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Development of a Cell-Bot Application for Teaching Children Using Android

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Abstract. In this paper, we design and implement a figure learning application using 'Albert' which is one of Android based cell-bot. This application aims to teach figures to children from four to seven years old using a kind of cloud robots. Furthermore, the application covers a form of storytelling to excite their interest in learning. Based on the story given to the application, various questions are provided to the children. If the children choose an answer, the robot can check the answer whether it is right or not.

Keywords: Cell-bot; Children learning; Cloud Robotics; Android application

1 Introduction

Recently, various researches related to robot have been conducted. Cloud computing and cloud based services are on the rise because they offer a high scalability and are very efficient because of capability to adjust to the current needs [1]. Even in robot industry, cloud robotics becomes very popular. Especially, cell-bot is a kind of cloud robots controlled by a smartphone. The smartphone herein operates as the robot's brain. On the other hand, various robots have been used to childhood education. There have been numerous studies where robots have been used as educational assistants for children [2].

In this paper, we design and implement a figure learning application using an Android based robot for children.

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2 Design of a Figure Learning Application Using cell-bot

Fig. 3. Model of a Figure Learning Application

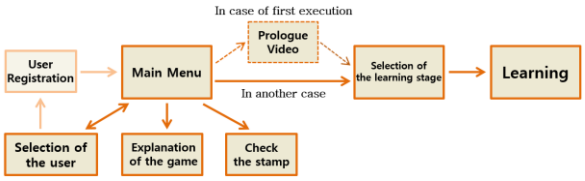

Fig. 4. Block Diagram of an Application

The proposed application aims at teaching some certain basic shapes to the children from 4 to 7 years old. Specifically, this application is designed to train ten basic shapes as shown in Fig. 3. This application covers a form of storytelling, and through the story, the children can learn these shapes answering various questions.
In the aspect of pedagogy, the amount of concentrated time on a task without becoming distracted is called attention span. Considering attention span of children less than 10 minutes for the children [3], each story of learning is designed to spend less than 10 minutes.

Figure 4 shows a block diagram of the proposed application. There are four stages of learning. The user can play the next stage only when the previous stage will be completed. When one stage is finished, the user will be received a stamp as a reward and, user can check this stamp in the main menu. Because the application is designed in a form of storytelling, users have to create their own accounts when multiple users share a device. It allows each user to learn figures individually.

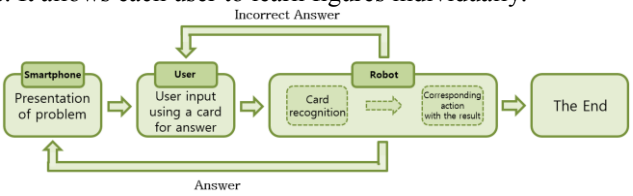

Fig. 5. Flow Chart of the Learning

As shown in Fig. 5, a user learns through the interaction between a smartphone and a robot. When the quiz pops up, the user should answer using a card. The robot, then, recognizes the card using Optical ID (OID) sensor and consequently, the robot moves as a result.

3 Implementation of a Learning Application Using Android Based Robot

The application designed in this paper is implemented in the Eclipse Juno and using a specific library offered by the 'Smart Robot Developer' Website [4].

The orientation of this application's screen is fixed vertically in order to mount a smartphone on the robot. The database of users is created and managed using SQLite.

In the first stage, basic shapes are provided to the children. When the figure chosen randomly is shown on screen of smartphone as shown in Fig. 6, user have to input the same card into OID sensor located at the bottom of the robot. After OID sensor recognizes this card, the robot makes a sound and performs correspondingly with recognition result. The robot's movement is controlled by pre-made motion files which are created using robot contents authoring tool called 'Roboid Studio' [5]. From second stage, each stage has its own story for figure learning. A quiz will appear when the story progresses in the form of video, as can be seen in Fig. 7. The implementation method of user input and result output is the same with the first stage's method.

Fig. 6. Smartphone Screenshot for STAGE 1

(a) (b)

Fig. 7. Smartphone Screenshot for SAGE 2

4 Conclusion

In this paper, we design and implement a figure learning application for children on an Android based robot. Figure card are used for the learning based on the printed dot code recognized by an OID sensor of a robot. This application is presented as a form of storytelling with a robot's movement to arouse children's interest. We expect this application can be used for various fields of childhood learning by changing the subject of this application.

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