PHOTONE – INSTALLATION PROPOSAL

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ABSTRACT

We present Photone, an installation comprising an interactive combination of photographic images and music. An image is displayed and a dynamic musical score is generated based on the overall color properties of the image and the color value of the pixel under the cursor. Hence, the music changes as the user moves the cursor, creating a modal synergy where visual and auditory output combine holistically with the chosen interaction technique.

1. INTRODUCTION

The starting point for Photone was the use of musical sonification to augment information visualization. In such application music serve as a complementary modality to enhance performance on primarily visual tasks, and the hierarchy between these modalities is clear. However, when applying a similar approach to photographic images for hedonic experience, the hierarchical relationship is not as clear. Photone was designed to explore this relationship, i.e. the **modal synergy** between photographic images and music, further.

1.1. The composition

The composition is made to be soft and relaxing, yet with interesting harmonic and melodic changes. The musical sonification is determined by the overall predominant hue in an image, and the musical expression differs in terms of harmonics and melodic components between these hues. The intention is to create different impressions of, for example, a whiter image compared to a greener one. The music within each hue is then determined by the pixel value for each color channel (red, green, blue) beneath the mouse cursor and the complexity of the harmonic ambience, the use of melodic components, and the timbre as well as the sound level are determined by the pixel value (see Figure 1). This means that the music changes in accordance to the user's interaction, from slow and soft changes to faster and more pronounced changes.

A short video demonstration of Photone can be found here: https://vimeo.com/246964768

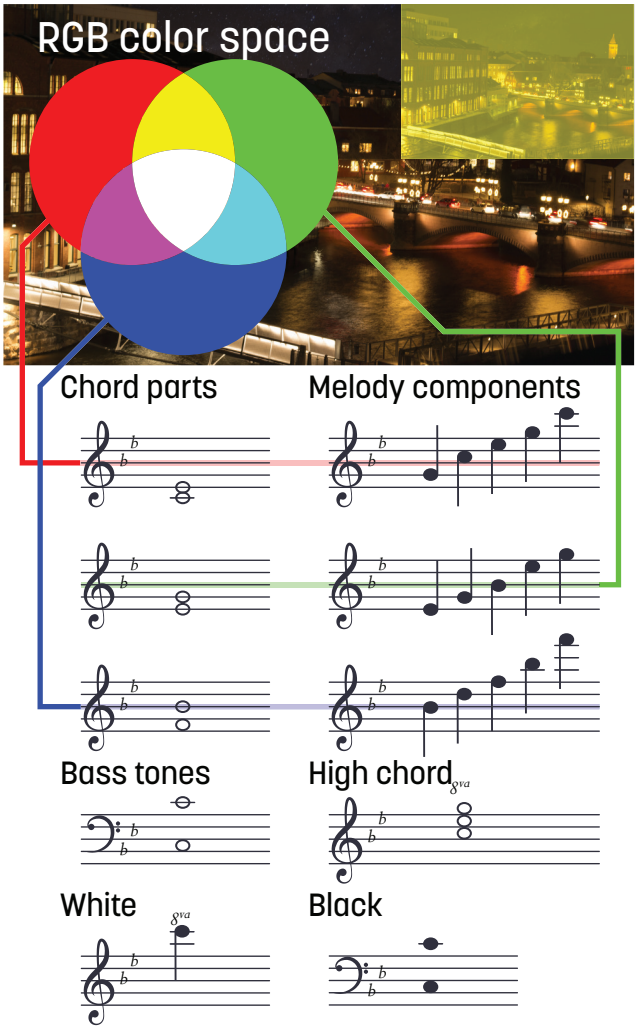

Figure 1: Each image is classified to a certain shade of color and the sonification is adjusted accordingly. The RGB color channels have different chords building up the ambient sound as well as different melodic components. The rest of the musical elements (the bass tones, the high chord, the bell-sound for white, and the synth sweep for black) are consistent within a certain main color shade, and are dependent on the intensity levels for each pixel.

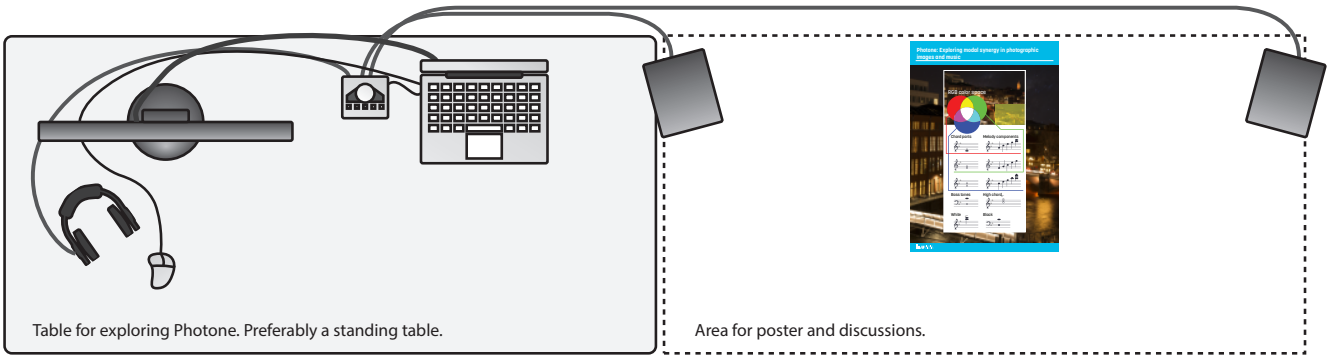

Figure 2: Example setup for the Photone installation, with an area for exploring Photone and a neighbouring area for poster and discussions.

2. CONTRIBUTION OF PHOTONE

The combination of images and music are far from new. The history is full of excellent examples of composed music for images and motion pictures. There are also different approaches to visualizing music and for turning an image into music. However, we believe Photone is more than just audification of pixel values or the playback of precomposed music to an image. The combination of carefully composed musical elements and the user interaction, where different hues and image components are used, creates something more and we characterize the resulting experience as one of **modal synergy**.

Photone differs also in regards to meaning and connotation. Traditionally, music is composed to images based on their denotative and connotative meaning. Our artistic intention in Photone is rather the opposite: By building the sonification upon pixel values of hue and brightness, that is, syntactic rather than semantic properties of an image, we aim to cut through conventional ways of seeing to a more foundational level. Other syntactic image features that would be interesting to use in further iterations of Photone include edges, shapes and spatial frequency measures.

3. ON A TECHNICAL NOTE

The implementation of the interactive sonification is done in SuperCollider 3.9.1, a programming environment for real-time audio synthesis. Even though SuperCollider simultaneously runs over 70 synthesizers, each consisting of many oscillators, playing multiple tones, Photone runs smoothly on a modern laptop. Due to a bug in SuperCollider 3.8.0 the green color channel was not read properly, therefore, the first version of Photone used individual text files for the color values for each pixel. Reading these text files took some time, causing a delay when changing images in Photone. This, however, was solved in the new version of SuperCollider, resulting in a faster and even better user experience.

4. THE RECEPTION OF PHOTONE

Photone was exhibited and well received at the science center (Norrköping Visualiseringscenter C) in connection to Linköping University. At the science center some visitors stayed and interacted with Photone and exploring the music as well as the use of images for a long time. However, not all visitors seemed equally interested in Photone. A tentative conclusion is that Photone attracts only some of the visitors in a public exhibition space, but the visitors engaging more deeply in the interaction are drawn into a more or less captivating state of exploration.

> "*First of all,* [I] *would like to say that the exhibition* [i.e. Photone] *was an interesting experience! Seems to be an exciting research area. On Saturday's visit, I expressed to my company that I would have liked to be able to sit for hours and explore this*".

A further developed version of Photone will be included in a exhibition about visualization at the science center in the autumn of 018. In this version all interactions will be logged for more detailed analysis.

5. PHOTONE, THE INSTALLATION

Visitors to the Photone installation will be using headphones when exploring Photone, and hence the installation is quite robust to surrounding noise, ongoing conversations in the vicinity, et cetera. A pair of speakers at a low sound level could be used to attract new visitors and to provide a glimpse of the ongoing user exploration (see an example setup in Figure 2).

It would be preferable if the lighting could be reduced in the installation area, in order to make the visual saliency of the images match the intensity of the headphone-mediated music and in order to create an inviting atmosphere. However, this is not an essential requirement.

There are no safety hazards in this installation. Sound levels in the headphones will be monitored to be within safe levels, and sound levels in the speakers will be kept low enough to provide a sound ambience without being loud or disturbing.

Equipment asked for from the conference chairs, if possible, are a $24"$ LCD display with HDMI cable, a pair of speakers (active monitor speakers, or passive speakers with an external amplifier) with audio cables (6.3mm TRS out from the audio device), and a space for a poster in A1 format (594 x 841 mm). Additional equipment such as a laptop, an external audio device (Universal Audio Apollo Twin), headphones, and a USB-mouse will be brought to the demonstration.

For the installation we will also bring a poster. This poster will essentially be based on Figure 1, which we think will be good for discussions about Photone, the composition, and the interaction between music and image elements.