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Future of Multimedia: Mixed Reality in Virtual 3D Exhibitions and Digital Products

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ABSTRACT

Creative digital application products are currently expanding rapidly and become the base of many countries to compete in the global market, including in Indonesia, which is preparing the creative economy of the digital application development subsector as a new force in the post-Covid 19 national economic recovery, especially in the focus of achieving the Sustainable Development Goals (SDGs). In the 2020 Game Industry Ecosystem Map report, it is known that 57% of the 80 surveyed digital application development companies said that productivity has declined since the pandemic, with the emergence of a new variation of Covid 19 type Omicron appearing at the beginning of 2022, making the impact of the epidemic on the industry huge. Therefore, the government has made a policy to carry out the recovery jointly through the Programme Strategy (RPJMN) of the National Medium-term Development Plan 2020-2024 (SDGs, Objective 4 Quality Education), on the Development Programme of innovative study programmes adapted to the needs of development and industry, with a partnership strategy of universities and industry for curriculum alignment, development of curricula, research and development activities. The method used in the research is MDLC (Multimedia Development Life Cycle). In this study, 1 virtual 3D exhibition building was produced with 6 rooms consisting of a game and application media room, a digital illustration room, an industrial partnership room accompanied by an interactive navigation design based on Mixed Reality.

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1. INTRODUCTION

Creative digital application product development is currently expanding rapidly and becomes the basis for many countries to compete in the global market, including in Indonesia that is preparing the economy of the creative digital application subsector as a new force in the post-Covid 19 national economic recovery, especially in the focus of achieving TPBs (Sustainable Development Goals) or SDGs. (Sustainable Developments Goals). The SDGs programme sets 17 goals and 169 targets that cover sustainable development issues as well as several indicators that have their own mechanisms to improve. The SDGs emphasize the basic principles of People, Planet, Prosperity, Peace and Partnership, or better known as the 5P.

The National Development Planning Ministry's Road Map of the SDGs of Indonesia Towards 2030 sets out the goals and policy directions of the Sustainable Development Goals (SDGs) for the period 2020-2024 for the development of creative economy industries under the digital application development sector. It includes the National Medium-term Development Plan for the year 2020-2024, on the acceleration of structural transformation through modernization of agriculture, reindustrialization, and the utilization of new growth resources with the strategy of strengthening the film, animation, games, and music industries. Then there is the programme (RPJMN) of the National Medium-term Development Plan for 2020-2024 (SDGs, Goal 9 Industry, Innovation, and Infrastructure), on the development programme of industrialization with strategies to exploit the competitive advantages of Industry 4.0, creative and digital economy.

Muhammad Neil El Himam, M.Sc. (Deputi Bidang Ekonomi Digital dan Produk Kreatif Kementerian Pariwisata dan Ekonomi Kreatif. 2021), stated that the creative digital application development industry has opportunities and potential to dig in the midst of an increasingly ready-made digital infrastructure. The creative digital application development subsector is one of Indonesia's creative economy subsectors that contributes high, especially in the time of the COVID-19 pandemic. Simply put, the number of domestic creative digital applications products is still not counted too large because Indonesia mostly still imports or buys applications from other countries.

Tourism and Creative Economy Outlook Book 2021, stated that the contribution of the industrial sector of the subsector of development of creative digital applications to the national GDP (Gross Domestic Product) in 2019 reached Rs. 1.2 trillion and in 2021 reached the figure of Rs. 24,88 trillion or about 2.19 percent. Dr. H. Sandiaga Salahuddin Uno, B.B.A., M. B.A. (Minister of Tourism and Creative Economy. 2021), stated that the creative digital application development industry could be a private capital for the revival of the creative economy subsector in the midst of the pandemic. In the 2020 Game Industry Ecosystem Map report, it is known that 57% of the 80 Indonesian creative digital application development companies surveyed say that employee productivity has declined since the pandemic, with the emergence of a new variation of Covid 19 type Omicron appearing in early 2022, making the impact on the digital creative application development industry huge (Samuel, 2022).

In addition to productivity, issues of partnership or co-operation are also one of the obstacles. Because, the creators need an intensive communication process to coordinate and do brainstroming with various parties in defining the concept of digital application development to be created.

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The Virtual 3D Exhibition emphasizes the efforts to disseminate the work of creative digital applications of UPI students and the efforts of collaboration with the related industry to create media innovation partnerships, research, enhance the University's ICTU, and improve the global image of the university's innovation work in the field of the development of digital creative applications in the virtual space using mixed reality technology, by collaborating in development of three-dimensional digital images (3D), Immersive Virtual (iV), Augmented Reality and Virtual Reality technologies. As well as conducted on the basis of academically, technically, and administratively accountable qualification studies.

The latest technological developments, affect the way people enjoy physical or real environments and virtual environments (Flavián et al., 2019). One with the use of virtual reality. Virtual reality is a computer-generated environment that supports synthetic interaction and stimulates high levels in a 3D context (Dubovi, 2022) Virtual reality (VR) applications have great potential for use in education at all levels. The VR interface has the potential to complement existing approaches in education (Ong & Mannan, 2004).

Besides, virtual reality is a technology that creates artificial digital environments, with interactive experiences generated by computers aimed at creating simulated environments (Smutny, 2023).

With current technological developments, Virtual Reality can become one of the learning media that can attract and interact with users while learning (Suri et al., 2022). Virtual reality simulation creates a psychological sense of entering a computer-made virtual world, and as if the place was real (Meyer et al., 2019).

2. METHODS

Referring to the purpose of this research, namely Design Building Virtual 3D Exhibition Based on Mixed Reality Media Information and Partnership Products Digital Applications Creative Program Studies Multimedia Education UPI Cibiru, then the research method used for this research is the development model of MDLC (Multimedia Development Life Cycle), following the presentation of the above statement among others:

The Multimedia Development Life Cycle (MDLC) is one of the software development methodologies developed by Luther (1994). According to Luther in Binanto, the methodology of multimedia development itself has six stages: concept, design, material collection, assembly, testing, and distribution. (pendistribusian). These six stages don't have to be sequential in practice, they can exchange positions. Nevertheless, the concept stage must be the first thing to do.

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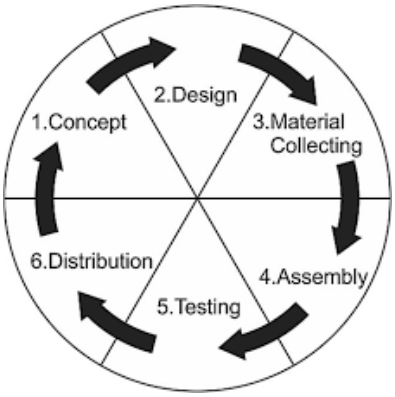
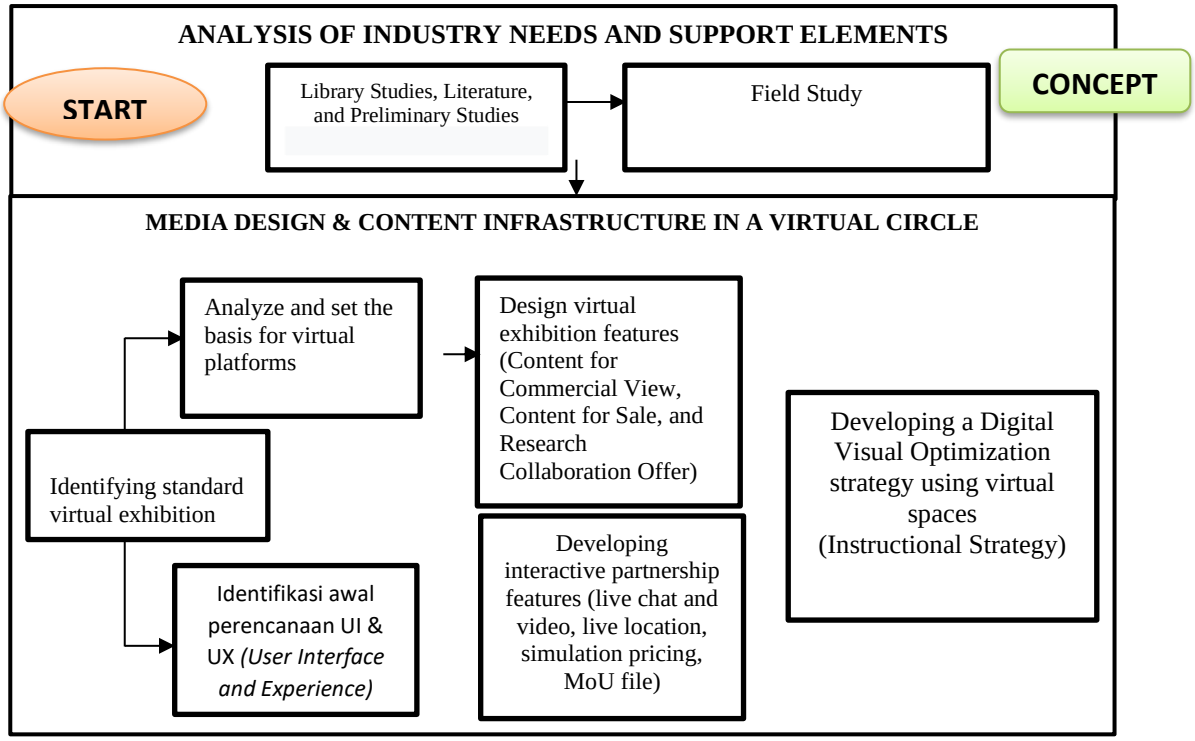


Figure 1. Model Multimedia Development Life Cycle (MDLC).

The next stage of implementation of the research methodology is described as follows:



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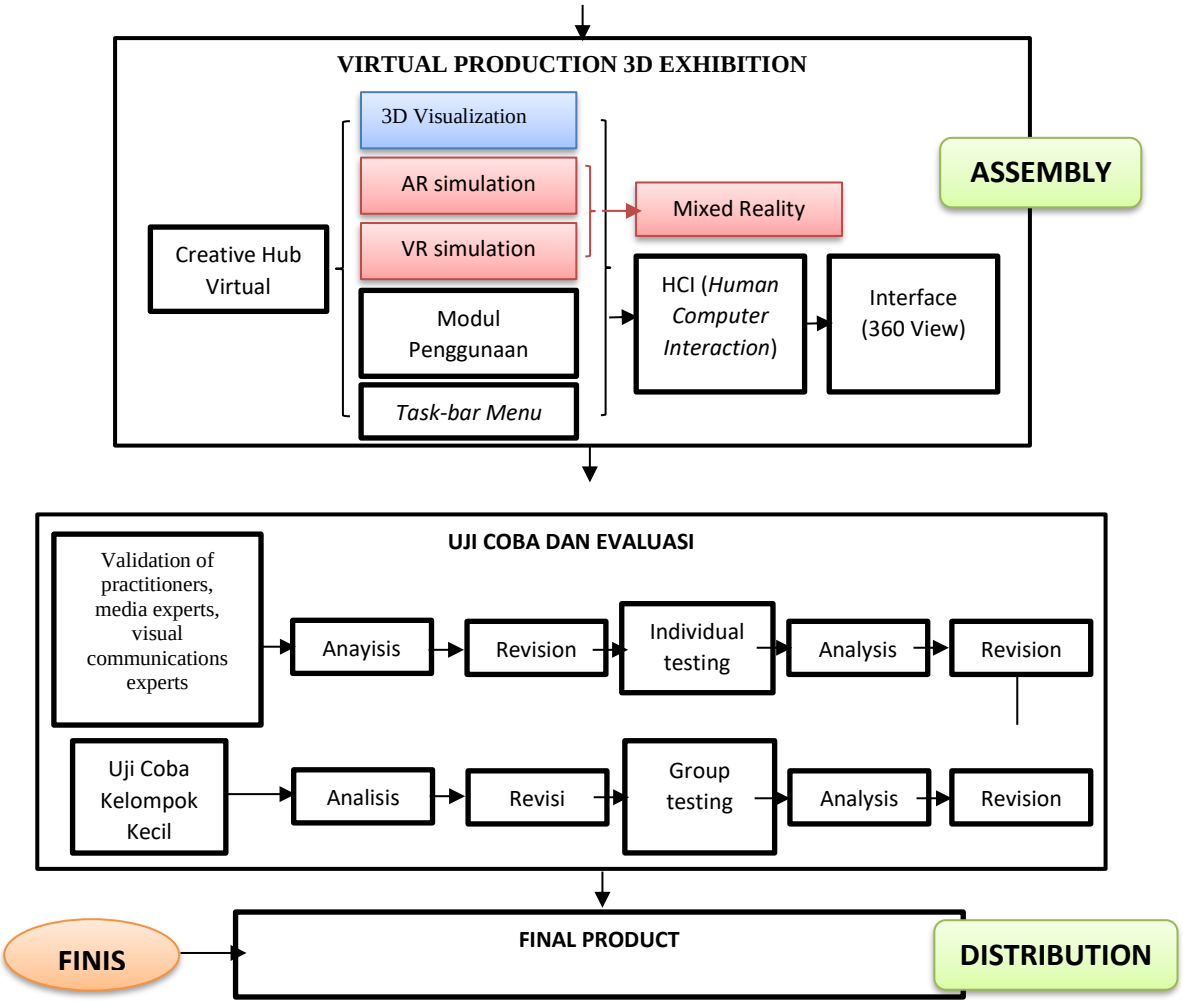

3. RESULTS AND DISCUSSION

3.1. Analysis of Needs and Supporting Elements of a Virtual Exhibition Model.

The exhibition space taken as sample research is the UPI Campus Building in Cibiru, assuming the building has met the elements to be used as a physical model of virtual production of 3D exhibitions such as:

a. Available materials and products of creative digital applications.
b. Availability of cleanly organized spaces.
c. Exhibition support facilities are available.

Mixed reality is basically a blend of augmented reality and virtual reality technology, and after looking at the above elements, the 3D virtual exhibition concept based on mixed reality can be implemented. In terms of virtual reality, the researchers visualized from the material and work of the product, the dimension of space, the layout of the space, as well as the means of presentation in the form of three-dimensional animated images (3D). In the terms of augmented reality, researchers also visualised the work of creative digital applications in

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digital form that can be connected in real-time with the communication equipment of visitors of the exhibition such as mobile phones and laptops, to be able to access the online system.

The concept of mixed reality on the virtual 3D exhibition is expected to be able to give a more exciting impression and exhibit experience of the work, even though visitors do not come directly physically to the exhibit building, but they can follow the exhibitions activities virtually without reducing the quality of the product work displayed, can carry out exhibit activities without having to borrow or buy exhibitory tools and materials such as stand booth, lighting, display brochures, tables, chairs and so on.

From the results of the process of analysis and identification of the initial concept to the design of the space that has been done, then the researchers of the product of creative digital applications belongs to the students of the multimedia education study program, because of the available creative digital application products are very varied as well as supported by the existence of partnership between the study program of multimedia education with the company or related industry. The detailed identification of the room concept for 3D modeling is described as follows.

Table 1. space concept details for 3D exhibition

No	Nama Ruang	Jumlah Ruang
1	Lobby	1
2	Front official	1
3	Poster Exhibition Room	2
5	Application Design Product Room	1
6	Partnership room	1
7	Conference	1

Illustration Tools, materials, products and media of the exhibition will be realistically made according to the original object and used in the scope of the Virtual 3D Exhibition.

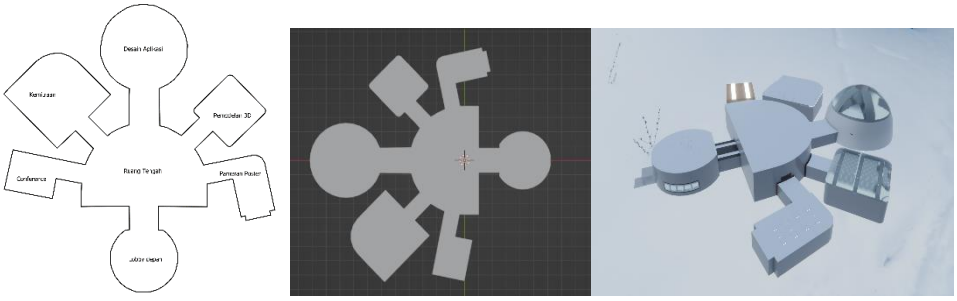

Figure 2. Convert the exhibition building to a 3D visual image.

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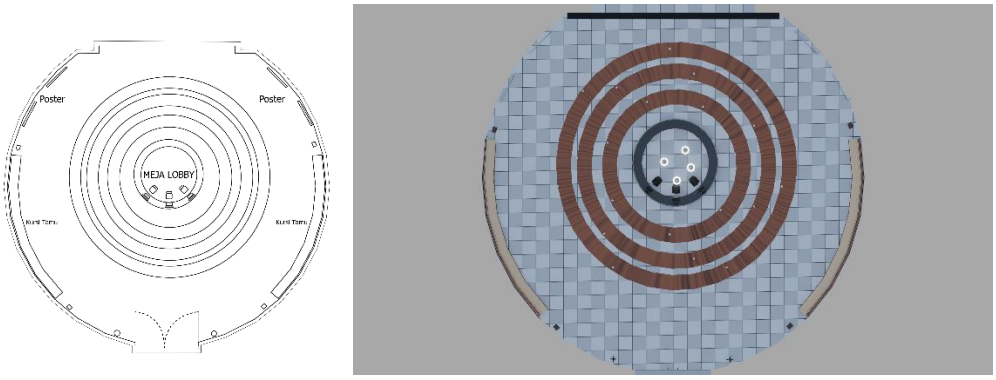

Figure 3. Convert the lobby space of the exhibition to a 3D visual image

The exhibition in the scope of virtual reality, designed in such a way as not to diminish the quality and branding of existing creative digital application products, ranging from analyzing and setting the basis of virtual platforms, identifying the standard of virtual exhibitions, initial identification of UI & UX (User Interface and Experience) planning, and so on as shown in the chart and some pictures below.

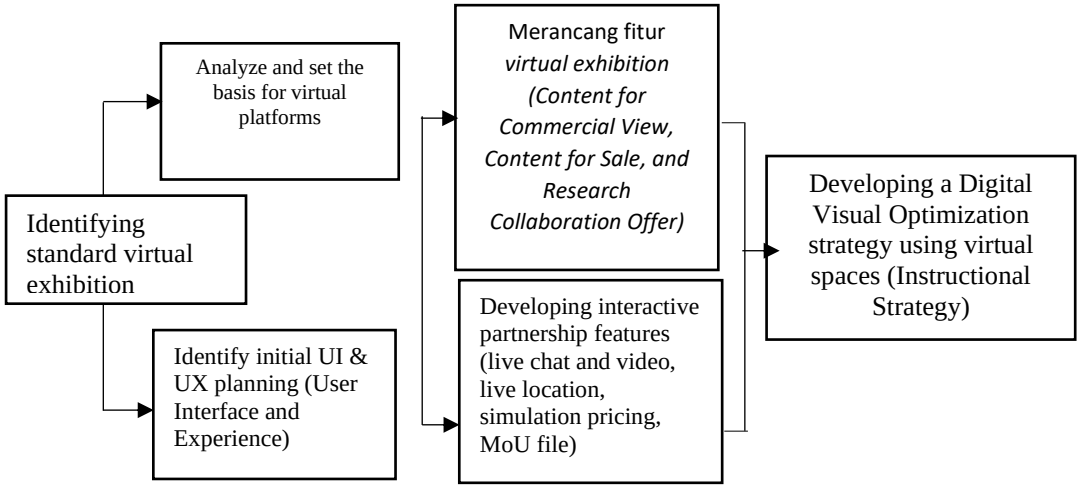

Figure 4. The flow of the preparation of material and content in 3D virtual exhibition

The design of the VR AR room began with the creation of several models of the room that would fit its function later. In this case, some of the rooms needed are one room for a poster exhibition, a room for 3D modeling exhibitions, one space for an application exhibit, one exhibit for a co-operating company booth exposition, and one room to conduct meetings. As for the additional room to decorate the room is a lobby and the middle area that connects the four rooms.

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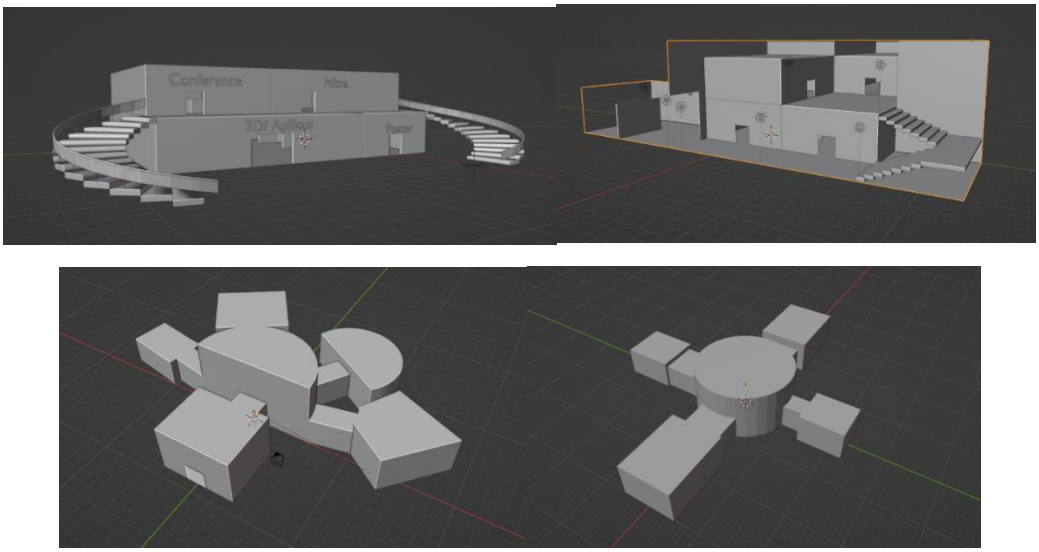
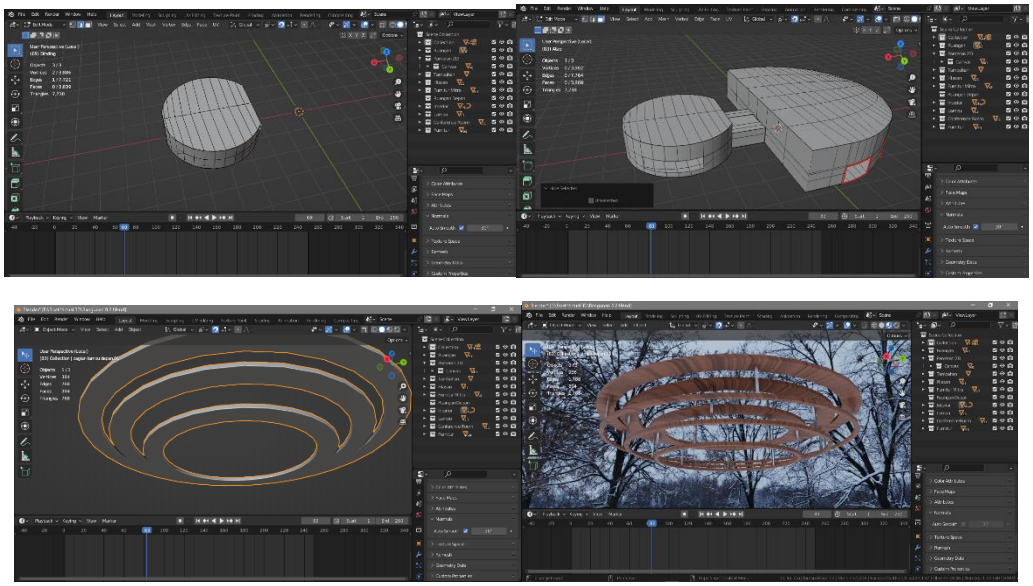


Figure 5. 3D modeling of exhibition rooms using blender software

The design of the building for the front room was made using a cylinder that was then partly extruded so that it connected to the main room. Decorative accents the interior decoration of the lamp above is made using a mesh circle which is then extruded into and given a solidify modifier. Some buildings in the shape of iron-iron embroidery are made similar to the concept of wood using a cube that is then extruded down, then using an array modifier and using empty as a pivot point to rotate the array. The same technique is done for some interior rooms with a square lamp on the wood. The illustration of 3D modeling is presented as follows:



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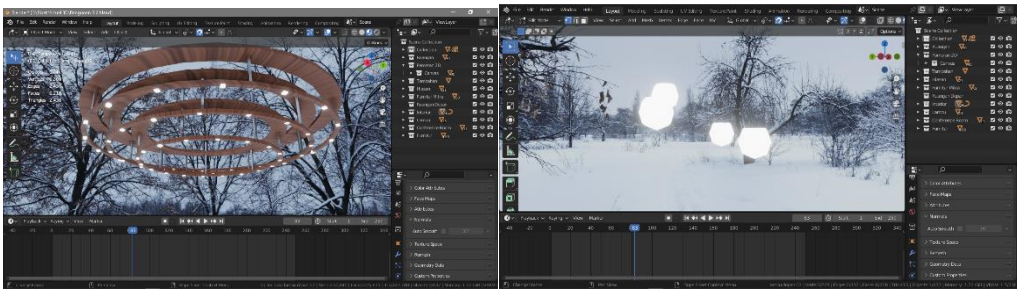

Figure 6. Illustration of room 3D modeling

The middle room is made using half a cylinder that connects the other room room, after which it is continued with scale technique with the size required to be contained with the other interior. The creation of the UPI 3D logo comes from the flood logo that is available on the Internet, with its format that the SVG logo can be directly converted into a 3D model. Next, the interior design concept and the accent of the light that is in the sky sky is made using the sphere icon that is dictated by removing half the mesh object, then given 2x texture resembling iron and light. Then it's duplicated and positioned like that. For tables and sofas made using cubes that are scaled and edited, using simple techniques like extrude and using subdivision surface modifier. The illustration is as follows:

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Figure 7. Final result of 3D virtual modelling design 3D exhibition

According to Satzinger, Jackson, and Burd (2012, p189), the User Interface is the input and output that directly involves the end-user system. The user interface can be used directly by internal or external users of the system. The design of the user interface itself can vary greatly depending on factors such as the purpose of the interface, user characteristics, and device interface characteristics. The purpose of a user interface is to communicate the features of the system available so that the user understands and can use the system. In this case, the use of language is very effective in helping to understand, because language is the second oldest means of communication of gestures, which people use to communicate in their daily lives. The concept of UI design for virtual 3D Exhibition is presented as follows:

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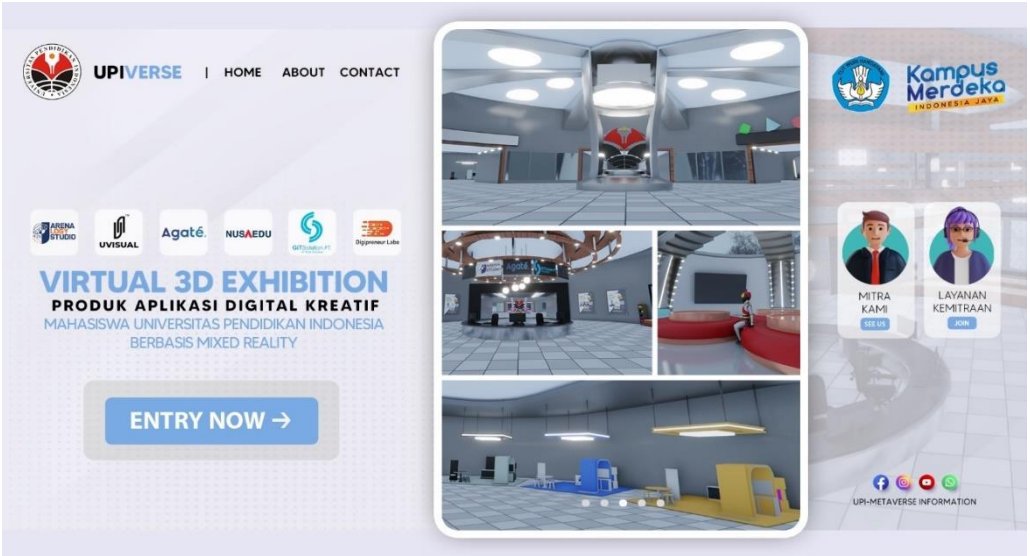

Figure 8. User Interface aplikasi

4. CONCLUSION

Mixed reality is basically a blend of augmented reality and virtual reality technology, and after looking at the above elements, the 3D virtual exhibition concept based on mixed reality can be implemented. In terms of virtual reality, the researchers visualized from the material

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and work of the product, the dimension of space, the layout of the space, as well as the means of presentation in the form of three-dimensional animated images (3D). In the terms of augmented reality, researchers also visualised the work of creative digital applications in digital form that can be connected in real-time with the communication equipment of visitors of the exhibition such as mobile phones and laptops, to be able to access the online system. In this study produced 1 virtual building 3D exhibition with 6 rooms consisting of media room games and applications, digital room illustration, room industry partnership accompanied by interactive navigation based Mixed Reality.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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