The Aesthetics of Project Orbit

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Abstract

The goal of this paper is to outline design considerations for codename Project Orbit, an isorhythmic sequencer for Ge Wang's Music 256a class at Stanford University. The outline will be divided up into two sections. The first section will discuss design considerations found in relevant musical sequencers and interactive applications. The second section will provide a detailed design proposal for Project Orbit.

1 Relevant Design Aesthetics in Existing Software

1.1 Applications to be Examined

The following applications have been selected by the author as being aesthetically and musically relevant to his own sequencer that he is trying to create.

Bloom is a generative music app by Brian Eno and Peter Chilvers. It is the main source of inspiration for Project Orbit, due to its simple design and musical brilliance.

Website: www.generativemusic.com

Osmos is a physics-based game developed by Hemisphere Games. It has been selected for its prominent use of the circle, and its satisfying audiovisual user experience.

Website: www.osmos-game.com

Poly is a generative circle-based polyrhythmic sequencer app for iPad by James Milton.

Website: http://james-milton.com/poly

Patterning is a circular drum machine for the iPad by Olympia Noise co, that shows how circles can put a twist on a classic product.

Website: http://www.olympianoiseco.com/apps/patterning/

1.2 Circular Sequencers

Project Orbit at its very core is a *circular sequencer*, where circles and ellipses are used to display time. While not a novel concept, circular synthesizer are a captivating alternative to more "conventional" step sequencers, whose time is displayed in a more linear fashion.

Circles are an intuitive representation of repeating phrases, and are ideal for visually displaying complex rhythmic relationships. *Poly*, for instance, uses the circle as the basis for plotting complex polyrythms; the rate of a particular note element is proportional to it's magnitude to the center of the screen. Circular sequencers have also be used to display Euclidean rhythms

and isorhythms, the latter of which is important to the design of Project Orbit.

1.3 Isorhythms

Isorhythms are a technique used by composers to build polyrhythms and complex contrapuntal phrases. Two or more repeating musical phrases of different durations are layered on top of one another. As time progresses, these phrases become more and more out of phase with one another. Isorhythms often have a very hypnotic effect, and can be a way of utilizing grooves and looping without sounding repetitive.

Brian Eno is noted as an artist and composer who heavily uses isorhythms in his ambient works. *"Music for Airports"*, for instance, uses isorhythms as the basis for many of the movements. More relevant to Project Orbit is his iPad app *"Bloom"*, which can be viewed as a minimalist isorhythmic sequencer. It is unsurprising that Eno has used isorhythms heavily in his ambient music, as they effectively "smooth" out the implied meter of the composition.

Isorhythms in Project Orbit will have single-note phrases repeating periodically in time. Size of the period will be determined by its position relative to the center of the screen.

1.4 Diegetic vs. Non-diegetic sound

In film, diegetic and non-diegetic sounds can be roughly described as musical elements that are part of the environment on-screen (ex: a jukebox playing rock and roll in a diner), and sounds that are not created on-screen (ex: the Imperial March theme played when Darth Vader is on screen). In the context of Project Orbit, diegetic/non-diegetic elements will refer to musical elements that the user can see and control

and those that they cannot see or control.

In a sequencer, what happens when the user doesn't have 1:1 control of the sounds being created? As more non-digetic elements are introduced, the application itself becomes more and more of a realized composition and less of a sequencer. The author has a strong interest in blurring the line between composition and traditional sequencing, and aims to incorporate that into Project Orbit. It can arguably be said that introducing a small amount non-diegetic elements into a sequencer can heighten the immersion of the musical experience.

The orchestration of *Bloom* can be split up into two main sounds: the bell tones (diegetic), and the drones (non-diegetic). The drones are a generative background texture, heavily influenced by the bell-like tones that the user makes. These drones are subordinate to the bells. They do not overwhelm or overpower, they are simply background accompaniment. Without the non-diegetic, the overall mix would sound very sparse.

Osmos is another counter-example to *Bloom*, where instead non-diegetic sounds overpower the diegetic sounds. Despite this lack of control, Osmos still proves to be a statisfying interactive sonic experience, as the diegetic sounds that can be created through movement and absorption blend well with the non-diegetic atmospheric soundtrack.

Project Orbit aims to have a balance of diegetic/non-diegetic elements similar to that of Bloom.

1.5 Decay and Opacity

Decay over time is an important design consideration for a generative sequencer like Project Orbit. In *Bloom*, user-generated bell sounds,

though repeating periodically, eventually fade out over time. This small detail adds great depth to it's musicality. Isorhythmic phrases that would otherwise be static and quickly boring instead have a more interesting evolution over time. When sounds decay, they create space for more note events, which can encourage the user to interact longer with the music.

In *Bloom*, decay is represented by opacity. As note elements decay in volume over time, the opacity becomes more and more translucent until it disappers entirely. It is indeed a very intuitive visual representation of decay.

1.6   Ambient design

Project Orbit intends to provide an ambient audio-visual experience. There are several specific design considerations for creating ambient. For work related to Project Orbit, these considerations will include:

Masked Meter
  A sense of tempo and pulse will be well defined, but the implied meter will be blurred.

Gentle pacing
  Timing and pace are a crucial part of creating a relaxing environment. There should be no jerky movements or sudden changes in overall speed.

Stillness
  The environment should invoke a sense of stillness in the user. Audio and visual cues should inspire one to slow down.

Flow
  A certain "flow" must be created and maintained. Just as a circle has no jagged edges, the ambient environment should not do anything that could jar the audience. There can be no wrong notes or sharp transitions.

Big Spaces
  Upon entering an ambient environment, one should immediately get the sensation that they are a tiny particle in a gigantic universe.

2   Project Orbit: a design proposal

Project Orbit (temporary name) will be a 2-dimensional, isorhythmic, ambient sequencer, utilizing the circle as the primary building block for design. When the program starts, a blank screen will be displayed. Clicking on the screen will draw a circle called a *moon* that orbits around the center screen. It's trajectory will be mapped by a circle, and it's origin will be defined by a small tick intersecting the circle. Every time the moon the tick, it will produce a note. The pitch and rotation time will be determined by X,Y position that the user clicks on (See Figure 4 for a breakdown of scales and positions.). After each rotation, the moons will decay, until they fade away.

2.1   Visual Considerations

Visualizing the passage of time is important. For this reason, each moon will have a ghost trail which will depict movement. It should be visually obvious when a moon has produced a note. The current proposed idea is to have the moon flash to white, and to emit a ripple or shockwave. Figure 1 illustrates some of these visual considerations.
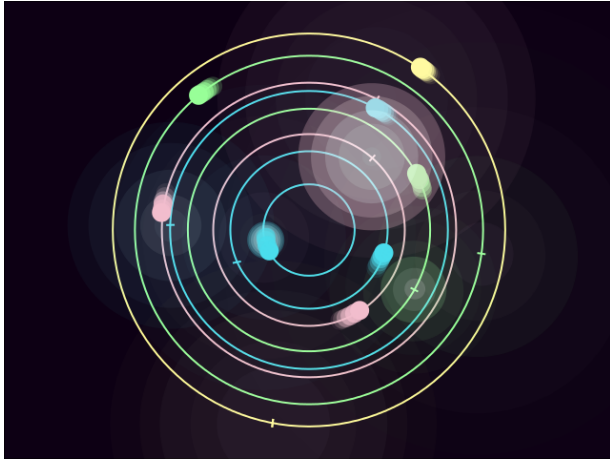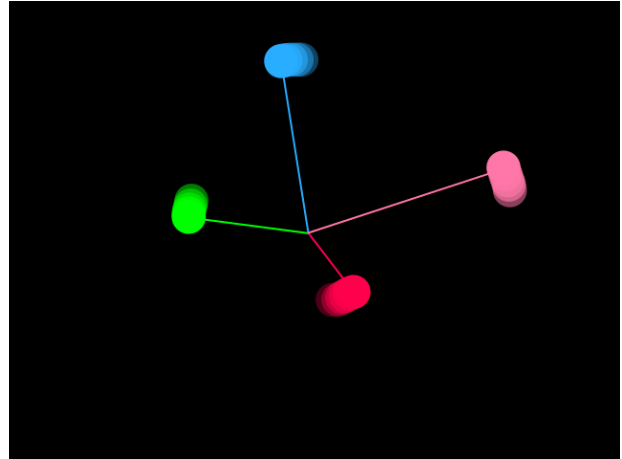
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Figure 1: Main design

Figure 3: Alternative design: A more minimal, "circles and lines" approach using the Pico8 color palette.
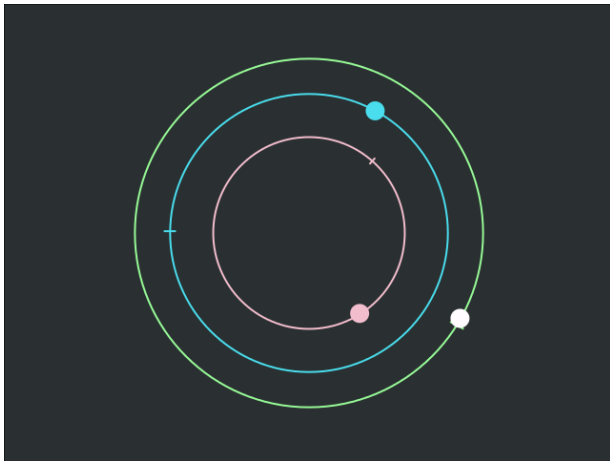

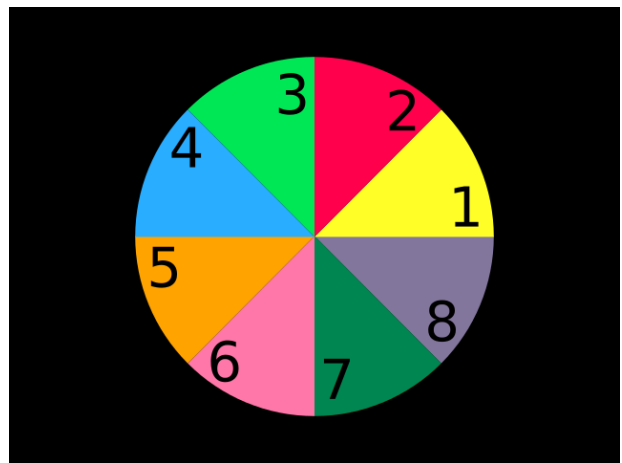Figure 2: An earlier rendition of the main design.

Figure 4: Note values and voices are determined by where you click relative to the position in the unit circle. Timing is determined by the relative from the center (the radius of the circle).

Visuals will be created using OpenGL primitives with use of color blending for opacity. Up for consideration will be the use of texture mapping to provide eye candy things like "glow". Shaders will be avoided for this particular project, as it exceeds the authors limited knowlege of OpenGL. Some measures will taken for optimization in order to make room for the sound engine.

The color palette for Project Orbit is currently in flux. Figure 1 utilizes a pastel pallette, while Figure 4 and Figure 3 use the color pallette used in the Pico8 fantasy console system.

2.2   Sound Considerations

Stylistically, the music produced by Project Orbit will be generative ambient music. Flavors of the pentatonic scale will be used, as these scales lend themselves well to generative and interactive music. To fill in the empty spaces, non-diegetic sounds will be used.

Initially, sound design for the instruments will consist of bell-like timbres and warm pads. Heavy amounts of reverb will be used to create a large space. All sounds will be synthesized and not sampled. Techniques such as jitter, humanization, and layering will be utilzed to add nuance to all the instruments and DSP.

For a sound engine, the author will utilize his own sound engines Soundpipe and Sporth to synthesize all the sound heard in Project Orbit. Sporth will provide a very expressive syntax for composition. Soundpipe, whose abstraction is at a lower level than Sporth, will provide more efficient and fine tuned control of the sound synthesis.