Tsunami Augmented Reality: Interaction Based on Marker as a Pointer

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Abstract- **In this paper, the development of various physical interactions such as grabbing, moving, and dropping of objects with natural and intuitive using marker as a pointer is done. In addition, user usability test on the use of interaction techniques for selection and manipulation in this AR system is done as well. The usability test results show that the use of marker as a pointer on tsunami AR system gives the user an ease of having natural and intuitive interaction. The identified problems obtained from usability test need recommendation to improve future interface design.**

Keywords : augmented reality, marker, pointer, selection and manipulation, usability test.

I. BACKGROUND

Natural phenomenon such as tsunami can be interactively and animated with the support of augmented reality technology. Augmented Reality (AR) is a field of computer research that combines data of 3D computer graphics and real world. The essence of AR is how to overlay virtual object into real world to get augmented impression about user involvement with the system. Researchers use this field as one of ways to improve learning and get science.

Several user interaction methods concerning fiduciary marker at AR system have been explained by researchers in AR field. Among other things is Bowman says that several ways to change attribute of virtual object is by technique of array marker, menu system, and marker as a switch toggle. Whereas technique to select 3D virtual object can be done by using magic pen, central pointing device, or marker as pointer. From several considerable studies of the strength and weakness from every techniques, tried to develop user interaction technique in AR tsunami system using marker as pointer. It is assummed that this technique matchs to user interaction need at selecting parameter menu in AR Tsunami.

II. PROBLEM STATEMENT

The problem that is adapted in this research is what user interaction tool as marker as pointer matchs to be developed at AR tsunami system?

III. RESEARCH AIM

This research aims to get user interaction tool as marker as pointer to AR tsunami system, know user response to interaction technique that is develoved in AR tsunami system, and get feedback opinion from user concerning whatever things should be done to improve next development system.

IV. RESEARCH METHODOLOGY

The kind of this research is experiment. The system is designed with AR technology framework and then is built and tested to users. When testing this system, it is developed and implemented evaluation instrument to measure the success of design and get opinion feedback from users. In this test it is involved 10 samples of users, five men and five women. The group of users is taken randomly but the processss of selecting samples tries to avoid research group from computer science. The ages of them vary from 27 – 33 years old, and the average 28,6 yeras old. The background of users generally from engineering and natural science. They generally never operate AR.

V. EVALUATION AND ANALYSIS

Evaluation or usability test consists of analysis of several aspects from performances of users at the tasks to run interface. The activities and user opinions are noted when doing tasks, and the questionnaire is used to get them opinion quantitatively. Evaluation is separated into three main stages, with each stage analysis several aspects available in the system. For the clear, the stages are written at TABLE 1.

From 10 users that is filling out questionnaire, they generally give appraisal weight with 4.4 average to the point of difficulty and easy opinion in operating system. That assessment, of course, appears after users undergo evaluation stage successfully and get positive response from tested system. Easy of and suppleness interaction method from designed system do not need a long time to adapt in the operation.

The result of questionnaire about user's opinion to designed system show that the system is ease used and users got self impression after operating again and again. To be familiar with AR environment, then it is important

done training and facilitating to users in the operation because there will appear difficulty and easy of operating the system. The identified problems obtained from usability test need recommendation to improve future interface design.

TABLE 1

Items	Evaluation stage	Description
Introduction to AR environment	Pre introduction	Introducing users in order to be familier with ar system. Users do *tracking*,fasten ayes on virtual objects at fiduciary marker
Selection and manipulation objects	*Selection*	Users do interaction with marker as a pointer to select available menu. To do interaction in tsunami game scene, users are asked to select menu with interaction tool.
	Grabbing	Objects that must be grabbed are showed. Users are asked to grab objects with interaction tool.
	Moving	An object that is grabbed successfully is driven again and again to move to other location from first position...
	Dropping	Users are asked to drop objects, with way of careening interaction tool to new position from fiduciary marker.
Final evaluation	General impression	Users are asked to do tasks again and again until all objects can be moved successfully from first position to new position. Users are asked to write general impression and give comments, if they want.

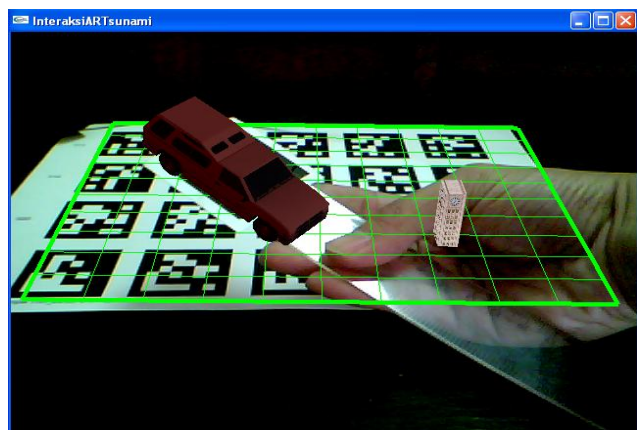The following figure 1 is screenshot when users try to interact moving virtual car object.

Figure 1 Users move car object that overlays at interaction marker

VI. CONCLUSION

From working through and analyses can be concluded that using interaction tool, namely marker as a pointer in AR tsunami give easy of operation to users to do interaction with natural and intuitive, AR tsunami as one of alternative learning ways with game based to introduce the process tsunami event to users, and tangible AR interaction offers natural interaction style that match used in education field such as inform about tsunami event in museum.

VII. REFERENCE

[1] Azuma, A. (1997), Survey of Augmented Reality, *Presence: Teleoperators and Virtual Environments* 6, **4**, 355 – 385.

[2] Bowman, D. (1997), An Evaluation of Techniques for Grabbing and Manipulating Remote Objects in Immersive Virtual Environments, *Proceedings of the ACM Symposium on Interactive 3D Graphics*, 35-38.

[3] Gabbard, J. and D. Hix. (1997),Taxonomy of Usability Characteristics in Virtual Environments, *Technical report, Virginia Polytechnic Institute and State University, Final Report to the Office of Naval Research*.

[4] Rekimoto, J and Ayatsuka, Y. (2000), Cybercode: Designing Augmented Reality Environments with Visual Tags, *Proceedings of Designing Augmented Reality Environments (DARE 2000)*.

[5] Shelton, B. (2002), Augmented Reality and Education, *New Horizons for Learning,* **9**, No. 1.

[6] Sinclair, P.(2004), *Integrating Hypermedia Techniques with Augmented Reality Environments*, PhD Thesis, and University of Southampton.

[7] Wloka, M. (1995), The Virtual Tricorder: A Uniform Interface for Virtual Reality, *Proc.UIST'95,* 39-40.

[8] Zlatanova, S. (2002), Augmented Reality Technology, *GISt Report No. 17*, TU Delft.