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Aesthetic Study of Panopticon Space Implemented in Virtual Space

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Introduction

Background and Purpose of the Study

This study aims to examine works that incorporate panopticon space from an artistic perspective. The term “panopticon space” derives from the panopticon, a circular prison first conceived in 1791 by Jeremy Bentham (1748–1832), in which a central watchtower enables constant surveillance of all inmates.[3] This spatial configuration produces an effect that restricts the behavior of those confined within it. In other words, the space itself induces performativity in its occupants. Accordingly, the present study seeks to explore the aesthetics of performativity as it manifests the distinctive characteristics of panopticon space.

In classical art, the flow of information was unidirectional, moving solely from the artist to the audience (one-way). However, in the art field following postmodernism, both the artist and the audience have come to assume the role of participants together. Depending on the audience’s preferences, the artistic act itself may change, and the audience can even alter the outcome in the direction they desire; in summary, the environment has transformed into one characterized by interaction. Media art, which has emerged as a new artistic domain, can be said to have interactivity as its core defining feature. Meanwhile, with the advancement of digital technology, computer games have firmly established themselves as a distinct cultural genre.

Against this background, the researcher recognizes the differences that exist between conventional physical spaces and virtual spaces, and focuses on examining agency and performativity, which are among the defining characteristics of virtual space. Furthermore, the study seeks to ensure expandability and scholarly rigor by grounding the research in established theoretical frameworks.

Research into the inherent artistry and aesthetic approaches unique to virtual space is undoubtedly important. However, this study considers interactivity—the point that most distinctly differentiates virtual space from other art genres—and, within that, the performativity that demands active play from the user, as the central focus. In other words, it aims to connect the theory of performativity in virtual space with the theory of performativity in art, thereby establishing an integrated theoretical framework that bridges these two perspectives. Currently, research on virtual space remains relatively scarce in many academic journals compared to studies on other media or popular culture.[4] Moreover, since the 1960s, artists, critics, art theorists, and philosophers have argued for the need to break down boundaries

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[3] Lim, Han-sol. “A Study on Images of Everyday Life through the Digital Panopticon.” Master’s thesis, Mokwon University, 2020, Daejeon.

[4] Kim, Gyeom-seop. “Digital Games as a Medium of Performative Action and the Practice of Players.” Brecht and Contemporary Theatre 46 (2022): 175–203.

between artistic domains, and have put this into practice. Traditional aesthetic theory has limitations in explaining virtual space.[5]

Related Studies

Virtual Space and Art

If virtual space today appears as a form of artistic activity, then philosophy of art must clarify how the artistry of such diverse artistic practices can be discussed. To this end, the study first defines what virtual space is and then examines the current state of related artworks.

The fact that virtual space can possess meaning as a cultural practice is possible only thanks to the concrete practices of players—that is, the performative practices of digital performers. Since practices within virtual space manifest in highly diverse forms, they need to be illuminated through multifaceted and multidimensional perspectives and methods, such as narrative, playfulness, and gameplay itself.

Performativity in Virtual Space

Aesthetics of performativity

This study raises the question of why aesthetics in virtual space is necessary. As Erika Fischer-Lichte puts it, "Feelings, thoughts, and actions seem to form new relationships. In this context, the audience is not only a subject who feels and thinks, but also an agent who acts."[6]

In music, the phenomenon of performance, emphasizing performativity, emerged in the early 1950s with John Milton Cage Jr.'s "Event" and "Work." In these performances, the diverse actions and sounds produced by the audience—in other words, the audience's voice—became events.

In literature, performance occurs internally within literary works. For example, there are novels like labyrinthine works that transform readers into writers, presenting material for readers to freely assemble. The key to this shift toward performativity lies in the relationship between performer and audience.[7] In the 20th century, especially since the 1960s, artists, critics, art theorists, and philosophers have argued for the need to break down boundaries between artistic disciplines, and they have put this into practice[8], Performance is, Maurice Merleau-Ponty viewed the body from the perspective of historical ideology and identified it as a treasure trove of possibilities. In other words, the body was viewed as a symbolic process in which all possibilities that exist in a specific culture and history are actively revealed. On the contrary, Butler describes the process of performative production of identity as an embody process. In the meantime, the embodying process is defined as a behavioral pattern and a method of dramatically reproducing historical situations. In this sense, the aesthetics of performance in virtual space goes beyond simple discussion of artistry and tries to explain in more detail what their work intends to do based on the theories of theorists who talk about performance while looking at the meaning of the movement intended to the player-performer in the game aesthetically.

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[5] Austin, J. L. How to Do Things with Words. Translated by Kim Young-jin as Malgwa haengwi: Oseutin-ui eon-eo cheolhak, uimiron, hwayongnon. Seoul: Seogwangsa, 1992.

[6] Erika Fischer-Lichte (2017) 30p

[7] Erica Fischer-Lichte (2017) 33p

[8]

Performance in Virtual Space

The aesthetics of behavior can be explained as feeling harmony through actions. If the behavior of the virtual space is transferred to the real world, it will be possible to add more value to life, and through this, artistic value can be found. Virtual space is thought to overcome various limitations and pursue meaningful experiences. Accessed https://youtu.be/4S-pJ5r8cUI)(0000 00/00).

In space, we temporarily accept behavior. In other words, games are a medium for storing and giving and receiving various forms of behavior. Therefore, the group of games constitutes a library of behavior. Games store different behaviors and social arrangements for those behaviors, and provide access and immersion experiences for them. Therefore, you can explore the library of behavior and encounter various types of behavior.[9]

Preliminary research for implementing one's own work

Technology applied to virtual space

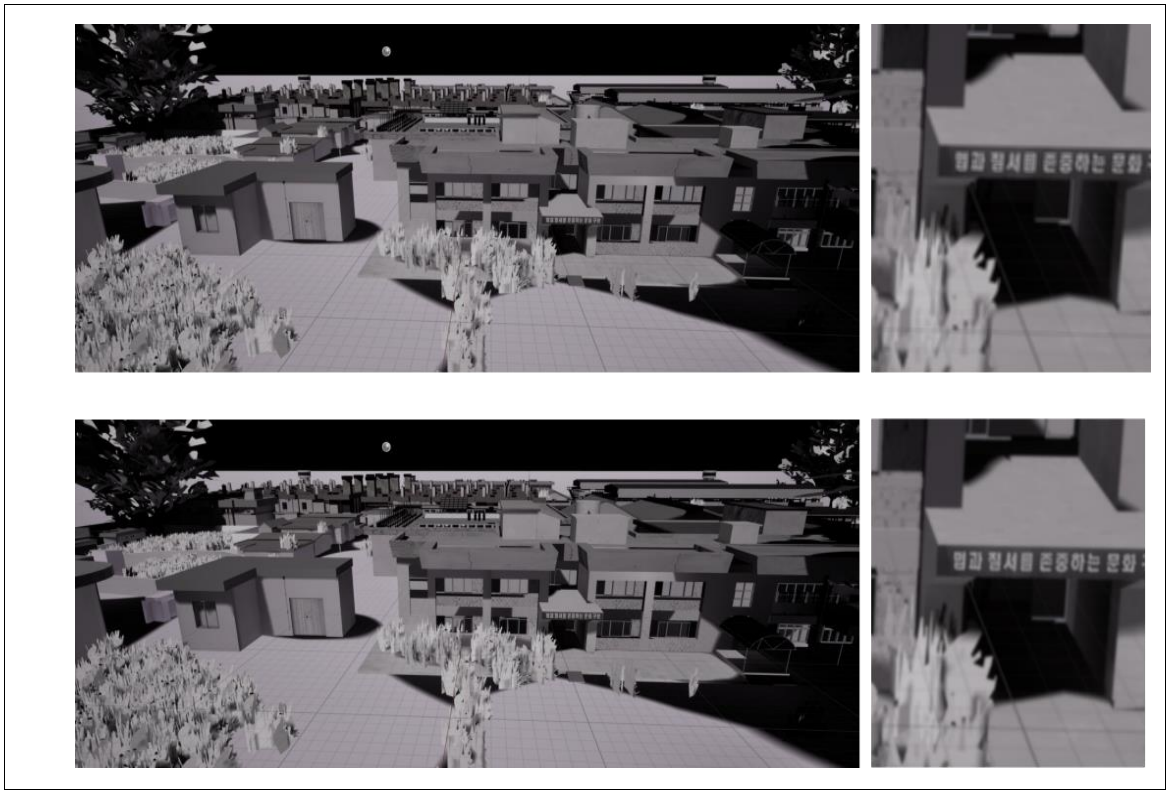
Technology applied to improve performance in this work

In Unreal, Gaussian blur was applied with its own shader to create a more natural screen. In the case of actual conventional average value filtering, both the file cell close to the filtering target location and the filesec far away use the same weight and calculate the average, which can be greatly affected by pixels far away. However, it can be seen that the Gaussian filter has little influence from pixels far away.[10]

In this paper, we intend to use these functions and apply them like blurring to make the space with a rough feeling soft and create a more natural space. Since it was used a lot in the video preprocessing process in the past, we will study the shader by referring to the OpenCV code.

[9] Lee Jun-myung, Na Jung-hwan, Do Young-im. (2016). The relationship between the player's personal disposition and the trolling behavior in the game. Journal of the Korean Game Society, 16 (1), 63-71, 10.7583/JKGS.2016.16.1.63

[10] https://ko.wikipedia.org/wiki/%EA%B0%80%EC%9A%B0%EC%8B%9C%EC%95%88_%EB%B8%94%EB%9F%AC



[pic 3-3] Above) Mean Value Blur and Below) Gaussian Blur

The picture above is a screen using average blur. If you look at the line of blur and the clarity of the text using the average value, it can be seen that it looks blurry more than Gaussian. The method of producing such blur can produce Unreal's custom shader using the High Level Shading Language (HLSL). When implementing Post Processing in Unreal, it is largely divided into two. It is to create an actor to set the space to apply the Post Process to the Scene and the type of Post Process to be applied, and to directly implement the Post Processing effect.

Setting the space to apply the Post Process to Scene uses the Post Process Volume. It is produced by automatically modifying the generated actor, and if you click the Plus mark on the Array in the Rending Features part of the Detail panel and click Asset Reference, there is a space where you can directly designate the material. You can add Material with Shader applied here. You can create a material and create a custom node here.

A shader that performs sampling on each pixel was implemented using a 5x5 Gaussian kernel. The first loop processes the longitudinal offset, and the second loop processes the transverse offset. For each pixel, the UV coordinates of the current pixel are calculated as follows.

uvShifted=uv+float2(u,v)uvShifted=uv+float2(u,v)

Here, uu and vv represent offsets in the horizontal and vertical directions, respectively. The weights corresponding to each pixel are obtained as follows.

weight=weights[temp+j]weight=weights[temp+j]

The color values are then extracted by sampling textures from the shifted UV coordinates:

```
tex=Texture2DSample(PostprocessInput0,PostprocessInput0Sampler,uvShifted).rgbtex=Textu
re2DSample(PostprocessInput0,PostprocessInput0Sampler,uvShifted).rgb
```

Finally, the accumulated color values are weighted and added.

```
res+=tex×weightres+=tex×weight
```

Through such a process, it is possible to obtain a blur processing result by applying the weights of neighboring pixels to each pixel of the texture. The shader implemented in this study provides a smooth blur effect using a Gaussian kernel.

Production of a work

Data collection

Independent curator group “Overlap” has presented the results of its online media art project "Transparent Society" under the theme of the May 18 historical site "Old Gwangju Prison." The project, which will be unveiled on the web platform of Weaving Lab (weavinglab.net), is part of the online media art activity support project of the Korea Culture and Arts Commission. It is the result of the past two years of collaboration with artists inside and outside the region. Starting from the former Gwangju prison, they conducted a search for the topic of power and control in modern society. They experienced the layout of spaces optimized for monitoring and control and set up a virtual community space using digital media in the era of digital panopticon. Through this, it dealt with the reasons for power and control, surveillance and punishment, discipline and oppression of this era. In 2022, local artists (Kim Ja-i, Kim Hyun-don, Bae Soo-min, and Choi Sung-wook) and humanities and social science researchers (Park Kyung-seop, Yoo Gyeong-nam, and Jeong Soo-nam) set up the old Gwangju prison in a virtual space in 3D and VR through field trips and research. In 2023, the VR public art project was carried out with artists outside the region (Kwon Hae-il, Kim Si-heon, Park Sun-ju, Jeong Hye-jin × Jo Mal, and Cha Yuna) in Seoul, Daegu, and Busan, expanding the scope of activities and thoughts. The two-year research and experiment was completed with a total of 10 teams in the VR space.

In a virtual space on a web platform that faithfully records the research process, visitors can experience the old Gwangju prison in 360 degrees and see artworks displayed in various places. It also introduces individual artworks of participating artists, which collected the process and results of the past two years. Visitors can also read articles and videos of participating researchers, including the history of the former Gwangju prison that led to Dongmyeong-dong and Munheung-dong, plans and imaginations related to site development (Park Kyung-seop), and emotional and sociological reading of the space (Jeong Soo-nam). Visitors can also view image records of the former Gwangju prison, the progress of the project, and interviews with participating artists and researchers. "We want to reveal the overly unbalanced relationship between power and governance in a human-centered society, and provide an opportunity to look back at contemporary society from a new perspective," said Kim Sun-young, CEO of Overlap.

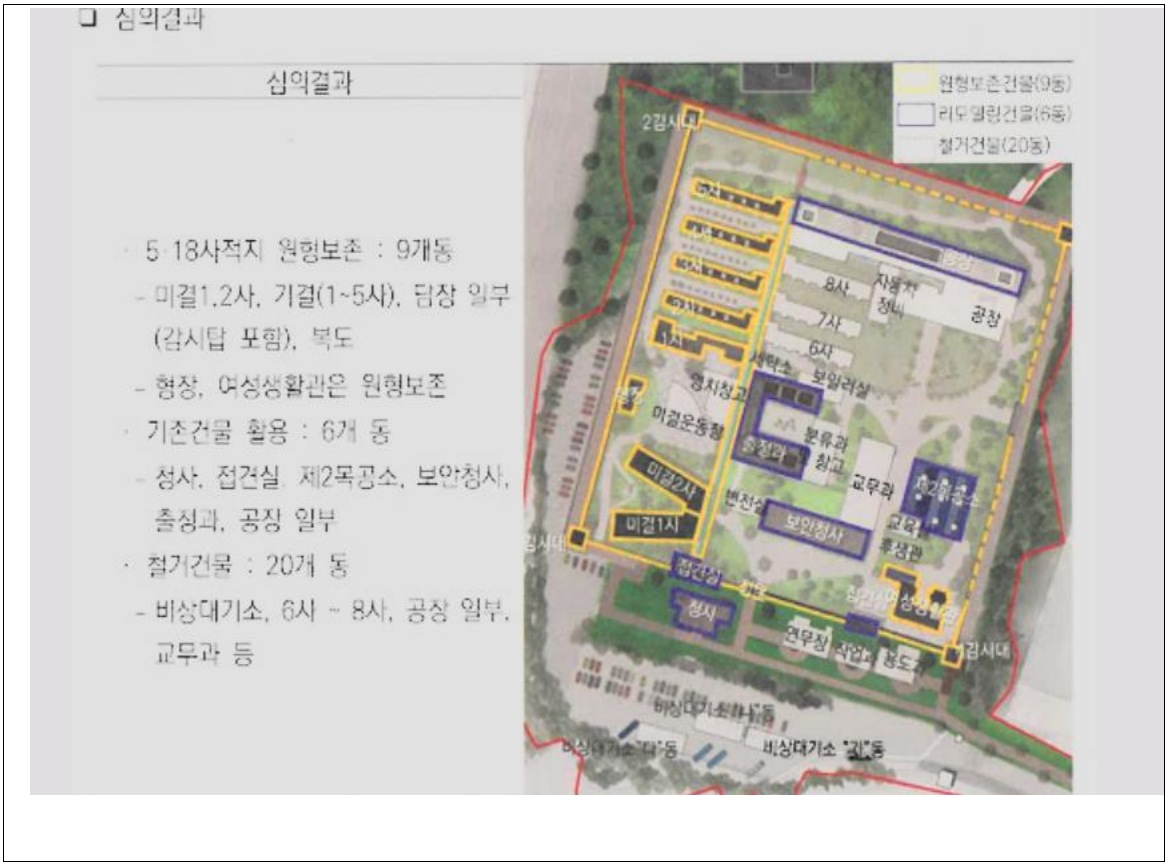
In order to produce this work, I visited the Gwangju historical site a total of three times, and I was able to explore the inside with the help of the Gwangju 5.18 Research Institute. In this process, photos and videos were taken and researched to be used in the work.

Modelling and Texture Creation

I will explain the 3D asset production process for the production of the work and the texture map required for the texture process to help you understand the overall process. First, the 3D asset production pipeline is largely composed of modeling, UV spreading, hypolygon production and scuffing, and finally texture. This process is conducted by most workers in a similar way, but there may be changes depending on individual preferences. This work is made of low polygons, but it includes the production of high polygons and the scuffing process because the details are made use of the normal map. Hypolygons are not included in the final work, and are used only to generate normal maps

It was largely divided into four stages as a production pipeline to proceed with this work.

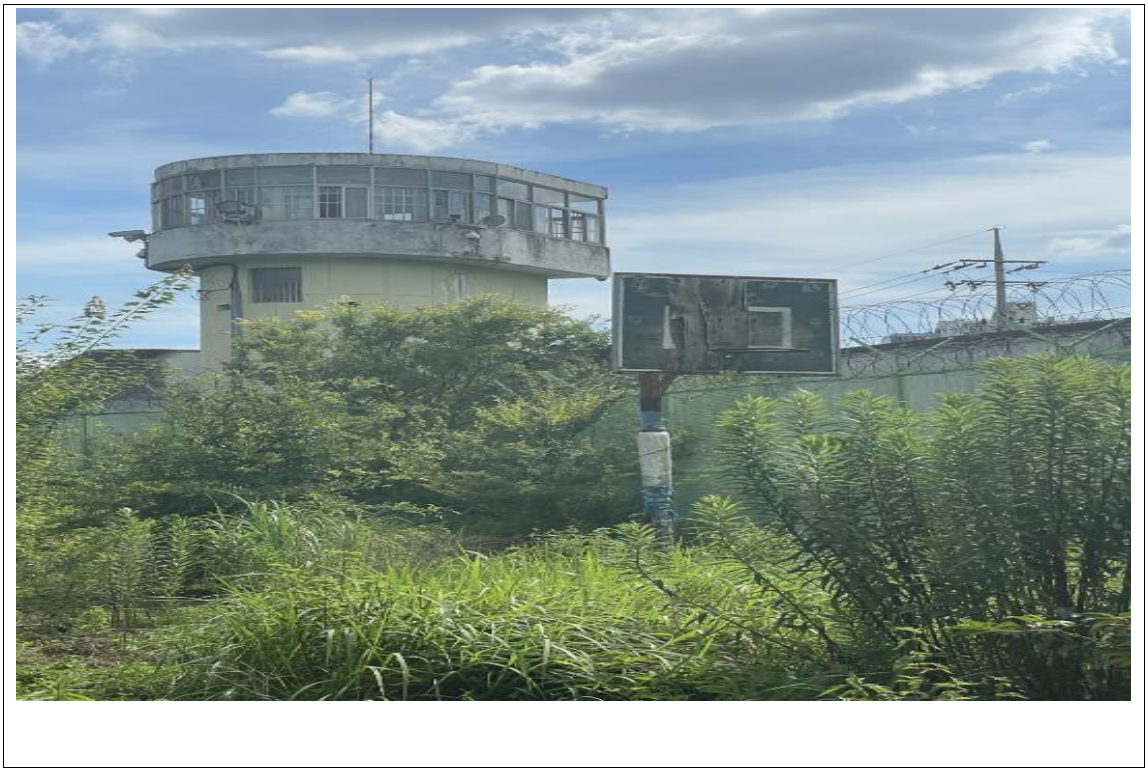
[pic 3-4] Work change before and after texture



[pic 3-5] The name of the actual space

[pic 3-6] a simple square-shaped building

[pic 3-7] a fence



[pic 3-8] watchtower, surveillance tower

The prison is surrounded by a huge wall in the shape of a square on flat land, and a high surveillance tower is arranged at each angle of the square. It is the structure of Foucault's Panopticon.

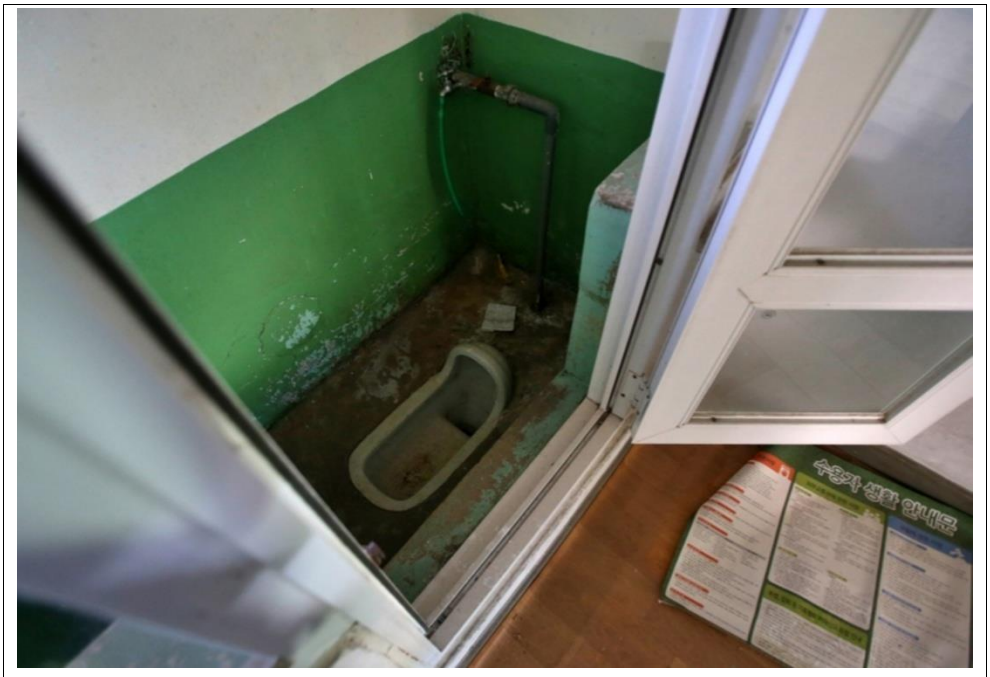
The alignment with the shape of the rectangular building is a structure for efficiency of surveillance and movement.

[pic 3-9] a passageway to a prison

The interior of the building is finely divided, and iron doors made of bars are installed throughout the passage. This finely divided space allows you to quickly grasp the movement and flow of communication of prisoners. It can be said that it is a spatial composition with a strong vertical and horizontal image. By actively utilizing these parts in my work, the actual interior space of the prison was also composed of the same space. And the inside of the cell is divided into various boundaries, and inside this, there are special rules unique to the prison. In general, inmates with a high rank are placed near the door where the prison guard's view is not reached, and the lower the rank, the more they are placed toward the bathroom.

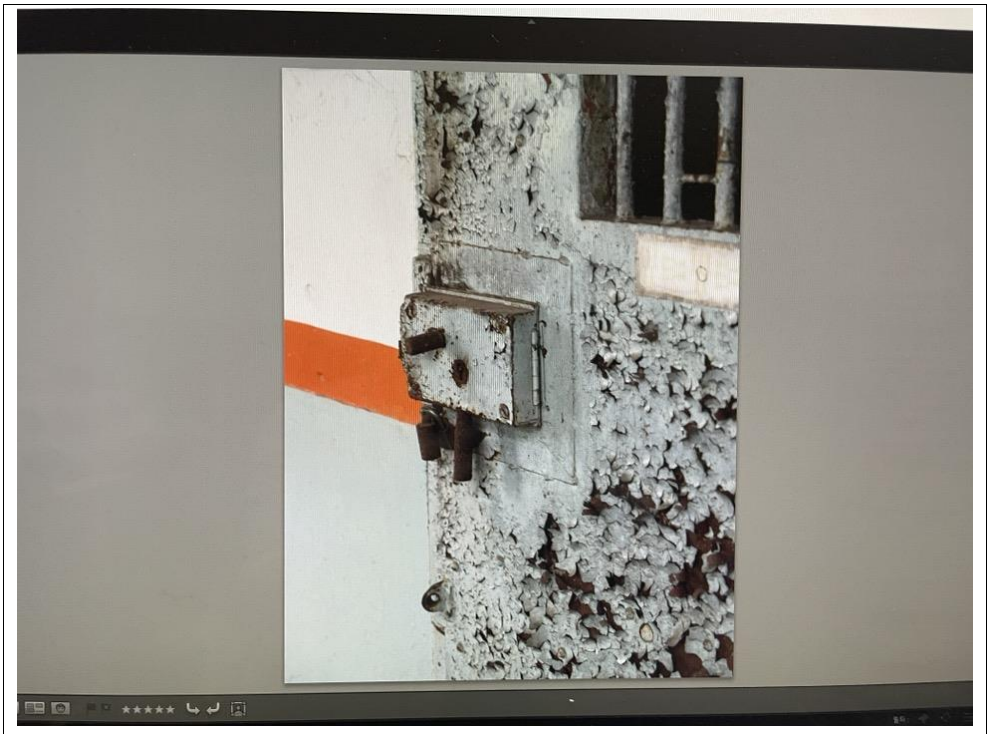
[pic 3-10] a prison information box

In Figure 3-19, the information inside the prison is drawn in detail. Based on this information, even in "Watched Me", visitors (players) must find their cell and find their place in it. As mentioned above, this is also the part that reflects informal tacit rules. You can feel the hierarchy, order, and atmosphere inside simply by visiting your place.



[pic 3-11] a prison bathroom

More than half of the toilets are open for anyone to see. The surveillance power affects even small and secret areas like this. Every space in which an inmate lives is visible to anyone at any time. This can be recalled that the inmate is in prison at every moment. To quote Jung Soo-nam, "All spaces in which a prisoner lives are designed to be seen by anyone."[11]



[pic 3-12] Locking device

All the cells, the doors of the inmates, have locks that can only be opened and locked from the outside. Control of the doors is done by prison guards, not inmates. It's only natural when we think of prisons, but this changes everything in the prison lifestyle. An inmate who is incarcerated will most directly feel that he has been incarcerated with this single device. It also says, "The fact that the lock is placed on the outside clearly reveals the asymmetry of power."[12]

[11] https://www.weavinglab.net/%EC%A0%95%EC%88%98%EB%82%A8

[12] https://www.weavinglab.net/%EC%A0%95%EC%88%98%EB%82%A8

[그림 3-13] prison Door

There is a small door at the bottom of the door. This is a small door to be distributed called a family container. This is because the prison space is composed in a way that is opposite to human dignity from the most basic human needs. Unlike how we usually get distributed in the cafeteria, we get distributed very inconveniently. This asymmetrically installed family container is a different emotional experience between the food provider and the recipient. At least, it evokes enough shameful emotions for the inmate.

While exploring the prison space in this way, we know that human movement and performance form change depending on the space. I try to actively reflect this part in my work. Therefore, in the work "watched me", it can be seen as a performance that can be experienced in the work to realize space and induce human movement in the form of structural space.

Space	Structural of space	Performance of Space
a square-shaped building	The rectangular building's shapes and aligned arrangements are structured for efficiency of surveillance and movement.	Movement while being observed
a fence	Rescue for disconnection from the outside world.	No outside
watchtower, surveillance tower	Structure for prisoner surveillance and efficiency of movement.	Movement while being observed
a prison passageway	A disciplined structure with a fixed direction of left and right movement.	Move according to the rules
a prison information box	Showing the hierarchy and order inside.	Should only be in designated positions
a prison bathroom	A structure that monitors privacy.	No personal privacy
Locking device	The power asymmetry that locks are installed on the outside.	Can't open the door free

a meal box	Unlike the way we usually get food delivered in the cafeteria, we get food delivered very inconveniently.	We get food delivered comfortably on our stomach

In the picture above, the interior of the prison has been relocated since 2015 and has not been managed at all. Numerous wastes and clutter interfered with accurate 3D scanning of the space. For this reason, I chose the method of taking pictures and videos myself and producing them.

[pic 3-14] Inside the prison 1

[pic 3-15] Inside the prison 2

[pic 3-16] Inside the prison 3

As you can see from the picture, the former Gwangju Prison, Gwangju's 22nd historical site, was left unattended. Due to the rainy season, the water in the basement was too high to enter, and some spaces in the prison were too low to enter. Numerous vegetations were also growing and destroying the building. This is because due to the internal circumstances of Gwangju, the remodeling and major repairs could not be carried out immediately. Therefore, the contents are explained in more detail on the Weavinglab website.

As a result, images, photos, and 3D scan data taken directly could not be used immediately, and processing and correction were carried out.

Conclusions and future research projects

In this paper, the system of performance behavior and rules of virtual space was emphasized. In particular, it emphasizes the interaction of space with the player, and through this, it deals with artistic phenomena as well as the power and reality composition of non-artistic phenomena, and aesthetic phenomena and experiences that cross life and art. It promotes a new perspective and understanding of virtual space through exhibitions, and aims for research for the development of multidisciplinary systems. This is to think about games outside the game through exhibitions.

This paper explores the expansion of artistry through an aesthetic approach through the player's performance in virtual space. Research methods are largely divided into three categories. First, it analyzes the performance through interaction through works related to virtual space displayed as prior research on virtual space. In this process, we try to prove the theory using an inductive reasoning method while conducting literature research. Second, based on the analysis results, a questionnaire was conducted through one's own work to analyze the aesthetic elements of the virtual space through the player's experience. Third, a conclusion was drawn by analyzing the collected data. In this paper, a questionnaire was composed by referring to the existing paper.

Through this method, the performance and regularity of the virtual space are emphasized, and it deals with artistic phenomena as well as the power and reality composition of non-artistic phenomena, and aesthetic phenomena and experiences that cross life and art.

In conclusion, this paper attempts to understand virtual space in depth through research on the characteristics of virtual space and performance in art. It is composed of a new media art form in a different form from the existing media.

The future task is to explore the interaction between virtual space and art in depth by continuing research on performance in virtual space and art in depth. It is also an important part of creating an aesthetic discourse, especially in the virtual space that is attached to the art museum.