Cloth Switch: Configurable Touch Switch Wearable Device Made with Cloth

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Abstract

The goal of our research is to realize a configurable wearable device made with cloth. We proposed a wearable device made with cloth as well as multiple cloth switches, each having a different function. Through our proposed system, a user can add or remove functions by simply attaching or removing relevant switches from the proposed cloth based wearable device, as well as switch functions on or off by simply touching the switches.

1 Introduction

Owing to rapid advances in computer miniaturization, a variety of wearable devices are now available. Cloth based wearable devices, in particular, have a specific characteristic in that they are soft and natural to use and can be worn without any discomfort. Applications of such cloth based wearable devices include usage in costumes during performances and as part of fitness clothing to serve as instruments for measuring the physiological data of a user. However, in the case of cloth based wearable devices, each device has only a few functions, and reconfiguration of the device 's interface is a challenging task. In this study, we propose a novel wearable device to address the aforementioned issues. Buechley *et al.* [Buechley et al. 2006] proposed a configurable device using cloth and snap buttons. We apply their method to our cloth based wearable device. The goal of our research is to realize a configurable cloth based wearable device similar to a smart phone or a tablet-type device.

2 Proposed System

Our proposed system consists of a cloth based wearable device and multiple touch switches made of cloth. The touch switches allow users to configure the interface of the wearable device and operate some functions. They can be attached to the device using a magnet button (if incorporated into clothes). A user can add or remove functions simply by attaching or removing touch switches from the device. The user can also switch functions on or off by touching the relevant attached switches. Figure 1 shows the structure of a touch switch. It consists of a chip resistor within two pieces of cloth. The resistor of a switch helps differentiate itself from other switches to a wearable device. Different types of switches for different functions can be created by using different resistors. A switch also has a circuit that enables it to detect a touch by measuring electrostatic capacity. Accordingly, the cloth based wearable device can identify the type of an attached switch, based on the resistor, and detect a touch to an attached switch, through the circuit.

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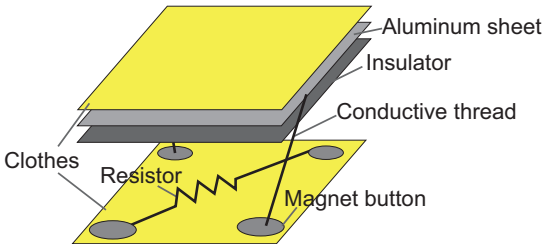

Figure 1: *Structure of a Touch Switch*

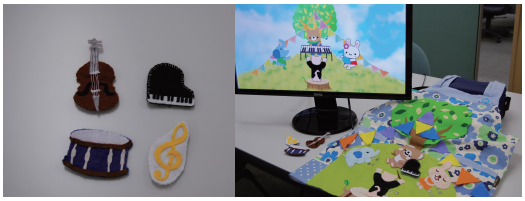

Figure 2: *Application*

3 Application

Using the proposed system, we implemented an application as a metaphor of apron theater, a performance tool for children using an apron and some motifs or dolls. We created some touch switches in the shape of music instruments for the application (Figure 2, left). There are animal character patches on the apron as well as spaces for attaching touch switches on each patch. When a user attaches a piano-shaped switch on a bear patch on the apron, an icon of a bear playing the piano appears on the PC monitor (Figure 2, right). When the user touches the piano-shaped switch, a melody of the piano is played. If the user replaces the piano-shaped switch with a drum-shaped one, the instrument played by the bear icon changes to a drum. This application demonstrated that the proposed system enables reconfiguration of functions corresponding to the type of the touch switch and the attachable position on the cloth based wearable device.

4 Future Work

This paper proposed a configurable cloth based wearable device along with attachable touch switches. In future work, we will apply our proposed method to a system that can disseminate educational content more effectively or as an input device for a remote control for multiple devices.

References

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