Freqtric Drums: A Musical Instrument that Uses Skin Contact as an Interface

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ABSTRACT

Freqtric Drums is a new musical, corporal electronic instrument that allows us not only to recover face-to-face communication, but also makes possible body-to-body communication so that a self image based on the sense of being a separate body can be signi cant altered through an openness to and even a sense of becoming part of another body. Freqtric Drums is a device that turns audiences surrounding a performer into drums so that the performer, as a drummer, can communicate with audience members as if they were a set of drums. We describe our concept and the implementation and process of evolution of Freqtric Drums.

Keywords

interpersonal communication, musical instrument, interaction design, skin contact, touch

Figure 1: A child playing the Freqtric Drums.

1. INTRODUCTION

Today, telecommunications penetrate our daily life in the form of such things as the telephone, e-mail, Internet chat, to mention a few. Certainly it is convenient and necessary to use these electronic means of communication, which offer a certain proximity over a distance. In recent studies, researchers have proposed many types of distance communication. Brave et al. proposed an interpersonal communication tool called "inTouch" which provides a physical link between distant users [2]. Yanagida proposed a way of communicating smells over distance [4]. In the near future, we will become able to communicate with the others at a distance in many new ways.

In these types of communication, we are separated, and therefore we need to be reminded of the importance of face-to-face, moreover body-to-body communication, such as handshakes, holding a child by his or her arms, or a high or low ve. These communications have a special intimacy that is missing from virtual space communication. Originally, we could only communicate with others face-to-face. We could get to know about others by sharing thoughts or sometimes by ghting with others. These are primitive ways of communication. Forms of interpersonal communication that involve skin contact and body touch are especially intimate and convey special emotions.

We have created a musical instrument called "Freqtric Drums" as a example of a communications tool that involves skin contact. Figure 1 shows a snapshot of a child playing the Freqtric Drums. It is of two types. One is "Freqtric Drums Live"(FDL); the other is "Freqtric Drums Home" (FDH).

Freqtric Drums is a musical instrument that involves mechanisms for sensing human skin contact as an interface [1]. In this paper, we shall describe Freqtric Drums in the abstract and its implementation.

2. SENSING TECHNIQUES

We propose a musical instrument interface that is able to detect human skin contact and its intensity. For this, we need a sensor device which can detect skin contact.

2.1 EDA

EDA (Electro Dermal Activity) is a term used to describe changes in the skin's ability to conduct electricity. By measuring the amount of electric current inside the body, the

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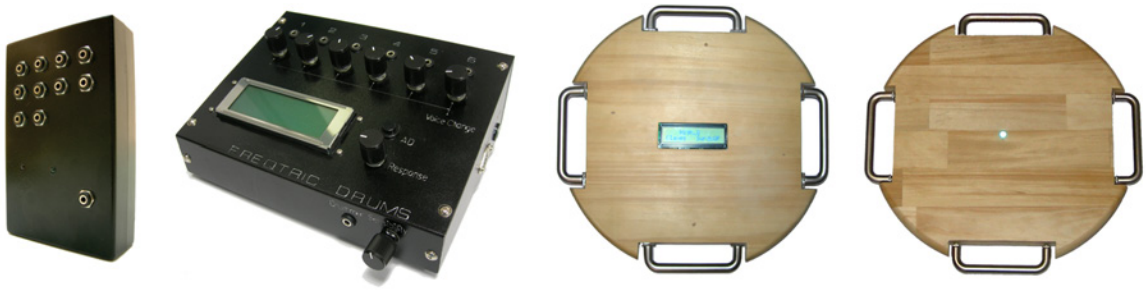

Figure 2: Prototypes of Freqtric Drums. FDL, FDL2, FDH and FDH2

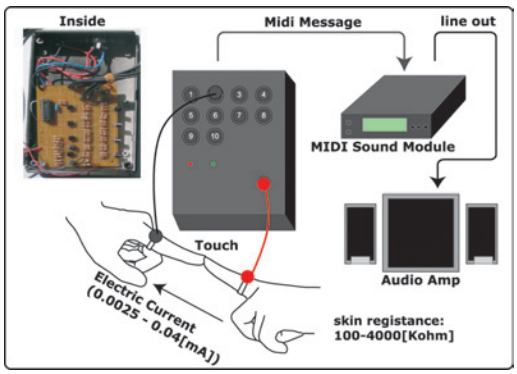

Figure 3: Overview of Freqtric Drums system.

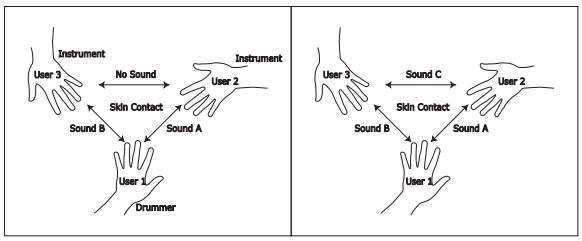

Figure 4: left:FDL and FDH system, right:FDH2 system.

EDA technique is used like a polygraph. Changes in the skin's ability to conduct electricity is mainly related to internal body resistance and skin resistance. The human skin resistance (100-4000 Kohm) itself is considerably larger than the internal body resistance (25-120 Kohm), allowing the internal body resistance to be ignored [3]. Skin resistance is related to the intensity and size of the surface that is touched. Therefore, in order to sense the intensity of skin contact, we use the human skin resistance and a subtle direct current.

We have implemented a device that can detect not only skin contact but also its intensity, which is important to detect because in touch communication a softer touching has a di erent meaning than a harder touching. We use EDA for the implementation in order to express performers' delicate nuances.

3. IMPLEMENTATION

Using the EDA technique, we implemented "Freqtric Drums", the musical instrument. By touching other users, a user can create sounds, such as those of percussions or drums. Sounds are generated by a MIDI signal. Figure 3 shows a system overview of Freqtric Drums, which exists in two types. One is Freqtric Drums Live (FDL), designed for live performance (Figure 2). It has a ring interface and sensor that is very sensitive and responsive in order to express a drummer's performance in its most delicate nuances. In addition to these functions, FDL2 has an A/D Converter and a voice change function.

The other is Freqtric Drums Home (FDH), designed for home use (Figure 2). It has a knob interface, a wireless MIDI module, an A/D Converter, and a voice change function. These features make it portable and easier to use than FDL. FDH2 has a sensing system which can detect the combination of skin cotact communication(see Figure 4).

4. FUTURE WORK

We have developed and been improving Freqtric Drums, which allows users to enjoy music and skin contact at the same time. The project is still ongoing and continues to develop. The technology we have presented here is useful for other applications. At present, we have begun a new project that applies our sensing technology to a video game device. We believe that skin contact is a new type of interface and important in our lives.

5. REFERENCES

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