MagNular: Symbolic Control of an External Sound Engine Using an Animated Interface

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Abstract

This paper reports on work in progress on the creative project MagNular, part of a wider practical study of the potential collaborative compositional applications of game engine technologies. MagNular is a sound toy utilizing computer game and physics engine technologies to create an animated interface used in conjunction with an external sound engine developed within Max/MSP. The player controls virtual magnets that attract or repel numerous particle objects, moving them freely around the virtual space. Particle object collision data is mapped to control sound onsets and synthesis/DSP (Digital Signal Processing) parameters. The user "composes" by controlling and influencing the simulated physical behaviors of the particle objects within the animated interface.

Keywords: Sound Toys, Open Work, Game Engines, Animated Interfaces, Max/MSP.

1. Introduction

Existing examples of computer game related technologies being explored within a primarily sonic context include work by Robert Hamilton using the ioquake3 engine [1], *Fijuu2* - a game-based, audio-visual performance engine developed by Julian Oliver [2], and *Elektroplankton* by Toshio Iwai, a Nintendo DS game for generating interactive algorithmic music. There are also many examples of game input interface hardware being used in a musical context, for example the Wii Remote controller, which has been evaluated as a musical controller in a study conducted at Sussex University, UK [3].

MagNular is a controllable sonic environment intended for "non-experienced" users. The artistic goal of the project is to create a playful and exploratory sonic experience with some capacity for compositional interactions by the player. The overall design and visual aesthetic exhibits some similarities with computer games, but the work shares more common interests with the field of sound toys, as characteristic game models of competition are not present, with the sole purpose being the generation and manipulation of sound.

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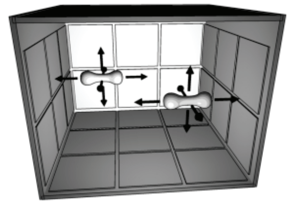

Fig 1. Prototype

2. Overview

The player is presented with a 3D virtual room containing a variety of differently shaped and textured particles. Each particle represents a specific sound type. The player-controlled magnets can be activated to attract particles within their immediate vicinity. Once attracted the particles can be dragged around the space, causing the particles to collide with the 27 tile objects mounted on the walls and floor of the virtual room, resulting in corresponding synchronized sonic events and sound transformation processes. The velocity of impact and point of collision data from each tile are mapped to sound parameters. Each magnet can be set to repel objects at varied intensities, resulting in clusters of player timed collisions around the room. Single or multiplayer options are included allowing the sound toy to be used as a collaborative performance system.

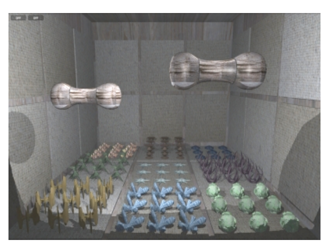

Fig 2. Screenshot 1.

Fig 3. Screenshot 2, magnets in "attract" mode.

Player control of the sound world is symbolic [4], with no sound or synthesis parameter names included in the virtual space. Control of the sound engine via the animated interface draws on the player's fundamental understanding of gravity, and the physical behavior of magnets, a concept which is extended and used as the primary basis for interactions. A player's prior experience of computer games may also aid comprehension of the control systems employed.

3. Magnet Behaviors

Each magnet can be moved freely around the room and has three player operated active magnet states. These are:
Magnet Attract Mode – attracts particles within the vicinity of the magnet.
Magnet Power Up Mode – cumulatively energizes the magnet over time. The longer this mode is activated, the greater the velocity of the particles when repelled.
Magnet Repel / Blast Mode – triggers the repelling of the particles away from the magnet.

Once a player has become accustomed with the sonic behaviors of each particle object and collision tile, compositional decisions can be made by the player regarding the particles and collision objects to interact with using the magnets.

4. Player / Performer Input

The system will be made available via free download for both Macintosh and PC platforms, allowing easy access to the project and providing the possibility of home use for players. For this reason conventional and widely available gaming pads have been selected as the user input device. These are used to control the position and movement of the magnets and their three operational modes.

5. System Structure

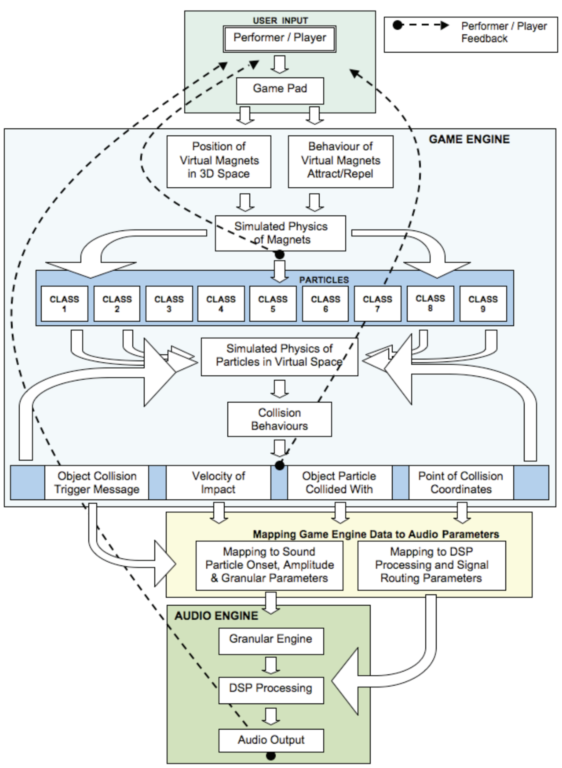

Fig 4. Structure and Preliminary Mappings.

The system utilizes an internal network connection on one computer for the communication of data from the game engine, Unity 3D [5], to the sound engine. Data is forwarded from Unity to Max/MSP on each collision event.

5.1 Collision Data

In addition to using game object collision onset data for triggering sound onsets (as found in many computer games), the game engine outputs additional collision parameter data for mapping and control of sound. Data sent from the game engine to the sound engine includes the object collision onset message, particle index, tile collided with index, velocity of impact, and point of collision coordinates.

5.2 Sound Engine

The sound engine prototype is in the development stage, and will be fully documented on completion of the project. Current key mappings are briefly outlined here.
Particle collisions instigate sampled sound onsets, with the particle index value determining sample selection within the corresponding particle sound set. The tile index value controls signal routing of the particle sound to one of the multiple DSP processes. Impact velocity values use one-to-many mappings to simultaneously control a number of different parameters including amplitude envelope, filtering and DSP effect parameters.

6. Final Comments & Future Work

Once the prototype is completed extensive testing will be required by a broad range of players in order to assess the usability of the project, and the effectiveness of the implemented control system. Its potential for sonic depth and variation will also be fully evaluated before making the project widely available. For the future, there is scope for the exploration and development of a multichannel audio version of the project, which may prove to be a potentially interesting way to spatialize sound within an environment such as the Sonic Lab at SARC.

References

[1] R. Hamilton, "Q3OSC Or: How I Learned to Stop Worrying and Love the Game," In *Proceedings of the 2008 International Computer Music Conference (ICMC)*, 2008.

[2] J. Oliver, "Fijuu2: a game-based, audio-visual performance engine," [Web site] [2008 Sep 01], Available: http://www.selectparks.net/modules.php?name=News&file=article&sid=480

[3] C. Kiefer, N. Collins, G. Fitzpatrick, "Evaluating the Wiimote as a Musical Controller" In *Proceedings of the 2008 International Computer Music Conference (ICMC)*, 2008.

[4] P. Dourish, *Where the Action Is, The Foundations of Embodied Interaction*, Cambridge, Massachusetts: MIT Press, 2001.

[5] "Unity 3D Game Engine incorporating the Ageia PhysX physics engine," [Web site] [2008 Sep 01], Available: http://www.unity3d.com