Hangul Gangul: Interactive toy for Hangul Learning
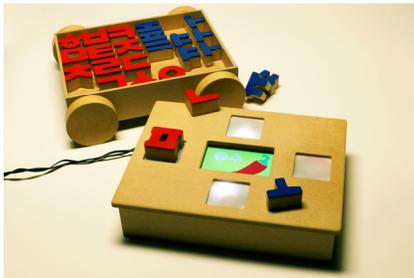

Figure 1. The Hangul Gangul prototype

Figure 2. Basic usage of the system

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Abstract

We propose an interactive toy, "Hangul Gangul", which helps users learn Hangul characters using a tangible interface. Using our system, users can enjoy learning Hangul characters by combining physical blocks representing vowel and consonant characters. Our system aims to encourage collaborative learning between children and adults.

Keywords

Hangul, Toy, RFID System, Tangible

ACM Classification Keywords

H5.m. Information interfaces and presentation: Miscellaneous.

General Terms

Design, Human Factor

Introduction

Although young children can easily learn foreign languages, most of them have few opportunities to do so as they ordinarily live in limited communities such as kindergartens or the home. In consideration of these conditions, we focused on learning methods for foreign languages using tangible toys with which children and their parents play together at home. Here, we applied Hangul (Korean language) based on its structural features: that is, all Hangul characters consist of
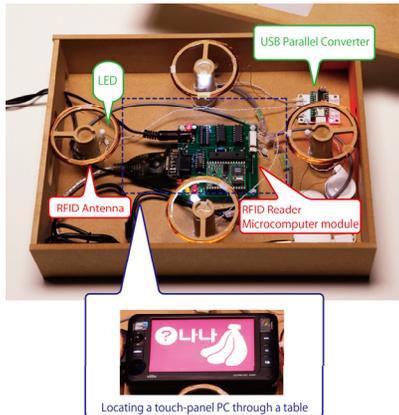
Figure 3. System Architecture

Figure 4. Appearance of the blocks

Figure 5. Appearance of the case

combinations of vowel characters and consonant characters aligned with each other. We proposed a tangible toy called "Hangul Gangul[1] ", which helps children learn Hangul characters just by playing with the physical blocks representing vowel/consonant characters (Fig. 1). Since we formed Hangul characters with blocks with precision, users can perceive these characters both visually and by touch.

Hangul Gangul

The Hangul Gangul is an interactive toy for learning Hangul using tangible blocks and an RFID system. Users can learn various features of Hangul characters (e.g., shapes, words, and pronunciation) just by placing the blocks on the system according to the instructions shown on a small display (Fig. 2).The Hangul Gangul mainly consists of an RFID unit, an LED unit, and a PC (Fig. 3). The RFID unit consists of an RFID reader (Texas Instruments S2000 micro reader), four RFID antennas, a microcomputer (Microchip PIC18F252) and surrounding circuits. We also attached RFID tags to physical blocks representing Hangul vowel/consonant characters (Fig. 4). The microcomputer connects multiple antennas to a single RFID reader through analog multiplexers. We selected a small touch panel PC (Brule Viliv S5) to display the contents for learning Hangul. The LED unit consists of an USB I/O module (Akizuki USB parallel convertor) and four white LEDs. Each LED is attached beside the RFID antenna. We installed the above devices into an original wooden case (Fig. 5). The size is about 306mm×67.5mm× 236mm (width/depth/height). The case consists of two parts: the upper case to store the devices and the lower case to store the blocks. We attached wheels to the lower case for portability. We have designed the

blocks and case suitable for use by children: we set the size of each block at 48mm×48mm×24mm (width/depth/height) to enable a child to hold the block in his/her hand and avoid swallowing it by accident; we also rounded the edges of the case for safety. We attached a translucent acrylic plate on each RFID antenna to encourage users to place the blocks and obtain visual feedback from LEDs. We set these plates around the display, as shown in Fig. 5, for two reasons: suitability for multiple users and in consideration of the structural features of the Hangul characters[2].

Next, we explain the basic usage of the Hangul Gangul. First, the system provides a question such as "What is this?" with an image of an object. When a user places the correct vowel/consonant blocks on the acrylic boards, the system plays a simple animation and sound related to the object, and then presents the next question. On the other hand, when the user places incorrect blocks on the boards, the system provides a hint by activating the LEDs on the correct places.

We plan to improve our system through evaluation of feedback from various users to realize a learning-by-playing structure.

References

[1]   Ullmer. B., Ishii, H., Glas, D.: mediaBlocks: Physical containers, transports, and controls for online media. In Proceedings of SIGGRAPH98, pp.379–386(1998).

[2]   Masui, T., Tsukada, K. and Siio, I.: MouseField: A Simple and Versatile Input Device for Ubiquitous Computing, In Proceedings of UbiComp2004, pp.319-328 (2004).

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[2] A character consists of vowel parts and consonant parts that change their positions up/down/left/right.

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[1] Gangul means "toys".