

Implementation of UHD Interactive Media Art Work through Multi-Touch Interface

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Abstract

*In this study, in order to implement 9K (8960*720, 3840*1080) image in real time, interface was recognized by receiving 2 touch inputs and as its system processing result, image of 7K(8960*720) was displayed and media art work was implemented based on cube type multi display work of Gwangyang POSCO Technology Institute. UHD interactive media art through multi touch interface enables user setting based on display bezel and it could be utilized in a diversified way in the future.*

Keywords: POSCO, Multi Display, Multi-touch Interface, Media Art, Interactive, UHD

1. Introduction

Technology of ubiquitous computing technology is being developed rapidly and along with this trend, all the human living environment provides intelligent type services organically by using diversified devices [1].

This work was presented and displayed as cube type interactive media art in PR Hall of POSCO Technology Institute, Gwangyang, Korea and recently owing to unusual concern and research on development of computer technology by a lot of people, development of computer H/W and S/W technology has been progressed actively [2].

Multi touch interface tool being typically used in actual life is a system of supporting touch input using table and its display output. By utilizing this table-top interface, users are able to perform the works in diversified fields including dietary life, study, business, conference and play independently or jointly [3].

Display system representing visual effect uses table-top as input tool in order to provide users with a sense of reality and it has been developed up to C6 comprising 6 screens surrounding users [4].

In order to provide users with a sense of reality based on features of expandability that the audiences desire more information and wish to watch more wide screen, visual effect, interaction of motion, auditory effect, tactile effect and various other effects are used. The most effective way of giving a sense of reality among these is visual effect [5].

[6] Such visual effect was expressed by utilizing DID (Digital Information Display) that was developed by utilizing outdoor display.

In this study, UHD interactive media art work utilizing multi-touch interface that may be utilized as DID based technology was implemented and connection of multi-touch utilization through network, connectivity using scale expansion of display and network system for implementing UHD display and change of image depending on bezel in its connectivity were implemented as a system of displaying visual expression.

2. Outline of Table-top Interface

2.1. Structure of Table-top Interface

Table-top interface is user interface based on table and table is used for placing physical object or other space for information. In other words, table is composed of one image output and user input system. First table-top interface is Digital Desk suggested by P. Wellnaer [7, 8] and afterwards, through numerous researches, its commercialization was achieved.



Figure 1. Microsoft Surface

Microsoft Surface is a product that extensively performed commercialization for this table-top interface and users are able to watch photos or enjoy simple game together through Surface.

2.2. Structure of U-Table

U-Table is basically furnished with a shape of table and it was developed in a mode of using beam projector in 2005 [9, 10] and it was upgraded as a version of using LED HD display in 2010 [11]. Characteristics of U-Table is that basically upper side of table is used as input system and for user input and output, backside projection and recognition method are used as a whole. While using upper side of table as input system, information manipulation and transmission of audiences are used as input information by hand motion. Information manipulation and transmission could be performed identically with fingers by recognizing finger of audience as a mouse.



Figure 2. DIY MT-50 Multi-touch Table (Projector type)



Figure 3. Tegatech 42 inch uTable 10 (LEDType)

3. Implementation of Cube-type Display Contents utilizing DID

3.1. Integration of Displays

Cube-type network display could be used as a display by using not only model system of identical specification but also display systems (Ex. PC Monitor, Projector, PDP, LCD,TV, LED TV, smart-type tablet) of diversified forms.

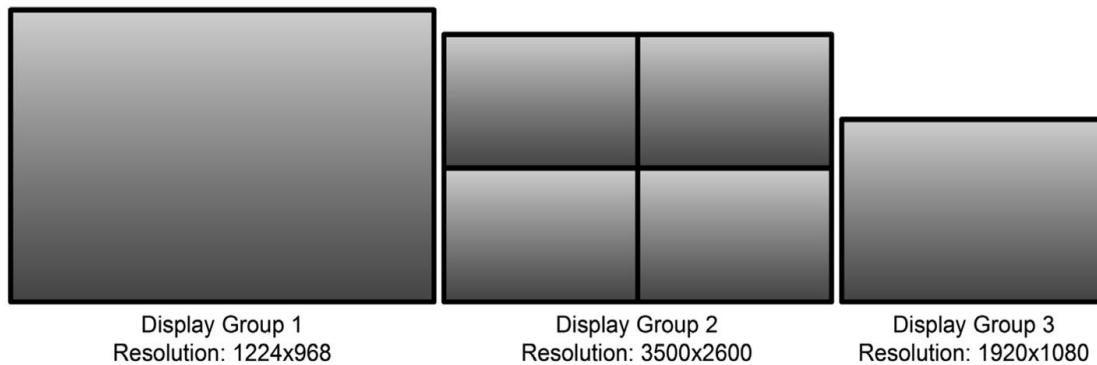


Figure 4. Grid-type Network Display Group [12]

As shown on Figure 4, each group is composed of display system of same form and it includes size of network display, resolution, monitor arrangement and IP address information. [13]

3.2. Implementation of Cube-type Display Contents

Displays being connected with each network have its own resolution and size and at this time, each different bezel exists depending on location, purpose of installation and individual device. This bezel may make heterogeneity of contents to be represented depending on monitor arrangement and image resolution in UHD image.

As shown on Figure 5, vacant space exists between image display groups and even though space between displays should be composed as narrowly as possible, bezel remains due to current technical limitation and in case of UHD display, it actually takes long time to narrow such space notwithstanding development of computer H/W in its contents through render process of image. As such, UHD image was implemented through rendering process of one

time in a way of adjusting ratio of total image by removing pixel as much as left, right bezel size after program coding bezel pixel of image followed by making bezel space between displays as pixel through programming bezel of such space.

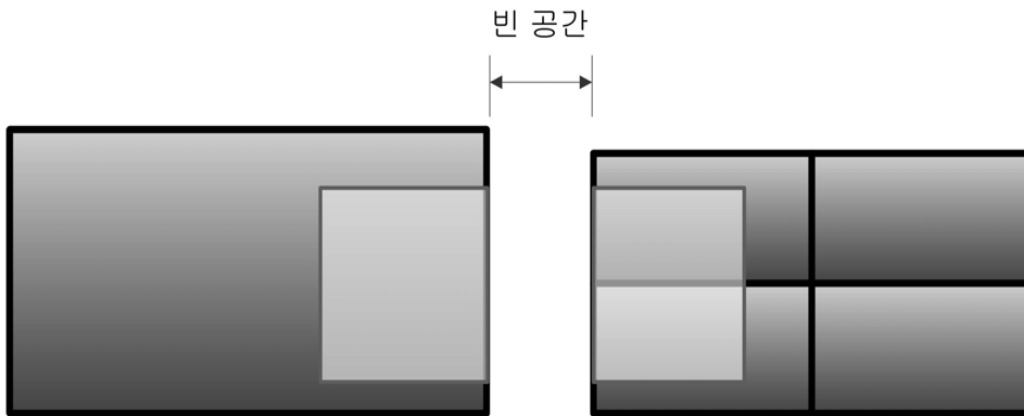


Figure 5. Image Revival Disregarding Vacant Space between Display Groups [14]

By program coding bezel pixel, UHD image was implemented through rendering process of one time in a way of adjusting ratio of total image by removing pixel as much as left, right bezel size.



Figure 6. Image Contents Twisting by Bezel



Figure 7. Image Deletion Process as much as Bezel Size

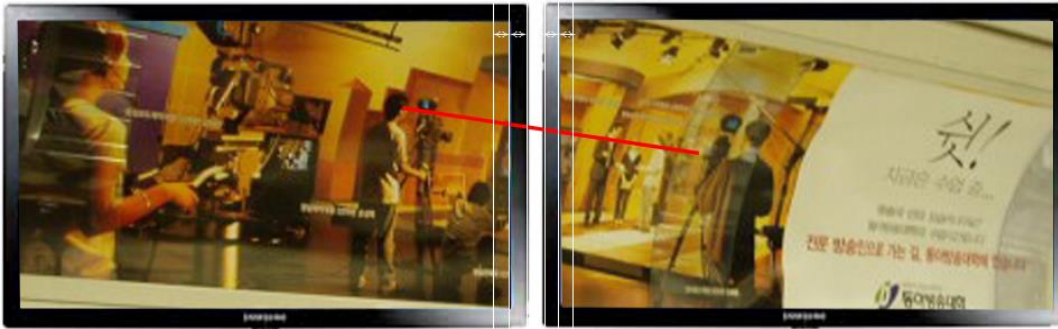


Figure 8. Partial Adjustment of Twisted Image after Deleting Bezel Size Image



Figure 9. Adjustment of Image being implemented in Vacant Space between Display Systems

Image twisting phenomenon as a result of implementing vacant space between bezel size and display system was adjusted by filling up vacant space through free transformation as much as vacant space after deleting left/right size between image contents followed by receiving input of half pixel size between bezel size and display system.

Recently, as bezel size gets thinner owing to development of technology, above method is a case of implementing minute twisting part of image contents just like a completely connected image. The more vacant space of system gets wider due to spatial arrangement problem between vacant space and display, the more is deleting area of image increased and as a result, a function as contents is partially lost and information to be provided to the audiences is reduced as a disadvantage but it is judged that when implementing UHD display, the more display volume is increased, a lot of time could be shortened.

4. H/W Configuration and Program of System

In most cases, implementation of big board through DID is progressed through an implementation mode of increasing screen size by matching one screen with number of display. Implementation of cube-type network display was progressed in order to ensure its visualization by utilizing DID. This media art work was furnished with interactive components by implementing UHD image of HD (1920*1080) class in 9 sets of DID display and 2 sets of table top of input stage and cube-type display image on the part of visualization implemented HD image of HDV (1280*720) class. (Tabletop: 3840*1080, Visualized display: 8960 *720)

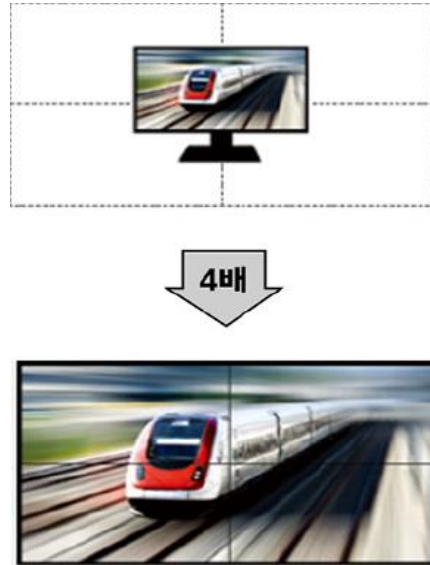


Figure 10. Implementation Mode of Existing Multi Vision (One HD class Image)

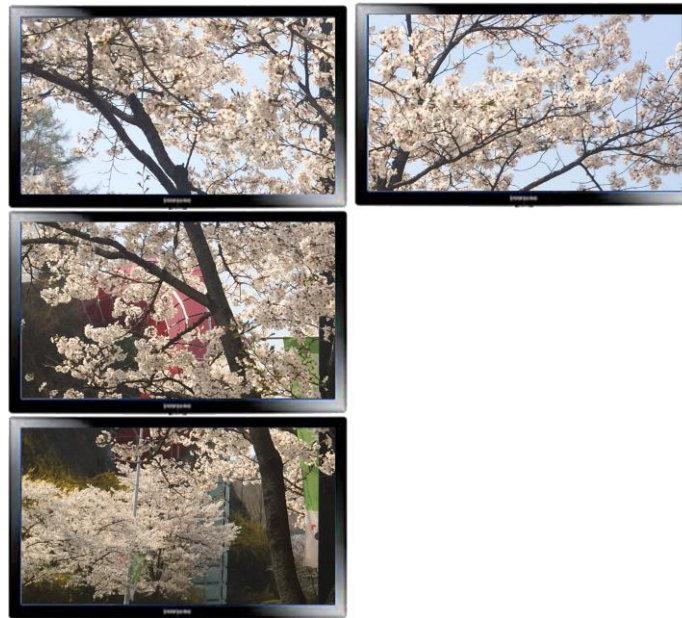


Figure 11. Suggested Display Implementation Mode (HDV (1280*720) per Display)

DID is adjusted through one set of control PC per its 2 sets. Control PC comprises total 5 sets and each control PC exchanges signal through network hub signal.

This system comprises 9 sets of DID, 2 sets of touch screen, 1 set of controller for server, 4 sets of user controller and 1 set of network hub and when input signal is entered in 2 sets of touch screen, display is controlled in a way that network signal is transmitted to server controller and server controller sends signal to each user controller based on signal in each input stage.

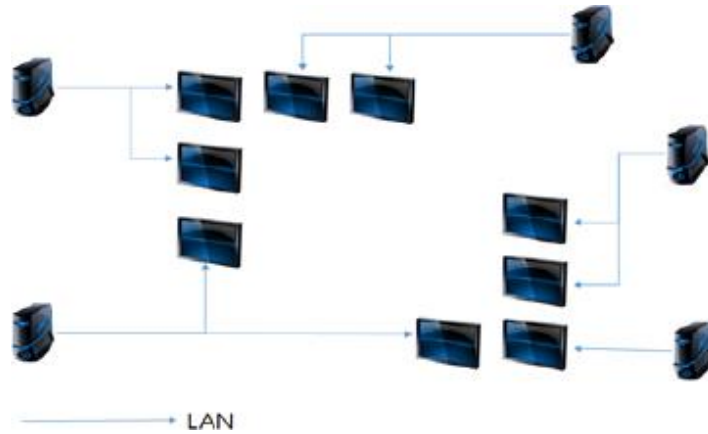


Figure 12. Configuration of System H/W

System H/W comprises as shown on Figure 12 and system S/W configuration is as follows.

1. Touch recognition S/W : Commercial program
2. Server program(Network signal communication) : PROCESSING development
3. User program(VIEW program) : MAX/MSP JITER development

Touch recognition S/W is a signal program and it was implemented for controlling input signal through IR touch.

Server program is a program of sensing network signal and when receiving signal input based on signal of touch recognition program, it communicates signal with main server and main server completes visualization work by transmitting signal to user program.

User program is VIEW program and it finally visualizes image by adjusting image twisting between displays in each display after receiving signal of server program.

5. Conclusion



Figure 13. Implementation Scene of Display



Figure 14. Implementation Scene of Touch Input

In multi vision that could be commonly seen in our surroundings, this work through smart big board is made by implementing big board display of 8960*720 and big board of user interactive input stage 3840*1080 (2K) that are sophisticated than UHD in terms of development of H/W being diversified and implementing through UHD in image through network system [15]. In this work, in order to develop cube-type interactive display system through □-shaped frame of Korean style, not existing stereotyped rectangular frame, and multi network connection S/W was developed. UHD image larger than UHD (4K) was implemented and considering that location of audiences and H/W is very close, individual image for every display was adopted and many audiences were made to select and appreciate media art works of UHD image system through system touch input and watch detailed explanation through table display.

In the future, a study method on UHD image as a result of display scale expansion is scheduled to be established and a study on contents applicable to diversified displays is required to be performed without sticking to frame of existing pattern.

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