

## Interface Design of Game Content for Children Using Motion Cognition Technology

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**Abstract.** The study is going to depict about motion cognition interface design through Smart Big Board For children's bug catching game developed with its basis on touch display. Bug catching game, a kid game skill that uses motion cognition and recognizes the natural movement of user, controls play wall by recognizing the movement of user, and an interface is developed to allow the user and avatar to produce exactly same motions by creating user's own avatar. Likewise, the avatar which reflects the motion of user is displayed on the play wall, and designed to make user and avatar enjoy the game through mutual interaction basing on it.

**Keywords:** Motion Cognition Technology, Interface Design, Digital Game Contents.

### 1 Introduction

Physical activity has been shown to be important for children's current and future health [1]. As technology developed, the development of motion cognition technology has brought many changes even to game field aiming at kids recently. Educational game for kids is an active field in serious game [2]. Development of the field of NUI-based motion cognition technology which can sense the user's natural motion or movement and control digital devices is in continuous growth - not the technology based on GUI which uses through input devices such as keyboard and mouse. The essential argument is that drawing on existing gestures in everyday life, by identifying the physical movements used to manipulate and understand the world, new interaction paradigms can be developed that will allow people to act and communicate in ways they are naturally predisposed to. They will not have to adapt their action or communications to the peculiarities and limitations of technology; the interface will no longer be a barrier to users; the interface will be them and their gestures [3].

The study tries to depict about interface design of bug catching game, which uses wide touch screen that utilizes motion cognition among technologies applied in Smart Big Board, an enterprise for development of contents for young children. Therefore, by looking into interface of motion-sensor-using contents for kids, providing fun of a media experimental play through motion and maximizing the effect as experimental game.

## 2 Design of Motion Interface

Play type of interaction smart big board's bug catching game is a game that uses one avatar by two kids together, avatar display and object interaction is displayed on play wall screen with avatar which reflects on the motions of users, and basing on it, it allowed user and avatar and avatar and object's mutual interaction.

### 2.1 Definition regarding avatar and object's movement

Object's movement is defined according to user's inputted motion, and determining movement command set based on motion interface that runs and controls play wall and user's sensitivity is used in user and dragon character's interaction.



Fig. 1. Motion Interface Tutorial Image

### 2.2 Motion Table Extraction and Definition

Cognizing motion of users with motion sensor, called Kinect<sup>1</sup> installed at the bottom of play wall, it increased accuracy of motion cognition by elimination unnecessary noise value by normalizing user motion cognition data of Kinect.

For motion cognition, Skeleton coordinate being extracted through Kinect was used. Coordinate of Skeleton is consisted of 20 joint parts, and only necessary values are defined and used according to the motion.

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<sup>1</sup> The Kinect sensor was introduced in November 2010 by Microsoft for the Xbox 360 video game system. The sensor unit is connected to a base with a motorized pivot. It was designed to be positioned above or below a video display and to track player body and hand movements in 3D space, which allows users to interact with the Xbox 360 [4].

### 2.3 Avatar Creation and Transformation Interface

The online Avatar is being created as user's distinct character with reflection of user's face and body through video filming and by adding an interface in which user can transform one's avatar, it synchronizes avatar with multiple access users to display on screen. When avatar of user is created in play wall, it is displayed in accordance with motion of user and it is developed to actualize interaction with dragon character of user.

### 2.4 Avatar Motion Mirroring and Object Interaction

A base module to apply the behavior information of user to avatar and to operate it after receiving user's behavior information from motion cognition sensor (Kinect) and processing the relevant information to skeleton data was developed. The mirroring technology which enables avatar to follow the movement of user needs an accurate cognition point creation of user's motion and avatar object mapping.

For this, cognition point of user's was created separately for each part and other module to operate the points of avatar through mapping in accordance with created points was developed.

### 2.5 Development of Avatar Display and Object Interaction Technology

With motion of hand movement as if clapping one's hands to the target, users catches bug and the score will be counted to show winner and loser. It checks whether users succeed to catch bug or not by processing play wall touch coordinate where movement cognition about clapping motion and the motion itself occur.

In addition, it expresses the emotional expression and reaction of drawing object through movement of avatar. User will be able to see master's pet staying around avatar as escaping from bugs and being happy whenever bugs are caught.



Fig. 4. Bug Catching Game Screenshot

### 3 Conclusion

Media contains positive characteristics which enable to taste new experience being called as "expansion of sense." Then, it is media experience type content which arose as result of combination of experience and play from such positive aspect, and there is also media experience exhibit as a type which includes the advantages of play using body. This is because of the reality that there are number of aspects which interactive media can satisfy under consideration of youth education's nature where stimulation of senses and experience are crucial [4].

The result of this study, play type interaction smart big board's bug catch game maximized the amusement elements of experience type game by designing intuitive interface after construction of 10 simple movements. Moreover, it is designed to let children enjoy through stimulation of their curiosity by development of interaction and actualization of avatar creation including mapping user's own face.

This research is expected to be an important guideline for development of experience type game, especially bug catch game, targeting children.

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