Design and Modelling Immersive Game Contents System for Virtual Reality Technology

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Abstract. Early in 1990, virtual reality technique based on computer graphics was introduced in internal computer engineering. This virtual reality is appeared technology that set a trend to develop product and environment focused on human. This paper introduces the trend and feature through case studies about the game contents system for immersive interaction among these virtual reality techniques. Moreover, we design it by using UML(Unified Modeling Language) and propose methodology about immersive system for the future game use a virtual reality technique focused on human.

Keywords: VR(Virtual Reality), AR(Augmented Reality), Game System Design, Game System Modeling, Immersive Game, Game Telepresence, Unified Modeling Language (UML)

1 Introduction

Virtual Reality(VR) technique is developing rapidly used in various medium such as novel, movie and game. According to the development of technology Augmented Reality(AR) has come that the user is immersed actively and feel their existence and acting in a real virtual reality [1]. For example, user can feel a real world like feeling according to put on HMD (Head Mounted Display) like glasses on their head and Data Glove(DG) on their hand or express action with bare hand, according to adopt five senses express technique control program that include olfactory sense and taste over visual, auditory and touch sensation interact with user in a real time realm has been developed. [2, 3]. This paper goal is to design the user experience actively and immersed to the virtual world like game based on that research. Virtual world like this kind of game has to be designed and will be implemented because the user need to create, arrange and perform the work freely in expanded of 3dimentional virtual work space. Therefore, design and make definition of complicated system is the important issue when implement virtual reality based on game contents. To solve these problems, using engineered design method UML to propose system design methodology. For this, in chapter 2, we describe related studies, chapter 3 design virtual reality game contents using UML and chapter 4 is presented conclusion and future study.

2 Related Works

The purpose of virtual reality is to experience telepresence by user. Originally presence means 'sense of being in some environment'. Clear up the meaning, telepresence is to experience a existence in some environment use communication media. To experience the in virtual reality, there are 6 kinds feature of component. First is social richness that the user feel sociable or intimacy when interaction though media. Second is realism that the media is how much expresses existence object, incident and people is like existed. Third is transportation to give a feel like exist in some other place to the user. Forth is immersion to give a feel like falling in a virtual environment by media. Fifth is social actor within medium. This is a situation to feel like a character or object is interaction in media. The sixth is a situation to be the medium as social actor. Not response to medium as social actor in medium, medium itself is like a performer and user can feel presence when interaction with the user. Therefore the fundamental task of virtual reality is how to combine communication medium and body. The complete combination of technology and body, namely embodiment is the virtual reality, go forward it is the final goal of the communication technology[4,5,6].

3 Virtual Reality Game Contents Modeling using UML

Chapter 3 researched about immersive virtual reality game contents modeling. in section 3.1, modeling the general game contents modeling method using flow chart of immersive virtual reality game contents, in section 3.2, modeling immersive virtual reality game contents using UML and comparison analysis in section 3.3.

3.1 Immersive Virtual Reality Game Contents Design Modeling

The virtual reality game to modeling in this paper is used the immersive user interface and connected the real user's movement to the virtual work space and proposeed a system design of offering a related service from a real world to recognized object 1. Show the expectation space composition of immersive user that this paper proposes is like the fig. 1.
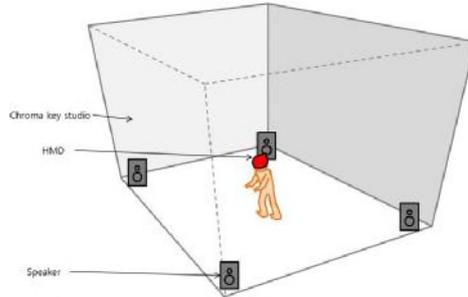
Fig. 1. Immersive Virtual Reality Game Studio

Fig. 2. shows Immersive virtual reality game contents flow. Use wearable immersive user interface HMD, receive video output and generate 3 dimensional virtual spaces. Moreover, through gesture modeling a data input process. In Fig. 2, shows flowchart, virtual work space module modeling to arrange all sort of application[7,8].
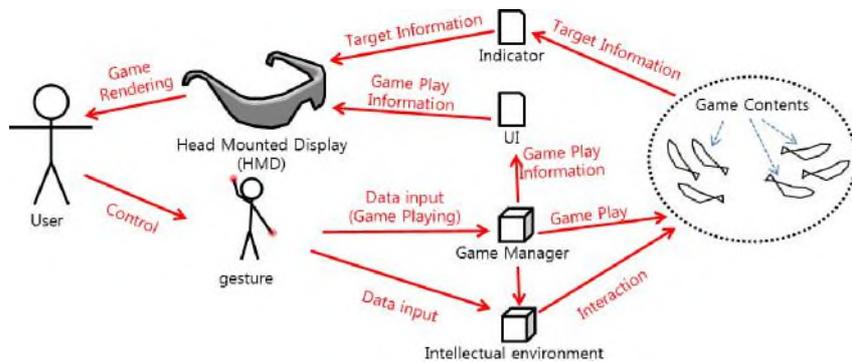

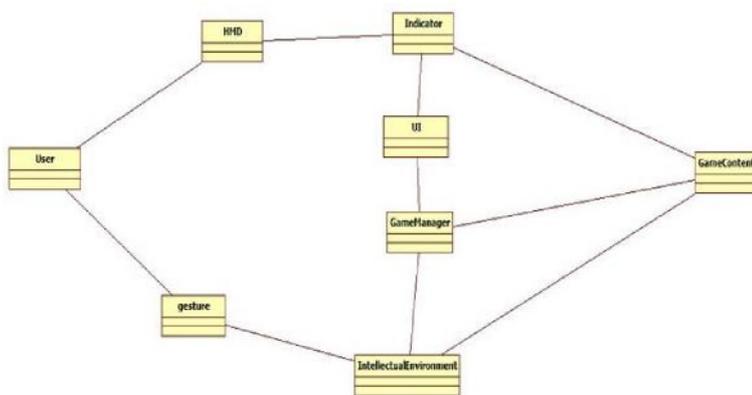Fig. 2. Immersive Virtual Reality Flow Chart

Fig. 3. shows The game flow chart of immersive virtual reality game contents is like Fig. 3. According to a command of game user, it is modeling to be input/output form according to environment and contents rule[7,8].
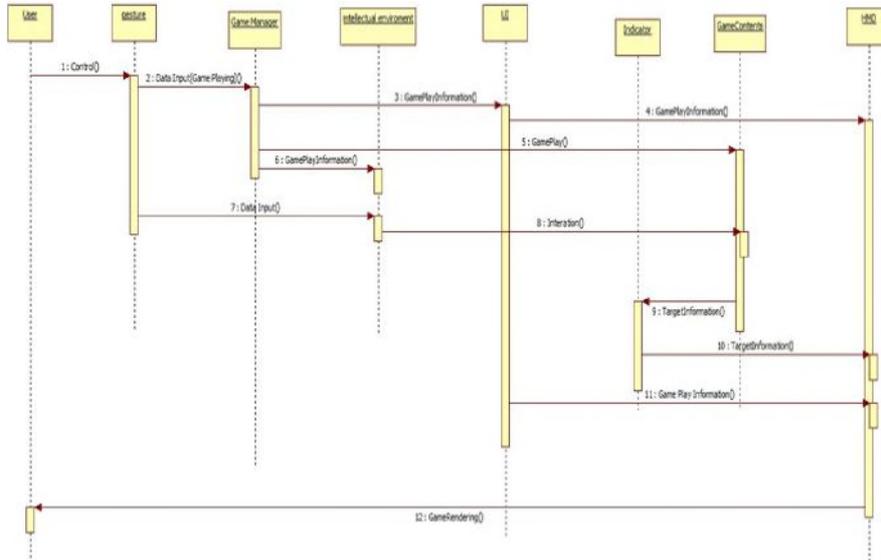
Fig. 3. Immersive Virtual Reality Game Play Flow Chart

3.2 Immersive Virtual Reality Game Contents Design Modeling Using UML

For modeling in method Fig. 2. and Fig. 3, and Fig. 4. and Fig. 5. Shows Immersive virtual reality game contents using UML(Unified Modeling Language) class diagram and sequence diagram. When using proposed UML visual and logical express is possible so it was possible to check the more detailed design method form then general flow chart.
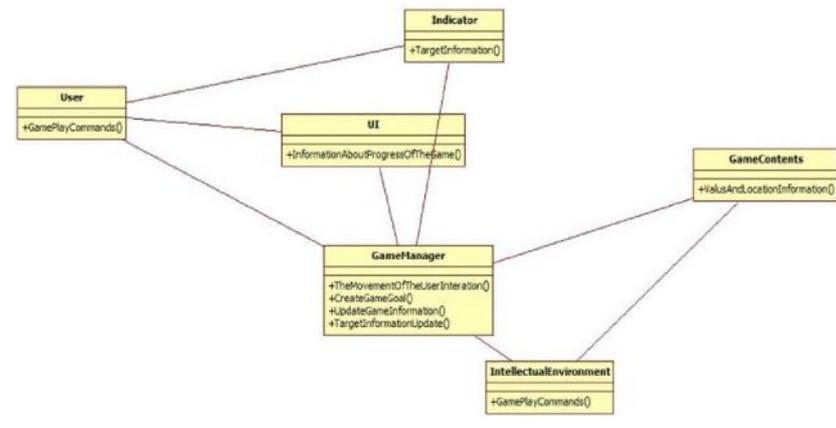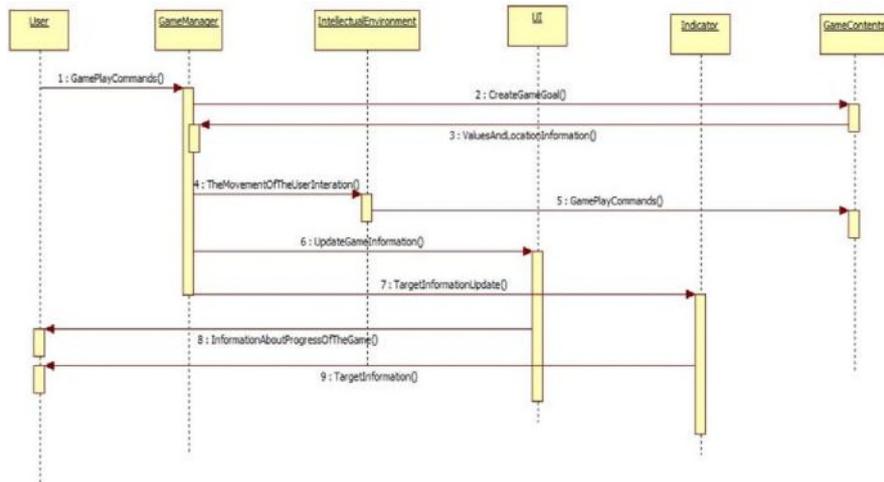

(a)

(b)

Fig. 4. Immersive virtual reality game design using UML: Class Diagram (a), Sequence
Diagram (b)

(a)

(b)

Fig. 5. Immersive virtual reality game design using UML: Class Diagram (a), Sequence Diagram (b)

3.3 Comparison and Analysis of Immersive Virtual Reality Game Contents Design Methodology

The proposed design methodology is compared and analyzed with the exits document and UML. Table 1 shows the visual expression and logical expression ability is possible using UML than exist general design methodology.

Table 1. Flow chart design methodology and comparison and analysis of UML

	Flow Chart Design	UML
Visual expression	Possible to express visual but can check complication.	Possible to express visual with class diagram and sequence diagram.
Logical expression	Many data is complicated and logical expression is hard.	Based on object-oriented language, complicated data is able to express logically.
Result	Hard to express when gaining system. Highly use then simple design.	Possible for visual expression, complicated data is possible to express logically.

4 Conclusion

This paper is designed and Modelling immersive game contents using UML based on virtual reality technology. For design immersive user interface, recognize movement through HMD and gesture recognition, design virtual reality based on game contents system through 3 dimensional virtual spaces and modeling with UML.

The proposed design method that ology is compare and analyzed to the exits design document, visual expression and logical expression ability is excellent when using UML then previous document method.

In the future, immersive game contents based on design methodology using UML that proposed will evaluate implement system and study more realistic virtual reality based on game contents.

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