

Remote Control with Switches on Fingertips

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Abstract--This paper describes a stand-alone household remote control. We previously proposed a glove input interface with switches on the fingertips, and added communication functions to the glove input interface. A prototype was prepared in order to evaluate the effectiveness of the proposed method.

I. INTRODUCTION

To enter numerals on small portable information terminal ten keys on its surface have conventionally been required. Also, on the surface of portable game machines, we see the plus key and the A, B, X and Y keys. More complicated input and more keys are necessary in order to input the 26 letters of the alphabet and 50 characters from a Japanese syllabary. We previously proposed a glove input interface with switches on the fingertips that does not require a keypad for small portable equipment [1]. Some glove input interface had been already proposed [2], [3]. However, there were some differences between the previous studies and ours. Our proposed method has following features.

- The inputs are decided by the combinations of the switches.
- By changing the LUT (look up table) , it is possible to allocate the signals to other than keyboard input.
- Inputting something by only pushing a fingertip onto a certain part of the body is possible.

This paper describes a household remote control that is stand-alone and controls audio-visual equipment and home appliances by the addition of communication functions to the glove input interface.

II. OUTLINE OF PROPOSAL

Figure 1 is a photograph of the total system and the input part, and Figure 2 is a block diagram of the remote control.

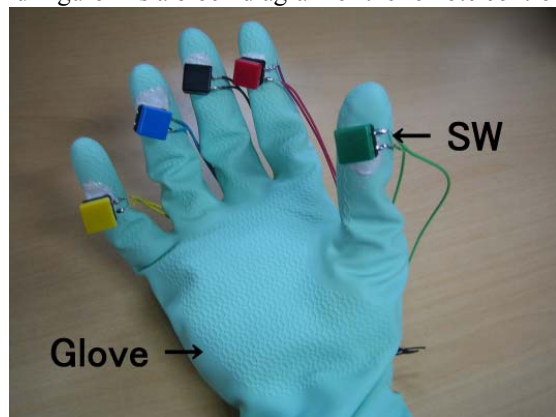


Fig.1. Photograph of the input part

The basic actions are as following. As shown in Figure 1, the rubber glove has an on/off switch at each fingertip. The user inputs an on/off signal by pushing a fingertip onto any surface. Next, the signal from the fingertip is detected as a binary signal as shown in Figure 2. The 5-bit signals using one hand are allocated 30 control instructions for audio-visual equipment and home appliances. Also the remote control has an allocation that changes between equipment types. In addition, the interface has added communication functions to use for stand-alone household remote control. The functions are IrDA [4] which is in common use, and ZigBee [5] which is expected to become popular.

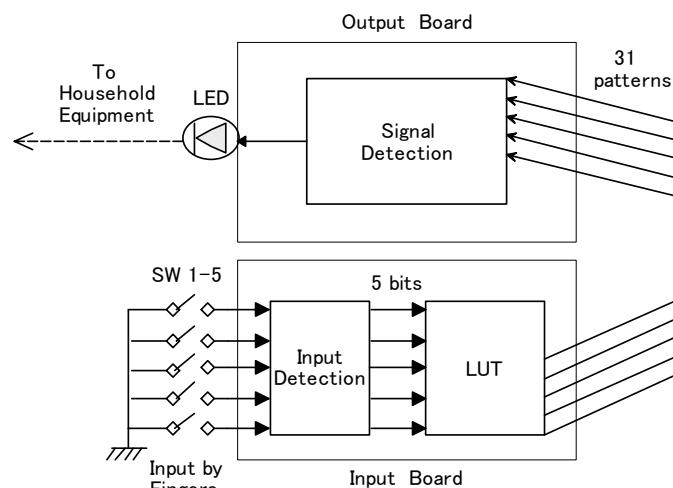


Fig.2. Block diagram of the proposed system

We planned to use the proposed remote control for television and video, and for air-conditioners and lighting equipment. The switches were allocated to the functions as in Table 1 for the audio-visual equipment, and as in Table 2 for home appliances.

TABLE 1
ALLOCATION OF AUDIO-VISUAL EQUIPMENT

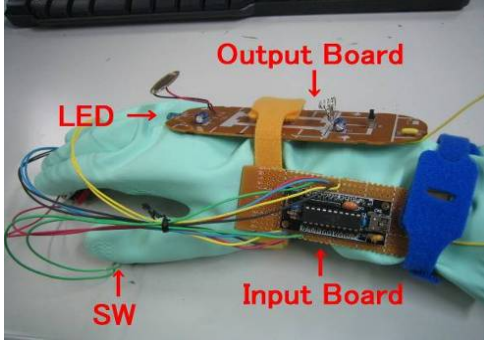
	Thumb	Index	Middle	Ring	Little
Power	1	1	1	1	1
Play	0	1	0	0	0
Pause	0	0	0	1	0
Next Chapter	0	1	1	0	0
Previous Chapter	1	1	0	0	0
Volume Up	0	0	1	0	0
Volume Down	1	0	0	0	0
Mute	1	0	1	0	0
Changing Function	0	0	0	0	1

TABLE 2
ALLOCATION OF HOME APPLIANCES

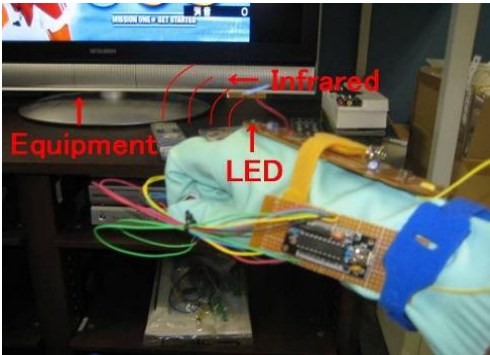
	Thumb	Index	Middle	Ring	Little
Power	1	1	1	1	1
Switching Air Direction	0	1	0	0	0
Switching Operation	0	0	0	1	0
Air Speed Up	0	1	1	0	0
Air Speed Down	1	1	0	0	0
Temperature Up	0	0	1	0	0
Temperature Down	1	0	0	0	0
Timer	1	0	1	0	0
Time Forward	1	0	1	1	0
Time Back	1	1	1	0	0
Changing Function	0	0	0	0	1

III. CONFIRMATION OF THE PROPOSED METHOD BY EXPERIMENT

A prototype was prepared in order to evaluate the effectiveness of the proposed method from the viewpoint of the audio-visual equipment and home appliances.



(a) Total System



(b) Example of Experiment

Fig.2. Photograph of the experiment

1) The functions of the audio-visual equipment

As shown in Table 1, the input signals are allocated to basic the functions that are necessary to control the audio-visual equipment. It is necessary for users to practice when leaning. However, it was found that there was no difficulty in using the remote control after practice. Also, because the remote control uses about only one third of the total input signals, it is possible to add some other functions.

2) The functions of the home appliances

In this experiment, we allocated the functions for an air-conditioner to the remote control as shown in Table 2. By allocating the switches for the temperature up and down to lights up and down, it is possible to control other home appliances with the same allocation. Also, in common with the audio-visual equipment, there was no difficulty in using the remote control after practice. As far as future research is concerned, further improvement of the operator skill level can be expected if combinations with a specific meaning between the fingers and the letters are considered.

3) Changing between audio-visual equipment and home appliances

We allocated the input of 1 bit by the little finger to changing between audio-visual equipment and home appliances in this experiment. This same allocation of switches between the two makes enhancing the skill level easy.

As shown from the experiment, it was confirmed that the proposed remote control functioned as planned and the target of this research was reached. On the other hand, it was found that the proposed remote control has the following issues by listening to the feedback of the users and observing the experiment.

- The necessity of practice for users.
- The necessity of improving the allocation of the fingers and the input method.
- And the infrared communication is restricted for the point and the angle of the hand by the direction infrared.

IV. CONCLUSIONS

A household remote control that is stand-alone and controls audio-visual equipment and home appliances by the addition of communication functions to a glove input interface was proposed in this paper. In the proposed method, the input part has an on/off switch at each fingertip, and the signals from the fingertips are detected as binary signals. The 5-bit signals using one hand are allocated 30 control instructions. In addition, the interface has added communication functions, which are IrDA which is in common use, and ZigBee which is expected to become popular for stand-alone household remote controls. A prototype was prepared in order to evaluate the effectiveness of the proposed method. In the future, we hope to resolve the issues of the necessity of practice for users, the necessity of improving the allocation of the fingers and the input method, and the restrictions of infrared communication directionality.

REFERENCE

- [1] R. Wada, T. Nonaka, and T. Hase, "Glove Input Interface with Switches on Fingertips"
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- [5] ZigBee, Zigbee Alliance, <http://www.zigbee.org/Home.aspx>