

## **ARTHIBITION: DESIGNING AUGMENTED REALITY FOR ART EXHIBITION**

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### ***ABSTRACT***

The Covid-19 pandemic, which occurred in the past 3 years, has forced art activists to reduce activities that involve many people. Meanwhile, art activities that gather many people are still needed as a means of publishing artworks from art activists. Augmented Reality (AR) technology has been widely applied to art exhibitions. To be able to take advantage of this technology, users must come to the exhibition site and scan an object at the exhibition site, resulting in a buildup of visitors at the exhibition site. For this reason, it is necessary to build an application that can be used to enjoy content from the exhibition without having to go to the exhibition location. This study aims to design an application that can be used by the audience to be able to enjoy the content of the art exhibition without having to go to the exhibition site. The use of AR Technology is applied as a tool to ostensibly bring artwork to the location of the application user, so that it can be enjoyed directly. The design of the ARt Exhibition application is expected to be a solution for art activists and connoisseurs to be able to enjoy art exhibitions anywhere personally so that the spread of the Covid-19 virus can be minimized.

Keywords: exhibition, art, augmented, reality

### ***ABSTRAK***

*Pandemi Covid-19 yang terjadi dalam tiga tahun terakhir memaksa para pegiat seni mengurangi aktivitas yang melibatkan banyak orang. Sementara itu, kegiatan seni yang menghimpun banyak orang masih dibutuhkan sebagai sarana penerbitan karya seni dari para pegiat seni. Teknologi Augmented Reality (AR) telah banyak diterapkan dalam pameran seni rupa. Untuk dapat memanfaatkan teknologi ini, pengguna harus datang ke lokasi pameran dan memindai objek di lokasi pameran sehingga terjadi penumpukan pengunjung di lokasi pameran. Untuk itu, perlu dibangun sebuah aplikasi yang dapat digunakan untuk menikmati konten dari pameran tanpa harus pergi ke lokasi pameran. Penelitian ini bertujuan untuk merancang sebuah aplikasi yang dapat digunakan oleh penonton untuk dapat menikmati isi dari pameran seni rupa tanpa harus mendatangi lokasi pameran. Penggunaan teknologi AR diterapkan sebagai alat untuk membawa karya seni ke lokasi pengguna aplikasi sehingga dapat dinikmati secara langsung. Perancangan aplikasi pameran seni rupa ini diharapkan dapat menjadi solusi bagi para pegiat dan penikmat seni rupa untuk dapat menikmati pameran seni rupa dimanapun secara personal sehingga penyebaran virus Covid-19 dapat diminimalisasi.*

*Kata Kunci: pameran, augmented, reality, AR*

## INTRODUCTION

The Covid-19 pandemic affects how people relate with one another. One method to stop the virus from spreading is to reduce crowd size. This has a significant impact on all human activities, including those of artists and art enthusiasts who encounter one another at an exhibition. Artists will present their works in an exhibition and audience will see or interact directly with either the artworks or the artists. The pandemic situation can be addressed as one of the challenges for the development of creativity so that artistic activities can still run well (Santoso et al., 2022).

The interpretation of the artworks refers to the art lover's investigation and understanding of the relevant art (Ross et al., 2019). Good communication can lead to a good interpretation, which will effectively portray the meaning of an artwork (Srinivasan et al., 2019). Exhibition is one of the media used as communication between artists and art lovers (Podol'skaya, 2019). Exhibition can be defined as a spatially organized and visualized expression of thoughts, objects, and systems of knowledge, originating from the Age of Enlightenment, and based largely on the display of material objects. Exhibitions of art have several goals, including (1) Appreciation: means understanding of the artwork, (2) Communication: means conveying a message or a specific purpose from the artist to the audience, (3) Recreation: besides presenting work, art exhibitions also provide entertainment to the audience, (4) Education in art exhibitions provides a stimulus for other artists to always work and provide new innovations, (5) Achievements, art exhibitions are one of the achievements of an artist after working. Entertainment for the audience is

one goal of exhibitions that benefits a lot of individuals.

A study on the human demand for entertainment during a pandemic found that works of art are the primary forms of entertainment for the society. Artworks that people access every day during the pandemic are films, music, games, and visual art. The arts such as film and music may easily adapt to already-existing digital channels, making them more accessible to audience. This shows the role of technology in supporting the distribution process of the artwork. Artworks are very easy for audience to enjoy, anytime and anywhere while only using the devices they already have.

Exhibitions of arts in the field of visual art can also collaborate with technology, so that audience can enjoy them wherever and whenever. A website is a form of digital media that is usually used as an exhibition medium for works of visual art. However, it turns out that the audiences prefer exhibitions that provide experience, namely the existence of moving visuals or the interaction between the audience and art connoisseurs. This is a challenge for visual art artists to provide exhibitions that are interesting and involve technology in it. Technology-enhanced exhibitions are becoming more common, such as immersive Van Gogh and Affandi shows. The use of Augmented Reality (AR) and Virtual Reality (VR) have also been used in several exhibitions to increase interaction between audiences towards the artworks.

Art lovers can get interested in and enjoy visual arts through exhibition formats that encourage audience involvement with the works of art. However, in various forms of interaction that collaborate with this technology, there are direct interactions that urge the audience to

come to the exhibition location to be able to enjoy works of art. The purpose of designing ARthibition was to address a new challenge, as in time of pandemic when the condition prevents people from engaging to each other directly, yet the necessity for entertainment in displays of visual art works is still in demand.

The downside of some commonly used AR technologies is the use of markers to access information embedded in artwork (Carrión-Ruiz et al., 2019). However, this drawback of AR can be minimized by using Markerless AR technology (Alves & Luís Reis, 2020). The Markerless Augmented Reality concept forms the basis for designing this visual art exhibition application. With the help of this application, it is hoped that art lovers will be able to continue appreciating artworks in their own homes. The art connoisseurs can digitally bring works of visual art into their homes. The advantages of creating the ARthibition application are definitely not at an end once the pandemic is over.

A pandemic is indeed temporary, so it will provide a temporary pattern of human behavior during a pandemic (Sholahuddin, n.d.), but the design of this ARthibition application can bring benefits in the long term and add more value to craft works of art. ARthibition is expected to become a medium used as a form of digital communication for artists and art connoisseurs so that the value of works of art can be conveyed properly and more flexibly.

**METHODS**

The research aims to design an exhibition application that can be accessed anywhere, anytime, and in person. The addition of Augmented Reality (AR) technology to the web-based online exhibition concept will provide a

new experience for exhibition connoisseurs.

Augmented Reality (AR) is a technology that combines computer-generated digital content with the real world in real time. Augmented Reality (AR) is becoming a more accessible technology with users that looking for new application innovations not only for entertainment and advertising media, but also for various other professional applications (Zollmann et al., 2021). Users can experience the item’s presence via augmented reality (AR) without seeing the whole environment of the object (El Filali & Krit, 2018). A study on the use of mobile AR visual guides at Taipei Fine Arts Museum showed that visitors using AR technology understand the works faster than those guided by audio only or without a guide (Shih et al., 2019).

To design an AR application for art exhibition, this study used a Design Science Research (DSR). Figure 1 shows the steps of design science research.

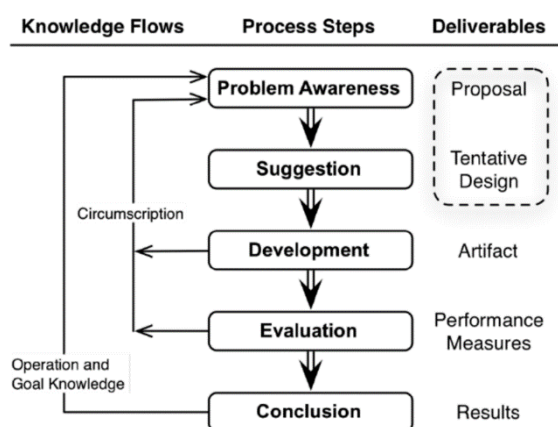


Figure 1. Design Science Research general steps (Helms et al., 2010)

In a generic way, the steps can be explained as follows.

1. Problem awareness is the realization that there is a particular problem in business, society, or science. At this stage, researchers understand the needs of users in this case, name-

ly artists and art connoisseurs (audience). The obstacle faced by artists and art connoisseurs during the Covid-19 pandemic is the limitation to hold exhibitions which are usually carried out directly in a gallery or a showroom. The problem of physical distancing can actually be solved with the involvement of technology.

2. Once the problem has been defined, one can start to investigate the problem at hand a bit further and search for any available literature and then to suggest a possible design solution in the form of an artifact. Literacy studies are carried out at this stage to obtain references related to forms of exhibition carried out online. Literacy related to exhibitions, especially in exhibitions that utilize technology, especially Augmented Reality, will be processed and analyzed so that they can provide references in accordance with the design of the application to be made.

3. The artifact, which should solve the identified problem, is developed. Application design began to be made to answer the needs of artists and art connoisseurs for an online exhibition form that can be accessed anytime, anywhere, and personally. A prototype design was created and then it was evaluated, which finally generated the design results that are in accordance with user needs and become a solution to existing problems.

4. After building the (prototype) artifact, then it was evaluated against predefined evaluation criteria. Testing was done by looking at the functions designed in the application. The use of Augmented Reality was also tested, so it could be seen that the application of AR can be an option for artists to provide new experiences in exhibition.

5. During the process of developing and evaluating the artifact, questions might be raised that require a re-formulation of the problem re-

sulting in further iterations.

Moreover, the development and evaluation process are iterative, as the developed artifact is not expected to be right the first time.

## RESULT AND DISCUSSION

Human creativity is not only processed by the creation of works of art. During the pandemic, people had to be more creative in communicating and interacting with others within limited space. Creativity allows artists to improve the quality of presentation of a new and original performance art (Rustiyanti, Listiani et al., 2019). Other exhibitions such as immersive exhibitions held by the National Museum which provided experience of enjoying a work of art with the addition of animated visualizations that adds the beauty level of the works of art being exhibited. Paintings by the painter Affandi have also been exhibited using an immersive exhibition concept at the National Museum.

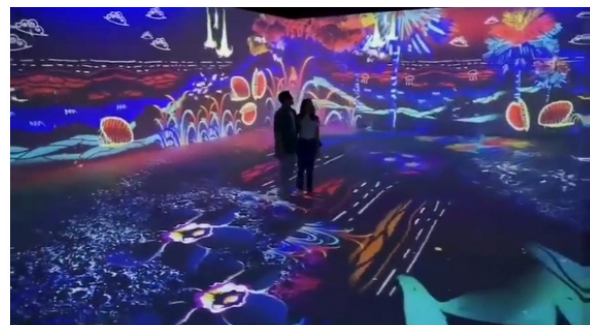


Figure 2. Show room of immersive installation, <https://www.kemdikbud.go.id/main/blog/2022/04/museum-nasional-luncurkan-ruang-pamer-dengan-instalasi-teknologi-imersif>

Another creativity in the exhibition was an exhibition that used a virtual tour and AR at the exhibition of “Kisah Antah Berantah”. Figure 2 shows the exhibition’s concept.

Other exhibitions utilizing technology such as at “Virtual Wing” an Augmented



Reality Exhibition by Tate Museum is shown in figure 4.

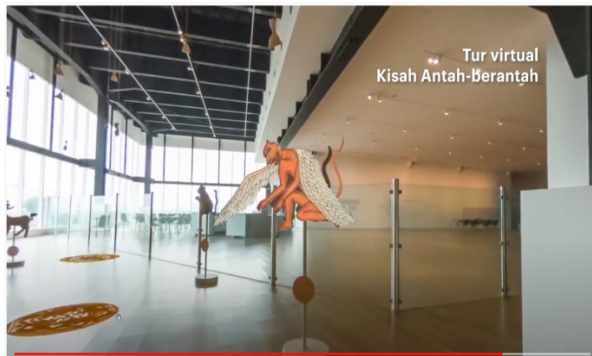


Figure 3. Virtual tour of Museum Macan, <https://daman.co.id/balis-mythical-animals-come-to-life-in-tales-of-nowhere-at-museum-macan/>

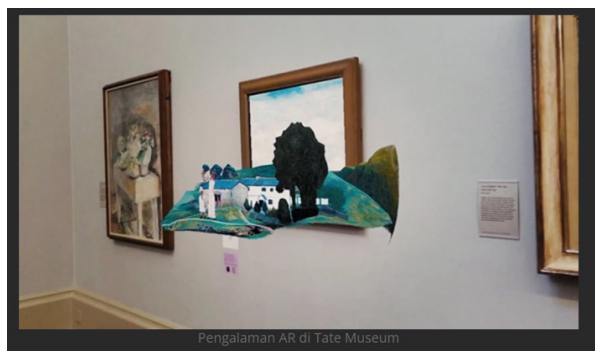


Figure 4. Augmented Reality exhibition of "Virtual Wing", <https://monsterar.net/2019/08/15/pameran-augmented-reality-museum/>

While another exhibition held by Antara Journalistic Museum and Photo Gallery made a breakthrough by establishing the museum digitization approach using Video Reality (VR) technology (Aldha et al., 2021). Several aforementioned examples of exhibitions that utilized technology still require an exhibition space, a place for interaction between art connoisseurs and works of art. Doing so, there are limits on operating hours as well. These exhibitions provide a new experience for connoisseurs of works of art and allow people who were previously not too interested in art to be able to enjoy the works of visual art being exhibited. AR is the choice as a

form of visualization of works of art because it can increase the exploration of a work of art (Kljun et al., 2018). In addition, the use of AR in conveying works of art can enhance the learning process of the works of art presented (Sobandi et al., 2021).

Unlike virtual reality (VR), augmented reality (AR) does not totally replace reality with an artificial environment. Augmented reality makes users see 2D or 3D virtual objects projected into the real world. AR technology allows users to connect the real world through digital environments (Masood & Egger, 2019). AR technology uses two basic ways to virtualize an object, namely marker based and markerless.

Marker-based AR works by scanning a marker which generates a visualization of an object (whether in the form of an image, text, video or animation) to appear on a device (Liu & Tanaka, 2021). Marker-based AR requires software application, which allows users to scan markers from their device through the camera that is on the device. Markerless AR allows users to be able to explore an AR object more freely because it is not limited by markers as a trigger for its visualization (Scargill et al., 2021).

There are several techniques used as substitutes for markers in Markerless AR, such as location-based, projection-based, superimposition based, and user-defined AR. Location-based AR utilizes data readings from camera of the device, GPS, digital compass, accelerometer, and uses the user's device focus as a trigger to provide dynamic positioning and point-related data or information (Jung et al., 2021). Projection based AR is one of the simplest forms of AR, in which light is projected onto a surface. The interaction occurs by physically touching the projected

surface. Projection-based AR methods can be used to create illusions of depth, position, and orientation of objects. Superimposition based AR replaces some or all of the original views of an object with a magnified view of the same object. Object detection plays an important role in this type of AR because an application cannot replace the original object with additional objects if the original object cannot be identified. User defined AR utilizes user-generated content that can be customized (Dong et al., 2020). User-defined AR typically uses existing AR libraries and technologies to produce various types of visualizations and interactions.

Arthibition is a visual arts exhibition design which in its presentation utilizes superimposition Augmented Reality (AR) technology and brings the exhibition to the homes of every art lover digitally, which can be accessed at any time. The object used as a spatial recognition will generate the visualization of an AR object in the form of a table. The purpose is to describe craft art objects on the table plane so that the user has an idea of how the craft art will look on the table.

In this design, the author takes fine art as a work of art in the ARthibition design. Fine art works such as sculptures, paintings, and furniture are works of art that also have a functional use at home. Each type of work of art can occupy every part of the house such as the walls, on the floor, on the table and on other sides of the house.

Exhibitions that also apply Augmented Reality technology, usually use markers to be able to display digital versions of works of art. As a consequence, art connoisseurs still need to come to the exhibition location, to see the artwork first hand and to scan the artwork or

markers that have been prepared beforehand. ARthibition has a Markerless Augmented Reality concept, which minimizes the use of certain markers in its operation. The user only determines the part of the house that is usually used to display the artwork and the artwork in digital form will appear in the visualization on the technology device. Art connoisseurs will be able to enjoy and admire detailed and complete works of art in digital form. ARthibition is a media device used in an exhibition of works of art, not as a substitute for exhibitions. Art connoisseurs can enjoy exhibition artworks in a new way through AR technology. But of course, this has a different feeling than when witnessing works of art being exhibited in person.

The workflow of the ARthibition design can be seen in Figure 5.

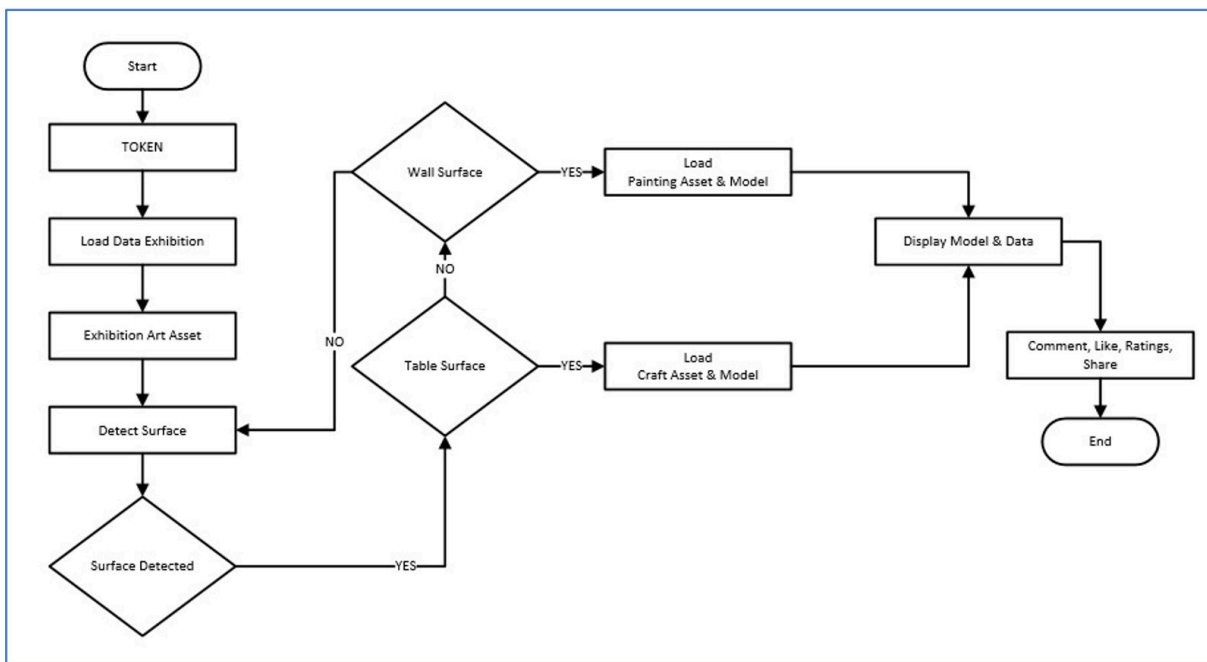


Figure 5. Flow process of ARthibition design

The ARthibition application begins by entering the token obtained by the user while purchasing tickets virtually on the internet. The token will be used to activate the ARthibition application which previously went through the installation process on the user’s device as shown in Figure 5. After successfully entering the application, user will scan parts of the house deemed as the right spot to place the artwork. As seen in Figure 6. Users can scan the table as a place to place the statue. When the device is pointed at the table, works of art that are already digital, which are usually placed on the table, will appear on the table. In figure 7 the artwork that appears will be followed by information on the title of the artwork, the name of the artist who created it and the year the artwork was made. If the exhibition is an exhibition that can sell works of art, of course the information can be added with price information. Figure 6 shows the process of how the object visualization appears when a table plane is detected. When

the device is pointed at the table, works of art that are already digital, which are usually placed on the table, will appear on the table.

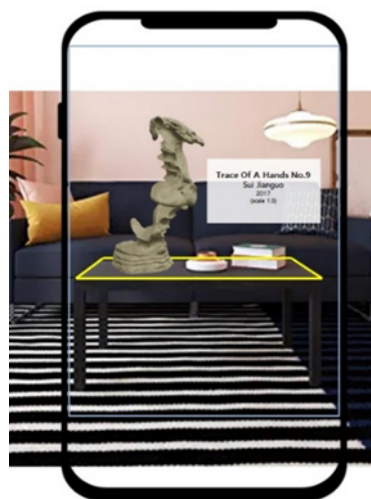


Figure 6. Artwork visualization process

If the description column is executed, the application will immediately display various complete information related to the displayed artwork as shown in the Figure 7.

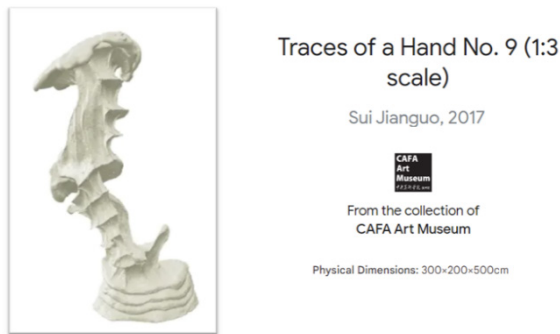


Figure 7. Detail information of the artwork

## CONCLUSION

Art exhibition designs that collaborate with technology provide new experiences for art connoisseurs in enjoying art. Due to time and space limitations, especially during situations such as the Covid-19 pandemic, artists must not only become creative in their artwork but also becoming creative in displaying their work. Artists can take advantage of technology as a support in exhibitions.

ARthibition is designed to make it easy for art connoisseurs when they want to enjoy works of art from an exhibition or museum but have limited time and location. ARthibition applies Markerless Augmented Reality technology so that it will minimize limited access to an object of art due to the use of markers as triggers for visualization of AR objects. Users can use the smartphone device that has the ARthibition application installed to objects or locations where art objects can be placed in the house and then the appropriate artwork will appear on the user's device. Users will get convenience and pleasant experience when they want to enjoy a digital artwork.

Real exhibition would not be replaced by ARthibition because art lovers still need to experience art visually. ARthibition becomes an alternative form of exhibition when the need to see an exhibition exists but is limited

by certain circumstances that do not allow art connoisseurs to go to art exhibition spaces such as art galleries or museums. ARthibition is a brief glimpse of the digitally displayed artwork in order to give users a sense of what is being depicted and pique their interest in viewing the actual artwork.

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