

Bubble Drum-agog-ing: Polyrhythm Games & Other Inter Activities

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ABSTRACT

This paper describes the bubble drum set, along with several polyrhythm games and interactive music activities that have been developed to show its potential for use as an input controller. The bubble drum set combines various sizes of colorful exercise balls, held in place or suspended with conventional drum hardware and thus creating a trap kit configuration in which the spherical surfaces can be struck and stroked from varying angles using sticks, brushes, or even by hands alone. The acoustic properties of these fitness balls are surprisingly rich, capable of producing subtle differences in timbre while being responsive over a wide dynamic range. The entire set has been purposefully designed to provide a player with the means to achieve a rigorous and healthy physical workout, in addition to the achieving beneficial cognitive and sensory stimulation that comes from playing music with a sensitive and expressive instrument.

Keywords

Bubble Drums, WaveMachine Lab's Drumagog, Polyrhythms.

1. BUBBLE DRUMS



Figure 1. The Bubble Drum Set

The bubble drum set was conceived to explore and experiment with an alternative "drum kit" that has been specifically designed to give a vigorous physical workout and, when used along with rhythm games that engage the player with challenging cognitive stimulation, also provide an instrument/interface to facilitate drumming with deeper musical expression that emphasizes the use of dynamics and accents, creating polyrhythmic patterns and developing steady timekeeping.

One of the obvious problems with real drum kits is that they are loud. While this is fine for concert venues and club settings, they are otherwise quite impractical for practicing in most spaces without disturbing others (not to mention the necessity for drummers to wear ear plugs to protect hearing.)

Alternatively, various electronic pads are increasingly being used in place of actual drums and cymbals, whereby in addition to providing a diverse range of sounds to be triggered, they can also allow the drum kit to become an input device so that individual strokes can be recorded and used as input to control games (e.g. Activision's Guitar Hero and Harmonix's Rock Band). However, there are several factors that limit the degree to which playing these electronic drum kits can provide rigorous exercise and cognitive stimulation. For example, typically there is limited or very reduced sensitivity to dynamic levels or accents, resulting in a performance sorely lacking in musical expression. The pads themselves cannot typically absorb the shock of stick hits like the heads of real drums, so there is a greatly reduced lack of "feel", not to mention the possibility of wrist strain or more serious injury. Another drawback of playing the typical rhythm games that utilize these pads is that a player cannot be particularly creative since the choice of notes (as well as the available selection of songs) are completely dictated by the video game companies.

The concept of using fitness balls as drums, combined with rhythmic aerobic movements, has become somewhat popular through a franchise known as Drums Alive®. Extending this approach, these fairly inexpensive and rugged exercise balls can actually become functional electronic drum pads. A surprisingly expressive musical instrument can be fashioned that can be played in such a way that it provides a good workout. Using captured accelerometer, microphone, and camera input data, it is possible to build interesting rhythm games that can accurately measure the player's timing, dynamics, endurance, pattern matching and creative rhythm making abilities. Both aural and visual feedback can be generated to enhance the player's feeling of musical and artistic expression while at the same time providing a good physical workout and cognitive stimulation.

2. WAVEMACHINE LAB'S DRUMAGOG



Figure 2. Input/Output signal from Drumagog Plug-in

“Drumagog” is a plug-in for DAWs developed in 1999 by Wavemachine Labs to replace recorded drum tracks with other sampled sounds. However, the much faster and multi-core CPU’s available in the current generation of computers now allows the Drumagog plug-in to be used as a real-time effects processor, generating sampled or synthesized sounds as well as sending MIDI signals to other modules. The plug-in’s controls permit very fine tuning of the input signal from a mic placed closely to the bubble drum, with the end result being a highly sensitive and responsive controller that can produce a wide range of dynamics and timbre both acoustically and electronically.

3. POLYRHYTHM GAMES

Several prototype games were written that test the use of the bubble drum set as a controller. These games challenge the player to perform polyrhythmic patterns using combinations of subdivisions of measures and/or beats. The basis for these games is a Flash-based application called the “polynome”.

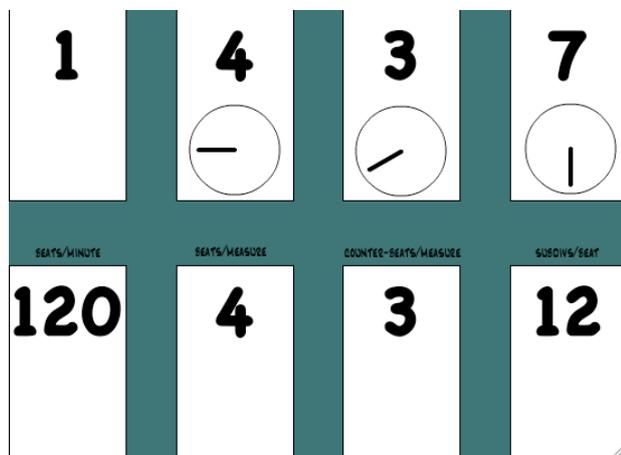


Figure 3. Polynome

Several variations of the basic polynome were developed to match particular songs, thus giving the player a means to produce interesting polyrhythmic remixes of tunes using the bubble drums to generate selected percussive sounds.

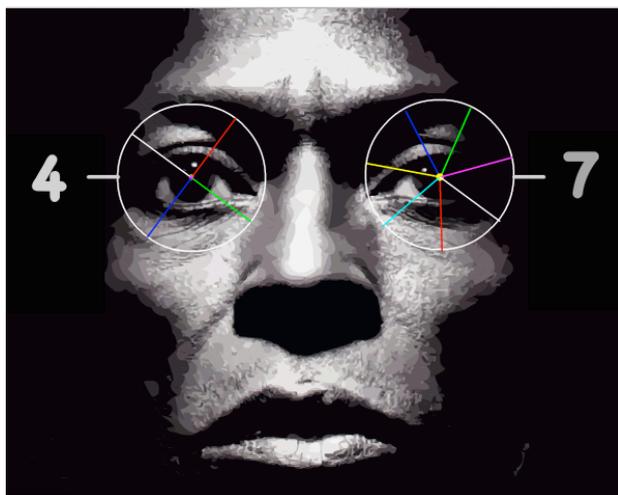


Figure 4. Tutu

For example, for the version developed for the tune “Tutu” by Miles Davis, the player combines playing with both 4 and 7 beats per measure using the sounds of a shekere and djembe to accompany the original recording.

In another variation, Miles Davis’ recording of Cindy Lauper’s “Time After Time” adds bayan and tabla drums that must be played using 10 subdivisions within the usual 4 beats per measure.



Figure 5. Time After Time

The last example to mention here is an interactive music visualization written to accompany the Wayne Shorter composition entitled “Footprints”. The player must keep a steady gankoqui bell pattern going while also playing a continuous 2 beat feel within each measure of 3 beats. The footprints seen in the score below show the beats that are marked off within each measure as the piece is performed.

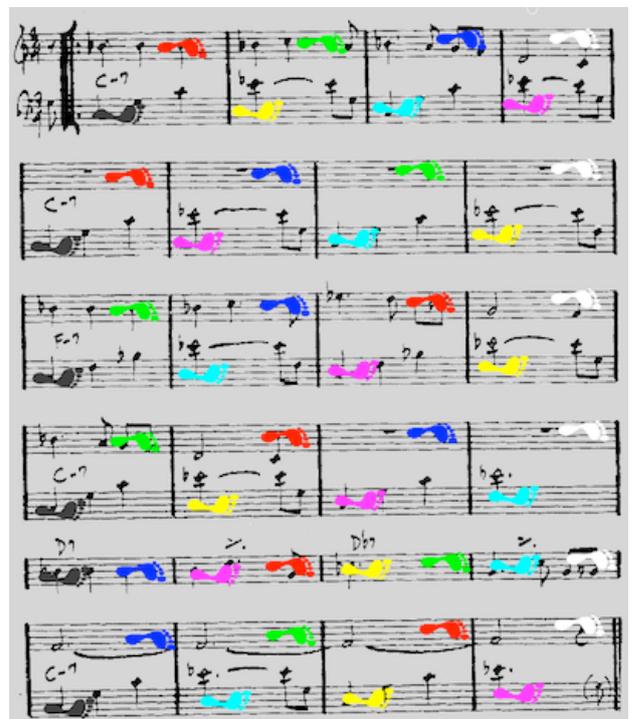


Figure 6. Footprints

4. REFERENCES

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