Mag-B: Tactile Sand Play using an Interactive Magnetic Display

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1 Introduction

This project describes the installation of an interactive sand work, plus a workshop to create a device called 'Mag-B', which presents a tactile experience using an interactive magnetic display. We have developed a multi-display by using tactile and visual electromagnetic interaction as a power source for tactile presentation. The goal of this project is to create and experience interaction technology and tactile expression, and facilitate the understanding of haptic communication through a workshop. This workshop developed from an earlier electronic work created in 2010. This paper describes the development of both an interactive tactile display and the Mag-B workshop (Figure 1).

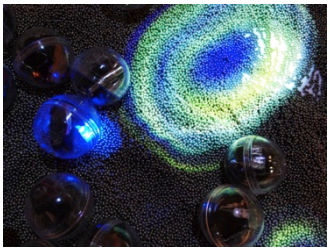

Figure 1. *The interactive magnetic display and Mag-B.*

2 System configuration

For the interactive electromagnetic display, a 50-inch apparatus was developed with a total of 192 individual electromagnet pieces, arranged in a 12 x 16 configuration, which was placed in contact with the back of the display (Figure 2). Each of these electromagnets can be individually controlled. A magnetic field is generated by running a DC current through the electromagnets. Interactive control and image formation are carried out according to the position and time detected on the touch screen. It is spread using steel balls with a diameter of 1mm, mimicking the texture of sand. The sand texture is changed interactively by the small steel balls, which are attracted to the electromagnets.

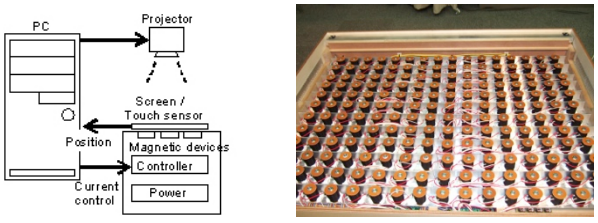

Figure 2. *System configuration.*

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3 Image generation

Real-time 3D imagery can be manipulated through the use of magnets and hand movements. The imagery generated simulates a spring and Metaballs create a sensation through the use of a magnet. The magnet and the generated imagery are changed interactively according to movements of the hand (Figure 3). Created using the C-language and an OpenGL library.

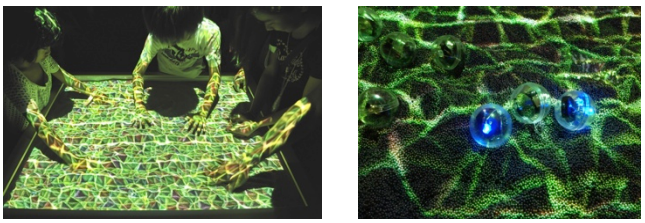

Figure 3. *Image.*

4 Mag-B Workshop

In this workshop, participants will make a simple electronic device, which we refer to as Mag-B. We will produce balls that can vibrate, make a sound or shine. Each ball consists of a reed switch, a small motor, LED, a button and a battery, which are placed inside a sphere 3cm in diameter. In this workshop, we create an interactive sandbox experience with magnet displays. This device vibrates, generates sound and glows in response to the magnetic force of the display. Interacting with the device aims to create a healing experience and stir the imagination. The experience created is similar to the stones in 'Karesansui' (a Japanese sand garden), and the experience is similar to miniature garden therapy. This workshop runs for approximately 20 minutes (Figure 4).

Figure 4. *Tactile Ball 'Mag-B' Workshop.*

5 Summary

In this work, we have developed technology for tactile presentations. The aim here is to provide a new form of tactile communication that can be used in everyday activities. We hope that this innovative product will have a major impact in a wide variety of fields, providing a new medium for creativity.

References

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