S T R A T I C: Performing the Sampling Rate

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ABSTRACT

Through our audio-visual project, S T R A T I C, we explore a particular technique the sampling rate, which refers to the visual appearance of line patterns. The connection of the audio and the visual is at the core and the project explores it through the *visual-music* technique. The S T R A T I C is using hardware, which captures frequencies of the produced sounds and directly generates light. Then the light and a camera compose the responsive colorful line patterns, which appear through the sampling rate phenomenon. The artist duo is playing synthesizers and by visually responding to the produced light patterns they perform live audio-visual performances. So the music is played in responding to the real-time visual appearances.

The audio-visual performance is played in a real-time and creates evocative, noisy and sometimes relaxing atmosphere. We propose to experience such audio-visual performance at the ACE 2015 Creative Showcase.

AUTHOR KEYWORDS

Interactive art, interaction design, audio-visual performance, media art

ACM CLASSIFICATION KEYWORDS

H.5.m. Information interfaces and presentation: Miscellaneous.

GENERAL TERMS

Design; Art; Performance;

INTRODUCTION

Recently, audio-visual performances are getting more attention and interest in academia, in particular, in the fields of interaction design and HCI focusing more on artistic expressions. Artists do play interactive works and designers demo their prototypes in conferences such ACE, NIME, CHI - Interactivity, etc. Interactive art sections of such conferences embrace a broad spectrum of creative solutions and other sensory forms of digital interaction.

Conferences interested in digital interactive technology have started to embrace interactive arts, recognizing that
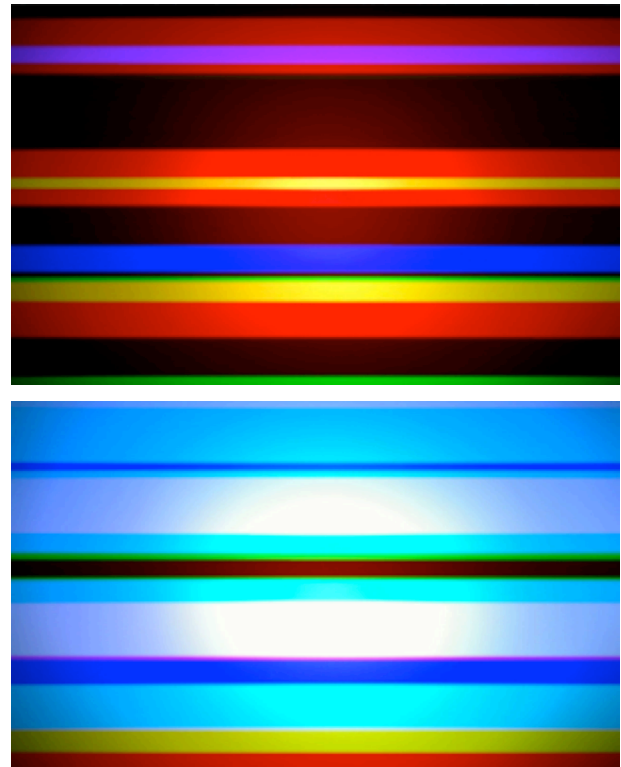
Figure 1. The S T R A T I C stills, 2015.

some aspects of arts, technology and interaction design are overlapping. In the past, we have also seen how art concepts, such as ambiguity [5], defamiliarisation [1], machine aesthetics [12] or characterizations of aesthetic experience [10], can come to have an influence on the design of interactive systems in general. In a slightly different strand, HCI-researchers have sometimes been involved in creating interactive art projects as a means to explore crucial, sometimes controversial research topics (e.g. [6, 7, 9]). Live performers and researchers have showed their interest in the relation of art and digital interactive technology [3, 4, 13].

In this work, we have begun to explore the aesthetic and artistic potential of playing with the phenomenon that occurs when filming a pulsating light – the sampling rate lines appear on the screen (Figure 1). This effect appears directly from the hardware and is created in real-time. We find this to be an interesting space that we should embrace, not only
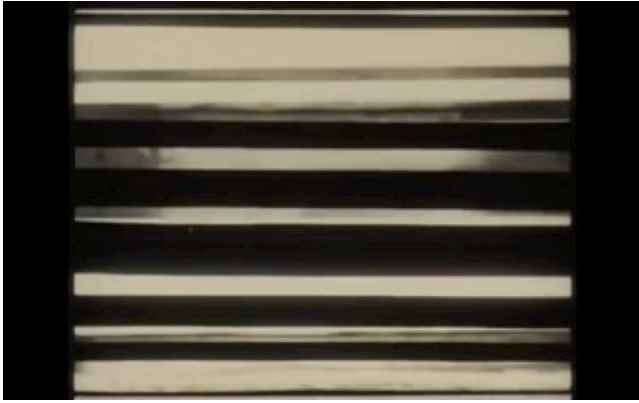
Figure 2. Still from Walter Ruttmann: Opus IV (1925).

confirm it as an existing technical whiz, but also engage with it artistically. We like to highlight that our contribution is not to surface this phenomenon as such, as it is already known, but rather to engage with it from a performative and artistic perspectives. Therefore, our aim is to explore the potential – what could be done – of using this phenomenon and finding its artistic qualities and the space for expression.

BACKGROUND

The futurist art movement [11] has strongly shaped the understanding of noise music promoting aesthetics that draw directly on machines and their processes. As the Italian futurist and composer Luigi Russolo (1883-1947) wrote in his manifesto L'Arte dei Rumori (The Art of Noises) from 1913:

"With the invention of machines, noise was born" [11].

In his manifesto, Russolo invites musicians and artists to embrace the aesthetics of noises created by machines and use them for artistic expressions by tuning the polyphony of noises into *"an intoxicating orchestra of noises"*. His definition of noise is broad and ever growing as new machines continuously give rise to new forms of noise. However, the manifesto did not explicitly urge to use the noise for visual aesthetic expression.

The genre of *visual-music* originated in early 1920's with silent films where sound was directly translated into a related visual presentation. Visuals constituting of lines have a long history with its roots in the art tradition know as avant-garde cinema. In particular, avant-garde experiments within abstract film such as acclaimed Walter Ruttmann: Opus IV (1925) where he pioneered playing synchronized abstract visual lines with sounds, see Figure 2.

Nowadays, the visual-music genre covers a wide range of expressions expanding in music visualizations within areas such as film, art, and computer graphics. For instance, in contemporary art, Monolake (Robert Henke) has done a performance pieces called Lumière with synchronized audio and visual laser. Artist duo Le RÉVÉLATEUR per-

forms rich audio and visual patterns through manipulating various analogue signals. By combining technology and artistic pursuits in audio-visual settings the artist Ryoji Ikeda works on high forms of perception and with a real-time visualization of data. A common reflected feature of scientific approaches in art settings is often expressed through minimal aesthetics, as in notorious Carsten Nicolai's works. These above examples are just a few to mention in regard to contemporary art and audio-visual performances, which deal with synchronized audio and video, but also in a delicate manner through the abstraction.

S T R A T I C PROJECT

The project[1] is part of an on-going exploration of audio-visual mappings in the context of artistic practice. The project can be read as a follow up on the Metaphone[2] project presented in art and academia settings, in which the artists worked together on the complexity of mapping sensor signals with machine-controlled abstract aquarelle painting as one core topic of exploration.

The S T R A T I C project explores the interplay of the sensed and the actuated in interactive media expressions, and the aesthetic properties of analogue/digital transformations formed by limitations and qualities of various forms of sensing apparatus. This time the result takes the form of a hypnotic soundscape linked with an abstract animation visually controlled by the raw functionality of electronic components.

Creation process

The project started as an exploration of audio-visual techniques within the arts and gradually evolved into a research project focusing on practice-based research. The researchers started applying autobiographical methodology to their performances and working on interactive paradigm as a platform for expressing their personal experiences. As discussed by Dewey [2], all the different elements that make up art should come together as a whole. For interactive arts, that involves not only the various materials, but also the dynamics of how the interaction unfolds over time, in other words, the aesthetics of interaction [8].

Technical Description

To explore our topic and expand on the aesthetic and performative qualities of our material, we have so far used a simple setup. The setup consists of 4 basic elements. First, an audio source, as our starting point we have used many synthesizers. Secondly, we have chosen to add tour existing equipment and move along with a DIY kit – Nova Drone[3] by Casper Electronics. In these early explorations we have experimented with the RGB-led. Thirdly, we used an USB camera attached closely to the led. We have tried many

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[1] http://stratic.net

[2] metaphone.net

[3] casperelectronics.com

Figure 3. Different cameras provide different effects.

different cameras and not all cameras were suitable, as the optics need to allow for a close attachment. Two aspects are important in this regard, one is that the led needs to cover the whole visible camera area; the other is that the camera needs to maintain a certain focus. However, other visual effects may be created when using different cameras, see Figure 3. Lastly, we have used Max/MSP[4] to provide us (as performers) with a visual monitor, while also sending a full screen signal to a projector for the audience.

When the sound frequencies make the RGB-led pulsate, it interacts with the sampling rate of the camera, causing lines to appear on the screen depending on the frequency. With lower frequencies there are thicker lines and with higher sounds – thinner lines (see Figure 4). Frequencies close to multiples of the sampling rate of the camera tend to make the lines to stand still in the images or move slowly. In between these frequencies the lines move up or down with different speeds correlating to the frequencies. Low frequency oscillation and the waveform also affect the thickness and the distribution of the lines. The frequencies of the different colors can mix and create blends of colors.
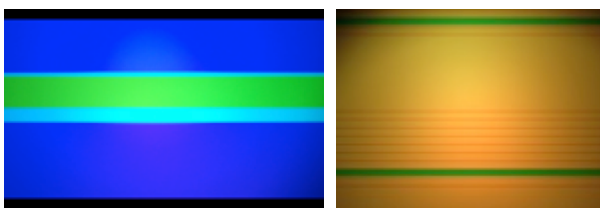

Figure 4. Relation of sound and weight of lines, low sound frequency generates thicker lines (left image) and vice versa (right image).

This project is a constantly changing project and is developing over time. All various contexts affect the project and bring new aspects to performativity.
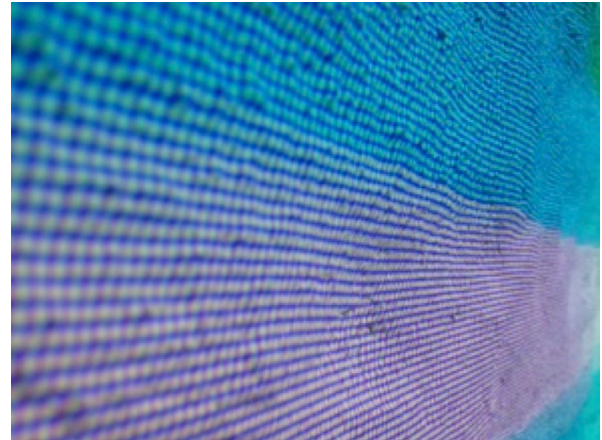
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[4] http://cycling74.com/products/max/

Figure 5. "Live digital painting" on rough surface.

Performances

In this section, we want to discuss the context of the performances: varying in the settings and space, which made an impact to performers and to the experience of the shows. The S T R A T I C was exhibited in art project space DKTUS and Reactor Hall (R1) in Stockholm, Sweden.

The first performance was performed in the intimate space of DKTUS allowed for a close inspection of the fascinating phenomenon of this particular exploration, which included: electronic circuitry responding through a light emitting diode, interactively controlled audio through analogue synthesizers, and the brute audio-visual performance projected in physical space.

The specificity of this show was the subtleness of the cozy atmosphere and a small space, the quality of sound and a textured wall shaping the projected visual presentation. The wall distorted the surface of a clean and sleek projection and created an illusion of a live painting as the rough surface of the wall transformed the projection into a wavy movement of colorful lines (see Figure 5). In this show the audience and the artists were sitting on the floor (carpet) around the improvised "stage".

Figure 6. Performance at Reactor Hall / R1, 2015.

The second performance was conducted in the huge space of R1 with a strong echo effect in the room and the video projection was of 10 meters length, Figure 6. In this setting the space strongly influenced the show and the performance was heavily affected by the echoing room space. The performance ended up in a more rough and noisy manner.

DISCUSSION

While we started this paper by explaining the project and by showing how it works, now we want to emphasize two important aspects of the audio-visual performativity and of the project itself. First, the importance of the live visual-music performances to interact in real-time with video, in our case, by watching visuals we played sounds through feedback loop. And secondly, the concept of abstraction returned us to the core of the audio-visual performance, where we focused more on the concept of connection (or separation) of the audio and the visual. At the same time, we refer to the experience of the audience, where we want to create a close sense between audio and video and their relation of synaesthetic experience, a sense of the idea of visual-music.

A particular focus with this project is shed on the concept of *abstraction* and *layers of abstraction*. The researchers explore the separation of the audio signal in visual appearances; they map and deconstruct its properties to speed, thickness and color qualities. The notion of abstraction relates to the rejection of representation of realistic references in the world. This sends the focus from the content of the message to the sensual experiences and explores the logics of the formal and minimalistic constructs of the audio and the visual. This consolidate minimal appearance relates to synaesthetic experience. The concept of layers of abstraction talks about the sound being directly mapped to the RGB colors and layered in the strength of the colors perceived by the eyes of the viewers. This effect of seeing colors in different strength creates 3D landscape and involves the viewers into an immersive experience.

Experiencing difficulties in finding the precisely balanced frequencies, sharp and clear cuts, and sometimes struggling with searching for a right wave, we think of developing the project further on. After experimenting with the similar equipment we are thinking of moving away from the analogue Nova Drone to use digital sound generators that we could control more accurately e.g. SuperCollider. We see the potential to play even more with the phenomenon of sampling rate as a material as we could expand on working in a more controlled way with the composition, both in the moment and in a period of time e.g. by sequencing it, playing with phase, freezing the moment, shaping the wave. All this relates to both audio and visuals, so the experience we plan to expand on is even deeper extreme in all senses. The additional work is waiting us in relation to the use of sensors to control various data inputs. Conceptually we keen to

explore and experiment with concepts related to visual grounds, minimal expressions and extreme perception.

FUTURE WORK

The next step in the project is to use more accurate sound technology and apply a digital layer, such as SuperCollider, to increase the artistic capabilities of the phenomenon. In particular we aim to work on the composition over time by sequencing the sound and cross-modulate the RGB-led to blend colors. Also we want to expand on the notion of "live digital painting" and screen our work on various surfaces. By sustaining the autobiographical approach and live performativity we also think of sharing the experience of the performer with the audience, providing them with our shared tools to perform the sampling rate through interactive art and installation format.

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