

ImageFlowing-Enhance Emotional Expression by Reproducing the Vital Signs of the Photographer

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ABSTRACT

ImageFlowing is a ‘living’ photograph that reproduces the biometric signs of the photographer. Viewers can feel how the photographer felt through photographer’s breathing, heartbeats and skin temperature. We extend a two-dimensional picture into a multi-modal experience, aiming at creating a tighter emotional link between the viewer and the photographer.

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1 INTRODUCTION

The popularity of user content sharing on social media shows that with the widespread use of digital cameras, everyone becomes an artist, capturing every aspect of their lives and sharing them with the world. The reason why we like to share photos is that we are more willing to share emotions when taking pictures[Jing 2009; Solomon 2008]. Photographs are more often a form of emotional expression of the photographer rather than functional depictions of reality. Kindberg et al. collected about 303 photos taken with camera phones and classified them by their purpose. About 84 percent of them had emotional meaning and only 19 percent had a functional purpose[Kindberg et al. 2004]. However, the existing photographic media lacks access to these emotional dimensions. Emotions are known to manifest through various physiological signs[Lindquist

2013]. The simplest example is elevated heart rate associated with an increase in arousal[Xiefeng et al. 2019]. we present our project on sharing the emotional context of a photograph with the viewers. The major contributions are: Conceptual framework and implementation of a system recording vital signs of the photographer; an approach to reproducing vital signs from the photographer; a formal exhibition with visually impaired visitors; designed an experiment and conducted a series of formalized studies.

2 CONCEPT DESIGN

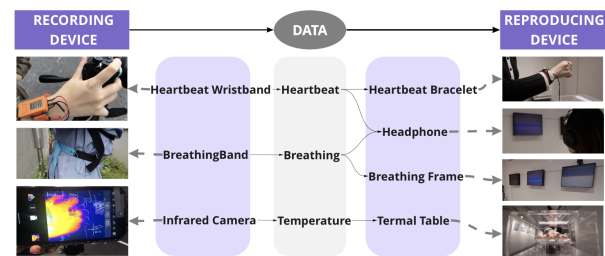


Figure 1: The System of ImageFlowing

The overall design of the system is divided into two main blocks. The vital signs are recorded with our recording devices and then the data is rendered with reproducing devices. We present several different ways to record and reproduce these vital signs, as shown in Fig1. The details are as follows:

- (1) Heartbeat[Tactile]: Heartbeat is measured with a Heartbeat Wristband, and the vibration of the heartbeat is reproduced with a Heartbeat Bracelet.
- (2) Heartbeat + Breathing[Aural]: We use Max/MSP for Live to synthesize music in real-time based on recorded heartbeat and breathing data. We chose those two metrics, as they have the most prominent rhythmic component and are suitable for sonification.

- (3) Breathing[Visual]: Breathing is measured with a Breathing Band, placed on the chest of the user. The tempo of breathing is reproduced with Breathing Frame.
- (4) Temperature[Tactile]: Temperature is measured with an infrared camera, and we reproduce temperature with our Thermal Table.

On September 20th, 2021, our artist took 5 photos with the recording devices. The recording system saves 10 seconds of the vital signs before and after the button press, the data of the photographer's heartbeat, breathing, and temperature were recorded, as shown in Fig.2.Top.

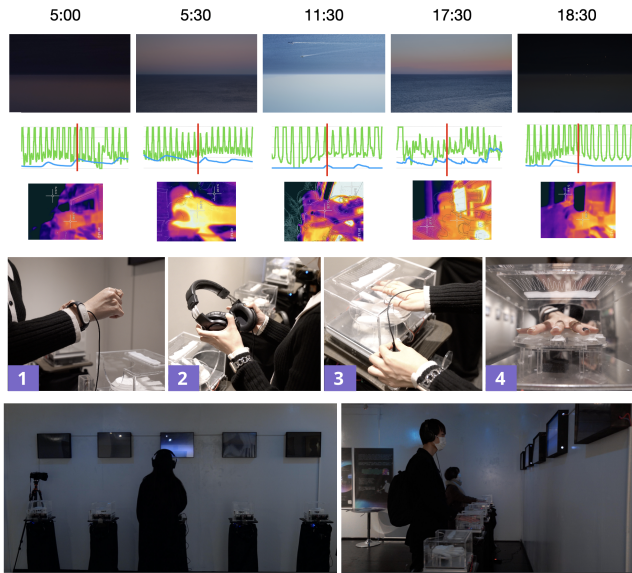


Figure 2: Top: Each Work with Photographer's Vital Signs. Center: The Way of Experiencing ImageFlowing. Bottom: Exhibition

3 EXHIBITION

After wearing the Heartbeat Bracelet, users first put on the headset and then insert the plug of the Heartbeat Bracelet into the socket of the Thermal Table, all devices start at the same time, as shown in Fig.2.Center.

We curated and held a 7-day exhibition at a gallery, as shown in Fig.2.Bottom. We invited a visually impaired person to participate in this exhibition, he had this to say about his experience:

"I think it's interesting that I can't see it at all. But without pre-conceptions, it seems I'm able to feel some emotions, like anxiety or calmness through the heartbeat and temperature of the photographer."

Some viewers breathed at the rate of the Breathing Frame, Some viewers felt the photographer's emotions almost exactly like the photographer's real emotions when taking the picture.

4 EVALUATION

Besides the overwhelmingly positive feedback from the gallery exhibition, we conducted several studies to quantify the effect of our system. We asked 10 volunteers to rate their experience and evaluate the emotional content of the presented photographs with

and without the system. Emotional ratings were given on a 9-point Self-Assessment Mannequin (SAM test). Participants were asked to rate the photographs on three SAM scales: valence, arousal, and dominance (totaling 3 numbers between 1 and 9 for each photograph from each participant). Gathered scores with and without the system were compared with the scores that the photographer gave. To simplify the procedure and save time we used only 3 images out of 5 for this test. Without using the system, the emotional scores that the participants gave were on average 2.2 points (out of 9) away from the photographer scores. To factor in the variance in scores, 2.2 points are 1.04 standard deviations away from the photographer's, implying that there was a noticeable misjudgment of the emotional content. Further analysis shows that most of the misjudgment falls on the third photograph. The other 2 were perceived much closer to the photographer's self-assessment. With the system, scores that the participants gave were on average 1.28 points away from the photographer scores, or only 0.66 standard deviations. The valence score for the second photograph remained misjudged, but the emotional context of the third photograph that was severely misperceived was much closer to the photographer's score. Thus, our system indeed helped to improve the understanding of the emotional meaning of the photographs.

We note the statistically significant effect of the system on the perceived dominance of photographs 2 and 3 and valence of the photograph 2 ($p=0.0124$; $p=0.005$; $p=0.001$ respectively). Effect on the valence score of photograph number 2 and arousal score of photo number 3 were close to significant with $p=0.174$ and $p=0.079$. Other effects were not observed. Many users noted that the temperature and vibrotactile feedback make them feel more connected to the photographer as a human being, but apparently do not affect their perception of emotional connotation. Average affective value and ease of comprehension of the emotional information using the system was rated at 5.33/9 SD=1.8, vs 3.33 SD=1.73 for just the pictures. T-test showed significance with $p=0.008$.

5 DISCUSSION AND FUTURE WORK

We believe ImageFlowing could lead to a very interesting gallery experience if we could enable people to demonstrate their own photographs with their own bio-data. Another aspect is incorporating the feedback we received from the visually impaired audience, we consider the accessibility of photography to be of high importance and hope this work would lead to other projects attempting to tackle it directly.

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