

Implementation of real time VJing responding to user's motion

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Abstract

As various media have developed in modern society, frequency of use of interactive media has increased which makes interactive function that uses and handles projection mapping and LED screen in set design of broadcasting, concert, play, musical and EDM(Electronic dance music) in real time possible. Development of various media led today's viewers to have higher cultural desire and the need of various interactive performance contents to receive more attention.[1]. This thesis implemented real time VJing that responds to user's motion based on existing H/W by utilizing real time interactive elements.

Keywords: VJing, interactive, media art, real time interactive

1. Introduction

As various media have appeared, art meets new paradigm. In modern society, art and technology create new added value keeping in good harmony. Overall technology that improves quality of life by combining art and technology is called culture technology (CT).[2]

As demand of rt and technology is aimed simultaneously, interactive function becomes more important.[3] Composition of various performances(musical, play, concert, music broadcasting, large music festival etc.) develops into integration in which acoustic, scene and picture go together and performance picturefiled does not overcome a limit of expense and time that are related to production of picture contents. Development of advanced technology led role of new communication to increase and caused interaction in the field of performance picture to become considered more important and enabled picture contents which use movement and gesture of performers to create interactive performance which overcome a limit of picture and performance and viewers can get together . This study implemented real time interactive media by using gesture and movement recognition through DJ's performance in DJing.

2. Understanding of VJing

VJing means that visual image is performed together with music during live performance.[4]

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Unlike motion graphic[5] which gives movements to various elements such as typography, image, drawing, photo[5], VJing can implement design, picture, music, effect etc. in real time.

VJing has developed as demand for control of pictures in various fields including video, performance, media art, enterprises's PR center, exhibition has increased. The necessity of VJing has risen as projection mapping has grown.

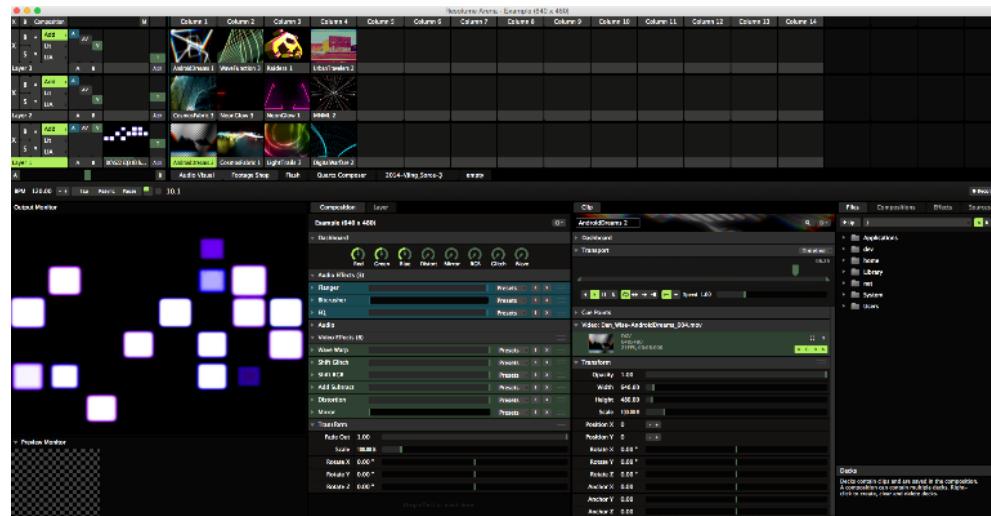


Figure 1. “Resolume Arena”Program



Figure2. “Modul8” Program

Software that mixes picture in real time and applies and creates visual effect immediately has developed. Representative software includes Module8, Resolume, VDMX, Arkaos.

Software that did not apply functions that were required and support high resolution of picture caused by conversion to HD broadcasting from SD broadcasting disappeared.

“Resolume” shown in Figure 1 which is a program which enables unlimited expansion of layer and simple interactive function can change picture by using input of microphone and acoustic waveform of wav, mp3 in real time. “Resolume” can communicate with MIDI, KEY, OSC. “Resolume” can communicate with various programs such as Processing, VVVV. “Resolume” is compatible with various programs.

Modul8 shown in Figure 2 is a program which is faithful to basic VJing. Modul8 is simple principle such as picture's R, G, B conversions, picture's scale, speed, picture coordinate's change and supports simple filter such as blur and noise.



Figure 3. “VDMX5” Program



Figure 4. “Pro Video Player” Program

VDMX5 shown in Figure3 is a program which is used most among VJing programs and can mix two kinds of INPUT pictures and implement standby of PGM and PVW.

Pro Video Player shown in Figure 4 is very simple program which can mix picture only and is used in case of emergency such as download of other programs.

Table 1 shows actual status of patent centering on tangible interactive technology with regard to performance picture VJ software development.

Table1. report on preliminary feasibility test for media industry R&D base establishment and result diffusion project[6]

| Classification | Korea | USA opening | USA registration | Japan | Europe | Total |
|--------------------------------------|-------|-------------|------------------|-------|--------|-------|
| Commercialization based technology | 30 | 65 | 26 | 31 | 18 | 170 |
| Education system building technology | 77 | 49 | 19 | 50 | 2 | 197 |
| Advertising production technology | 192 | 233 | 49 | 69 | 22 | 565 |
| Game development technology | 87 | 198 | 57 | 150 | 30 | 522 |
| Experience center technology | 29 | 23 | 57 | 107 | 8 | 224 |

Commercialization based technology, education system building technology, advertising production technology, game development technology and experience center technology in media industry are surveyed and classified in a various way but there is little patent which is directly related to VJing programs.

3. Motion response performance cases

“VJing is used in clubs, parties and events. VJing can be projected on various surfaces such as public places and buildings beyond indoor screen and stage by new idea of visual artists.”[7]. According to previous studies, the number of performance using mapping or performer's motions is more than that of performance using VJing.

First case is Scotto Snibbe, “Deep Walls”. Scotto Snibbe, “Deep Walls” is a video control case that uses representative interactive media and tracks viewer's motion by using video camera. Scotto Snibbe, “Deep Walls” can lead viewers to participate by exposing viewer's figure with a form of shadow as it is through installation art using video camera. In Scotto Snibbe, “Deep Walls” viewers are art work making good use of interactive media and screen based interactive installation performance art is expressed.

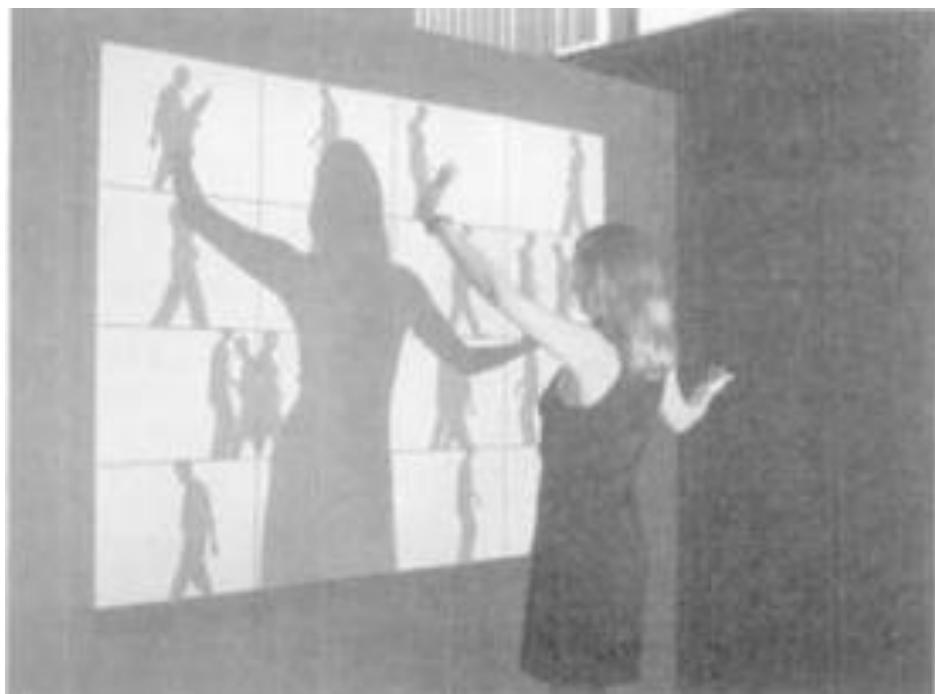


Figure 5. Scotte Snibbe, “Deep Walls”

Second case is one that 3D projection mapping technique is applied in music festival performance(EDC : Electronic Daisy Carnival). In the performance, high interaction with viewers in real time VJing is shown. In the performance, patters that use line, side and figure utilizing graphic image is shown.



Figure 6. EDC 2012 : Bassrush Experience

Third case is 2014 Gorak Festival. In the festival, one side large screen with three sides of Sangam Joint Production Center projection mapping and a total of 3.5 side of screen was made by integrating central LED. In the festival, 4 switcher for broadcasting were used and each side was utilized and sides were implemented depending on direction.



Figure 7. 2014 Gorak Festival

Fourth case is 2014 Loop Barcelona Together. 2014 Loop Barcelona Together enhanced participation of viewers by using artwork and viewers in real time. In 2014 Loop Barcelona Together, Kinect was used to change sound and beat making good use of input source when viewers move as if they play game.

Media performance that real time interactive is possible enables viewers to expand their experience by directly responding to viewers.[8]



Figure 8. 2014 Loop Barcelona

In a test based on cases, artwork was completed through viewer's gesture and motion and DJing + VJing which was considered that only experts can perform was accessible to viewers and direct experience of viewer(performer) made it possible for viewers to have more impression and sympathy.

4. Extraction of motion data

Michael Buckwald and David Holz developed Leap Motion, HID in 2010. Lip Motion tracks hand's motion by using infrared camera and recognizes hand's motion by drawing 3D map with computer. Lip Motion Sensor consists of two infrared camera(infrared recognition module) and three infrared LED(light source). Infrared camera receives picture information and determines x,y,z axis. Specific dots on the screen

are extracted and moving orbit is tracked successively and tracked dots are analyzed to recognize movement.[9]



Figure 9. Leap Motion

Lip Motion is implemented in the same principle with Microsoft's Kinect but sensitivity of Lip Motion is about 200 times as high as that of Kinect sensor and can sense up to about 1/100 mm.[10]. Lip Motion communicates with device(computer) through USB and supports most OS(Operating system).



Figure 10. The inside of Leap Motion

5. Implementation

This study aims to develop software that can expand a role of existing VJ which controlled only pictures into an area which DJ's one man implementation by implementing control elements that are necessary during VJing process such as picture replay, stop, clip conversion utilizing user's finger position.

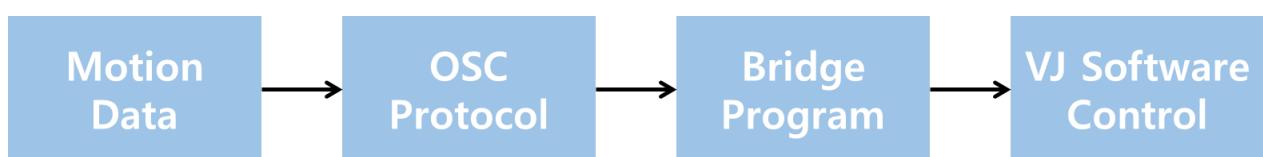


Figure11. Gesture data transmission using communication

Motion data that was received from lip motion, Kinect and infrared camera was transmitted to VJ software which was produced through transmission to standardized OSC communication so that control of software such as picture clip and effect is possible.



Figure 12. Clip control of VJing program that tracks user's hand position and motion

System that can systematize and manage signals concerning standardized TCP/IP, OSC, Syphon was used for sharing/linkage through data transmission between programs.



Figure 13. Equipment and software which is compatible with OSC

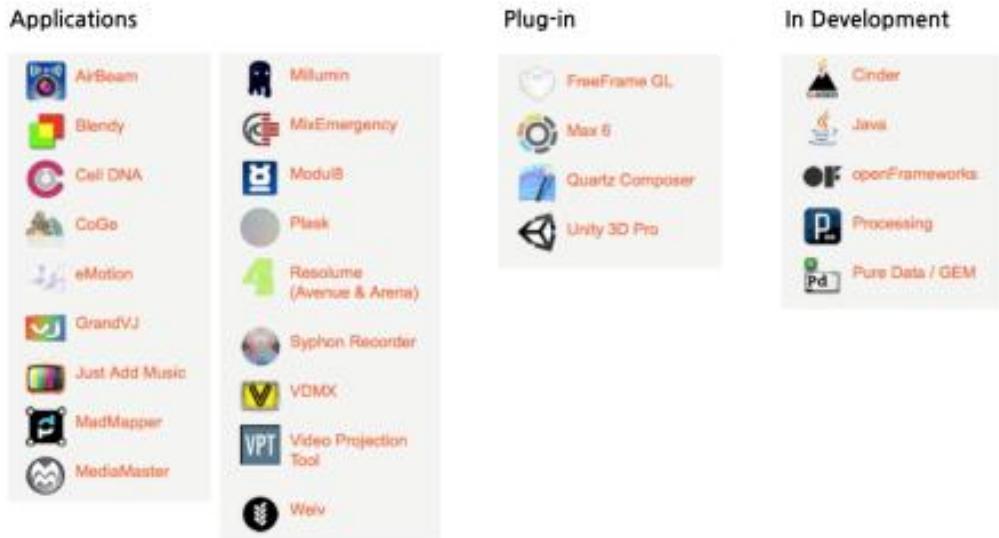


Figure 14. Syphon compatible software

TCP controls end to end communication with Transport Layer(fourth class) based on client-server model in OSC 7 class and if demand for setting connection for transmitting data in upper class, implementation is performed by setting connection to TOP of opposite node.

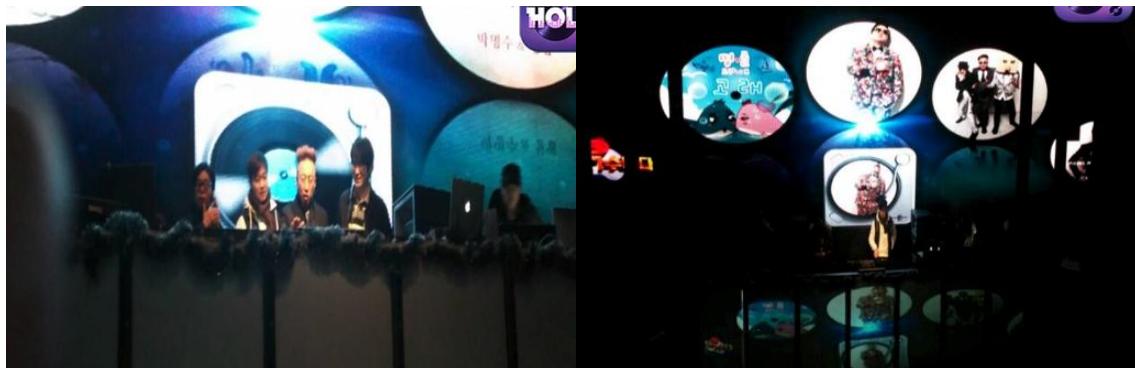


Figure 15. Lip motion contents test

The figure above is VJing that switches video by selecting motion, gesture and pictures in real time utilizing 2014 Park Myeongsu club day and lip motion +Resolume. The figure above was implemented so that video and sound can be controlled by utilizing gesture in real time.

6. Conclusion

This work was made in such a manner that anyone can participate easily and DJing and VJing can be controlled in real time utilizing media + engineering beyond simple selection of video using picture's switch. Picture, acoustic and effect were controlled in real time by connecting Leap Motion device and Processing + Resolume Arena program through Syphon communication which made it possible for viewers to experience virtual space and expand their experience. It is expected that utilizing image(2D, 3D, 4D)control through

viewer's gesture will improve virtual reality space and video mapping through control which makes it possible to be used as medium of various positive communication in addition to media art, interactive media and VJing.

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