Collidoscope: Let's Ride the Waves of Sound

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Submitted to ACM CHI 2016 - Art.CHI II: Digital Art in a Post-Digital World.

Abstract
Collidoscope is an interactive, collaborative sound installation and musical instrument that allows participants to seamlessly record, manipulate, explore and perform real-world sounds. Collidoscope is designed for both amateurs and professional musicians.

Author Keywords
Interactive sound installation; Musical instrument; Collaborative interactive music system, Public interactivity, Real-time sound synthesis; Performance

Figure 1: Participants using Collidoscope.

Introduction
Collidoscope (Figure 1) is an interactive, collaborative sound installation and musical instrument that allows participants to record real-world sounds, which they

then can creatively explore, manipulate, and perform in real-time. Unlike traditional instruments, Collidoscope enables participants to *play with* real-world sounds in a direct and immediate way which allows for both musical and explorative interaction. Participants record and playback sounds (or 'samples') via the keyboard, and then use large sliders to explore the recorded sounds, which are visualized as waveforms on the Collidoscope screens (Figure 2). In this way, participants can *move through* the recorded sample, play it back at different speeds, 'freeze' it at a particular position, loop parts of the sound, or layer a number of sound snippets on top of each other. Layering sound snippets often results in novel sound textures and timbres, which then can be played via the keyboard. These audio manipulations are based on *granular synthesis* - a method for independent control of pitch, speed and format characteristics.

Granular synthesis was pioneered by avant-garde composers such as Iannis Xenakis and Barry Truax, who implemented the first real-time versions in 1988 [6], and it is now commonly integrated into software packages and used for audio processing and editing, e.g. for pitch and time adjustment or used as a creative effect. Collidoscope's innovation is that it provides novel, immediate and performative access to this powerful synthesis technique in order to foster creative exploration and impromptu collaboration both for amateur and professional musicians alike.

Figure 2: Collidoscope's novel interface allows for innovative granular synthesis techniques.

Design and Interface

The driving vision behind our design was to develop an interface that embodies the underlying sound manipulation process in an intuitive and non-technical way; participants should be able to see, understand and experience 'what is going on' at any point during their interaction. The design was strongly informed by our earlier work on the design and systematic evaluation of interactive collaborative music systems for public settings [2], and its implications for public multi-user installations [1], and our work on cross-modal audio-visual interfaces [5].

Therefore, the interface design is based on a strong coupling between visual and haptic cues and affordances that closely map onto the underlying digital process. For example, metaphorically speaking, while recording, the sound gets 'sucked into' the Collidoscope by visually building up in the waveform display in real-time. The long horizontal slider then acts as a physical play head that allows participants to explore the recording on a seemingly 1:1 scale.

Importantly, conveying 'what's going on' is not only focused on the active players, but equally on spectators observing the interaction e.g. bystander in a museum. In an exhibition setting, this encourages bystanders to transition to spectators and then active participants, by allowing them to learn and understand how the system works simply by watching what is going on. In a performance situation, this tackles the 'black box problem' of electronic music performances related to the opacity of performer activity; for example, in live laptop music it is often difficult for the audience to understand how the music is created [3].

Exhibitions and Social Media Response

We first exhibited Collidoscope at the Sonar Festival, (Barcelona, Spain, 2015) and at the Digital Design Weekend at the Victoria and Albert Museum (London, UK, 2015) and several exhibitions are planned for 2016.

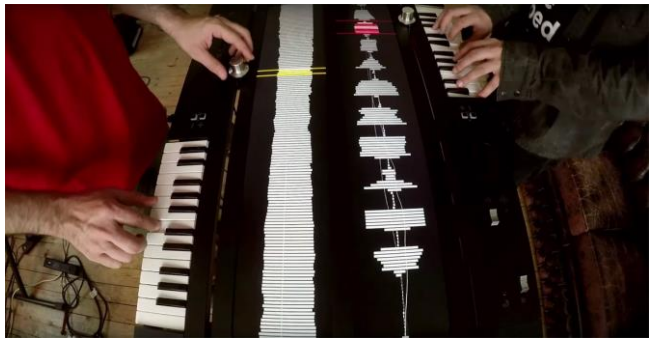

Figure 3: Two players "jamming" with Collidoscope.

"When? Where? How Much?"

In November 2015, a music technology blog published a video of Collidoscope via its Facebook channel. The video instantly went "viral" [4], reaching 4 million views in the first 24 hours, and to date has reached an online audience of over 11 million. The success on social media was echoed by dedicated articles on several blogs and online magazines specialized in electronic music and synthesizers.

Remarkably, despite being initially designed for the general public, musicians and producers expressed very positive views about Collidoscope as a potential tool for their musical practice both in live and studio settings. The online comments indicated that many perceived Collidoscope as a product ready for sale, rather than an interactive exhibit or art installation.

So while we "ride the wave" of Collidoscope's success, we are interested in engaging with Artists and Arts collaborators to explore how we might take Collidoscope to "the next level" and we believe that the Art.CHI II workshop would be a perfect forum for having this dialogue.

Bio:

Ben Bengler: As designer and artist, Bengler has developed numerous interactive sound and music works which have been widely exhibited internationally, amongst others, at the Victoria and Albert Museum (V&A) (London, UK), OCT Loft (Shenzhen, China), Sónar Festival (Barcelona, Spain), and Yang Gallery (Beijing, China). Bengler has worked on several art, technology and performance projects with diverse audiences including children and cross-cultural groups.

Currently, he is a postdoctoral research associate in interaction design and physical computing at University College London, working at Intel ICRI-Cities and UCL Interaction Centre (UCLIC). He is also an Innovation Fellow at the Centre for Digital Music at Queen Mary University of London, where he received his PhD in Human-Computer Interaction focusing on design and evaluation of interactive collaborative music systems for public settings.

Fiore Martin: Martin a software developer and researcher who specializes in the design and development of interfaces that use the different senses available to the human body. The objective of such interfaces reaches from empowering the expressive capabilities of the user, to reducing barriers and improving collaboration among people with differing sensory abilities. He draws on extensive experience in programming real-time audio, visuals and haptics. Currently, he is a postgraduate research associate at the Centre for Digital Music at Queen Mary University of London.

Acknowledgements

Collidoscope is kindly supported by the Centre for Digital Music, (EP/K009559/1).

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