Shaboned Display: An Interactive Substantial Display Using Soap Bubbles

Shiho Hirayama*
Keio University

Yasuaki Kakehi†
Keio University

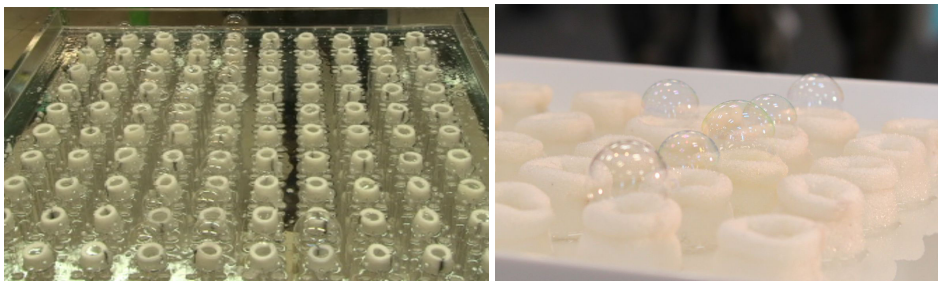

Figure 1: *Shaboned Display*

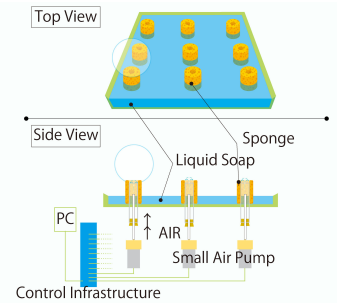

Figure 2: *System Design*

1 Introduction

From childhood, we often play with bubbles. We find various aesthetic elements in a series of actions of soap bubbles: appearing, expanding, floating, bursting and disappearing. This time, we utilize the movements of soap bubbles as a pixel of an image and propose a novel interactive substantial display named "Shaboned Display." (see Figure 1)

Mainly in the field of media art, many artists and designers have also used bubbles as a tool for expression. However, in most of the previous systems, bubbles float freely and randomly in air. For example, in "Bubble Cosmos [Nakamura et al. 2006]", participants can interact with projection images by breaking floating bubbles with white smoke. "ephemeral melody [Suzuki et al. 2008]" also use bubbles as an interface. In this piece, musics are created according to the collisions of bubbles floating randomly. On the other hand, our Shaboned Display can show images by controlling the size of each soap bubble arranged in a matrix in a plane. As for the substantial displays, various types of material have also applied to construct visual images. One of the features of such display systems is that each pixel has a physical form and we can touch them freely. In our system, we can use each soap bubble not only as a pixel of a display but also an input tool. By exploding the soap bubbles, the displayed images change interactively.

2 Design of Shaboned Display

In our Shaboned Display, We offer three innovative points as follows.

Firstly, this system can show images with soap bubbles arranged in a matrix in a plane. Figure 2 shows the system design of the Shaboned Display. In the current implementation, 10 x 10 air tubes are arranged in a plane. Underneath tubes, air pumps are attached. By controlling the volume and timing of air flow, it can manipulate the size and shape of each soap bubble freely. Note that this system does not allow these bubbles to float in air and it also controls contracting of bubbles. By keeping bubbles expanding and contracting, this display can present various images such as characters or figures.

*e-mail: hirayama@sfc.keio.ac.jp
†e-mail: ykakehi@sfc.keio.ac.jp

Secondly, we developed a system for creating a soap bubble automatically. By using this function, even if some soap bubbles are broken by winds or users' fingers, this system can make the film rapidly again and keep showing images. In addition, this system can also break the soap bubbles intentionally. Conversely, this display can show images by popping some of soap bubbles.

Thirdly, this display can work as an interactive system. More concretely, this system can detect a explosion of film by using an electrical approach. By attaching electrodes on the surface of soap bubble and the edge of the air vent, this system can detect the explosion event by sensing the ohmic value of the circuit. Furthermore, this system can also detect users' actions for example hand gestures by using a camera.

3 Applications and Future Works

We have already developed the prototype system with 10 x 10 air vents and implemented some applications using this display.

Firstly, this display works as an ambient information board. Of course, the image displayed on it is affected from environmental factors such as winds. Audiences can observe the digital information and analog phenomena simultaneously. Secondly, we developed an interactive application on this system. In this application, the events of bubble bursting are enhanced. For example, when one soap bubble is exploded by winds or users' fingers, bubbles around it are also bursted sequentially like ripples in conjunction with the event. In other application, this system generates audio feedback when explosions happen. Thus, audiences can enjoy the intentional of unintentional phenomena through these various effects.

In the future, we are going to implement this system in various scales and settings such as on a vertical surface. In addition, we also plan to propose more interactions using the soap bubble pixels.

References

NAKAMURA, M., INABA, G., TAMAOKI, J., SHIRATORI, K., AND HOSHINO, J. 2006. Bubble cosmos. In *SIGGRAPH Emerging Technologies*, ACM, No. 3.

SUZUKI, R., SUZUKI, T., ARIGA, S., IIDA, M., AND ARAKAWA, C. 2008. "ephemeral melody": music played with wind and bubbles. In *SIGGRAPH Posters*, ACM, No. 80.

SIGGRAPH 2010, Los Angeles, California, July 25 – 29, 2010.
ISBN 978-1-4503-0210-4/10/0007