hipDisk: a most undignified musical instrument

figure 1. *hipDisk*, demonstrated by the author

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Abstract

hipDisk is an interactive sonic system triggered by core-body gesture that highlights and responds to the dynamic relationship between the wearer's hip and torso.

Keywords

Interaction Design, wearable interface, body-instrument, gesture-control.

Introduction

The *hipDisk* (see Figure 1) is a self-contained wearable system that augments the body with instrumental capabilities. By placing the hip and torso in extreme opposition the wearer of *hipDisk* can trigger simple tones within a one-octave chromatic scale, so play tunes or melodies.

Key features include two disks, attached to the wearer's body – one above the waist, one below; twelve custom made soft contact switches that represent twelve notes on a chromatic scale, spread evenly around the perimeter of the inner face of each of the disks; and microcontroller generated audio tones, output through a speaker discretely positioned in the upper garment of the wearer.

hipDisk is intended as a performance instrument. To date the interface has only been used for solo performances and demonstrations. Ensemble use will facilitate more complex audio output such as the creation of chords, harmonies, counterpoint, etc.

Motivation

The *hipDisk* interface was designed to inspire people to swing their hips and explore and extend the full range of movement available to them through a simultaneous, interdependent exploration of sound. The idea came out of a desire to move beyond limb- and digit-based control and explore core body movement for actuation.

While different parts of our bodies have varying degrees of freedom, the relationship between the hip and torso is particularly dynamic. By extending these core body parts on horizontal planes the *hipDisk* draws attention to their position and relative tilt. Though the body typically doesn't make sound when it moves, sound as an independent sensory modality provides an ideal complement to the highly visible movement-based input of the *hipDisk*, thus further focusing the attention of both viewer and wearer on the position and relative tilt of hip and torso.

The *hipDisk* creates a link between body motion and sound production, which cannot be ignored when composing or performing. The interface also raises questions about the role of physical affordance, extension and abstraction in the development of wearable elements and systems, and suggests that a focus on these issues can lead to novel yet meaningful applications of technology.

Outcomes and discussion

hipDisk has, at the time of writing, been shown in a number of different contexts. In each instance, almost without exception, performances were found to be highly compelling. Though it is difficult to qualify why without conducting rigorous audience surveys, the following attributes have been identified as relevant: the *hipDisk* focuses the attention of both wearer and viewer on the wearer's physicality; the interface itself is visually arresting, as is the gestural extension required for use; an incredible amount of effort is necessary to play the *hipDisk* – the wearer must perform at the outer limits of their physical capabilities for the

simple result of a single audible tone; the rhythm of the output is closely linked to core strength and flexibility – the tempo of the resulting melody is physically constrained by the wearer's ability to move from one position to another; finally, in 'reaching' for a particular tone, the wearer's body is repeatedly thrown into bizarre positions to achieve the physical extension that will result in contact. This combination of strange body positions and extreme imbalances in input and output energy seems to be particularly humorous and compelling.

The *hipDisk* demands, conditions and requires total freedom of physicality on the part of the wearer. In such a system self-restraint is counter-productive, but in the case of *hipDisk* this does not seem to be an issue. In the experience of the author, wearing and using the *hipDisk* is a completely immersive experience. The interface does not lend itself to being used in a restrained manner as the desire to trigger a particular tone seems to override any sense of the effort, extension or physical distortion required to do so. The intense combination of mental focus and physical effort required to play the interface effectively removes any thoughts of appearance. The wearer thus remains unconscious of the bizarre positions they create, and censorship of movement or ideas about self-restraint become irrelevant.

Anne Bogart cites Agnes de Mille as saying that extension of effort, prolongation of stress beyond the norm, can be arresting or remarkable, and can help fix a gesture in memory [2]. *hipDisk* can be considered a case in point. Brecht [1] developed theories about making the strange familiar and the familiar strange saying that "What is 'natural' must have the force of what is startling." According to Short [3] "what is unexpected, commands our attention".

The hipDisk is certainly unexpected, strange, perhaps startling. The choice of costume and persona are reminiscent of a character from a circus. The apparent incongruity of this choice supports the strangely humorous and compelling nature of the interface as a whole. The ungainly manner of physical input necessary to achieve what could only be considered quite primitive audio output seems humorous and compelling. The fact that, when wearing the interface, the wearer is compelled to smile broadly, continuously, throughout their performance – as if experiencing unrestrained enjoyment – captures people's attention and prompts them to smile in return. Finally, the rings, and the associated movement, are reminiscent of a hula hoop – a device common to many from their childhood or from going to the circus. While this does not necessarily compel people to want to use the *hipDisk*, it certainly seems to trigger deep-seated memories of times past and physical immersion that are pleasurable to revisit even if only vicariously.

Future directions
Future directions include creating an extensible version of the *hipDisk* to fit different sized wearers. Performances will then be developed for a *hipDisk*-ed ensemble. Questions to be addressed include: How would a *hipDisk*-ed ensemble play standard tunes? What would compositions for *hipDisk* sound like? What would they look like? If body motion is largely harmonic would music for *hipDisk* also be harmonic? Questions relating to the role of core-body gesture in interface design will also be investigated.

Acknowledgements

References
[1]   Brecht, B. interview with Otto, L. in Brecht on Theatre: the Development of an Aesthetic. Edited and translated by Willett, J., Hill and Wang, New York, 1964, p. 70-71. [online] http://showme.physics.drexel.edu/thury/A-Effect.html. Last checked August 17, 2007

[2]   De Mille, A. cited in the essay Violence. In A Director Prepares, Seven Essays on Art and Theatre. Bogart, A., Routledge, London, 2001 pp.52-54

[3]   Short, M. (1996) Exploring the Language of Poems, Plays and Prose Addison-Wesley Publishing Company, Boston MA, U.S.A.

[4]   Reskin [onine] http://www.anat.org.au/reskin/. Last checked August 17, 2007.

Additional Online Material

1. Additional photos and quicktime movies of the *hipDisk*:
    http://www.daniellewilde.com/docs/hipDisk.html

2. Personal website: http://www.daniellewilde.com

3. Research blog: http://daniellewilde.wordpress.com

4. Reskin wearable technologies blog site: http://www.anat.org.au/reskin/index.php

5. Reskin Lab flickr site: http://www.flickr.com/photos/reskin/