phrases can be layered as multiple tracks sounding at the same time. After copying a phrase to a phrase card, the phrase can be later opened up for editing on the table without the presence of the original note cards. In this case, a *phrase-edit* card is applied to the images of the notes allowing the user to change the timing, pitch, velocity and duration of each note.

An *instrument card* allows the user to change the instrument sound of either the notes playing from the table, or any of the individual phrase cards' sequencers. The card is placed close to either a note card on the table or the appropriate phrase card. By tilting the card to the left or right, the sequencer cycles through a 'palette' of instrument sounds and sends the appropriate MIDI program-change message to the synthesizer.

2.1. Visual Representation

In general, the *Music Table's* visual design creates a sense of fun and cuteness. This is partly due to our hopes of making a system for children to use, but also, being a Japan-based project, a contemporary Japanese sensibility underpins the design aesthetic.

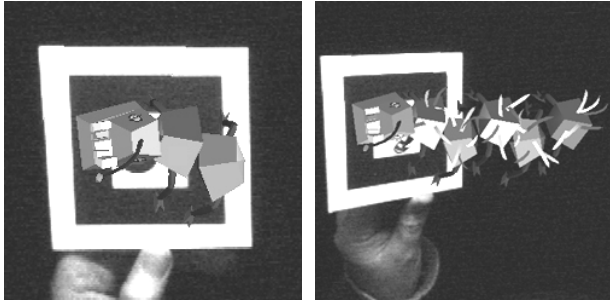


Figure 2. Short and long note-cards

Note-cards are coupled with animated computer generated *note-creatures*. When a note is made louder, the creature's body grows more spikes. When a note is made longer, the creature also becomes longer. *Phrase-cards* are coupled with marching circles of creatures.

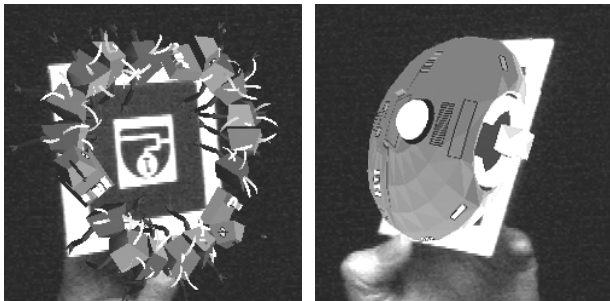


Figure 3. Phrase card and Copy card.

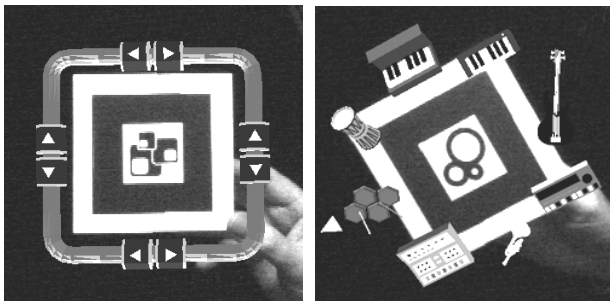


Figure 4. Phrase-edit card and Instrument card

3. Conclusions and Future Plans

The Music Table is currently a very usable and fun music making tool. Its integrated physical and visual representations may help young composers to more

intuitively understand patterns in the music they make. The live sequencing of music offers some of the immediacy of live performance without the frustration of a conventional instrument. *The Music Table* currently sits somewhere between the world of children and the world of adults and will most probably be split into two separate projects to better meet the needs of each. For children, we would like to develop the character aspect of the representation to make learning more fun. For the more advanced composer, it should be possible to build larger structures and save them for later editing. The Augmented Composer project aims to apply augmented reality to sound synthesis, intonation and other musical areas where flexible representation of sound is a problem. People who become 'augmented composers' will experience musical structure as a place they can enter and manipulate.

4. Acknowledgements

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5. References

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