

**DESIGNING DIGITAL DIORAMA  
FOR HISTORY'S INFORMATION SYSTEM  
(Case Study: Gedung Merdeka, Bandung)**

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**Abstract**

*History, as one of the most important matters in urban planning, needs to be remembered, preserved and appreciated by all citizens. Urban facility for preserving history is museum, with various exhibition objects inside, such as diorama. The role of digital media in museum raises a variety of new alternatives diorama's form, which can present the limitations of information that cannot be served by an ordinary diorama.*

*The design of this research is focused on Gedung Merdeka as one of historical buildings in Bandung. This study uses exploratory method for designing a digital diorama. The media exploration is using the principles of spatial augmented reality, perform by projection mapping on the miniature of Gedung Merdeka.*

*This study resulted a model of digital diorama that useful as an alternative form of media exhibition in the museum. One of the key words in a digital diorama of excellence is 'sensation' and 'perception' those are produced by some stimulus given by digital diorama, specifically eye (forced perspective), ears (verbal narration), brain (information from visual narrative) and touch (touch screen interactive). Interactivity is designed that user can freely decide which events are displayed in a digital diorama.*

**Keywords:** *forced perspective, diorama digital, spatial augmented reality, projection mapping, Gedung Merdeka.*

**1. Introduction**

The importance of histories in urban development is related to imaging a city, since the beginning, the development, until the future. Learning about histories can be obtained through formal education (school) and informal education, which one of them is through museum. It also offers a system of information, besides being one of the facilities in the city to preserve its history; one of it is through diorama.

This research is the development of a diorama form, using digital media. The principle of diorama is 3-dimensional static objects and shows a particular event. Diorama is an object of momentopname, which 'freeze' an event in a 3-dimensional display. The design of this digital diorama expands the scope of information offered regular diorama, which can present a variety of events in a diorama. Research and design of this media focused on the effectiveness of the evolution of the form of a museum diorama as a display medium by using visual, audio, and interactivity.

This study focused on a case study of the history of Gedung Merdeka, Bandung. That is one of the historical buildings in Bandung. This case study is one of the sources of historical objects that can be presented in the form of a digital diorama. The history related are Gedung Merdeka construction, building physical changes, the Asian-African Conference in 1955, and some changes of the building's function to this day.

## 2. Methods

Research carried out by the method of exploration through 3 analysis, they are the analysis of the media evolution as a principle for digital dioramas, building analysis of Gedung Merdeka as a reference design of miniature, and analysis of historical literature of Gedung Merdeka, as a reference design for visual narrative projection mapping.

### 2.1 The Evolution of Diorama

Designing Gedung Merdeka diorama is based on the theoretical foundation of the effectiveness of the diorama according Bitgood (1995). Bitgood focuses on the relationship of audience behavior diorama. This study focused on sensation and perception for the audience to see the diorama. Analysis according Bitgood diorama form described in the following table:

Table 1. Analysis of Digital Diorama Based on Bitgood

<b>Factor in the diorama according Bitgood</b>	<b>Implementation on a digital diorama</b>
Behavior	Projection mapping
Cognitive	Visual Narrative
Affective	Interactive

In this study is used, as the ultimate goal is an optical illusion caused a sensation in seeing the diorama, this can be realized through the technical principle of projection mapping using spatial augmented reality. Projection mapping has the advantage to present the illusion that objects can tell events. These technical functions extend previous diorama, which can deliver multiple events in one diorama, in which event is presented through projection.

One of the advantages of digital dioramas in this research is an optical illusion resulting in a diorama. This is used as a reference in the design concept of the media. Digital diorama has a role as a medium to deliver a history that produces the sensation and perception to see it. Below is a chart figure explanation for the concept of information systems through a digital diorama.

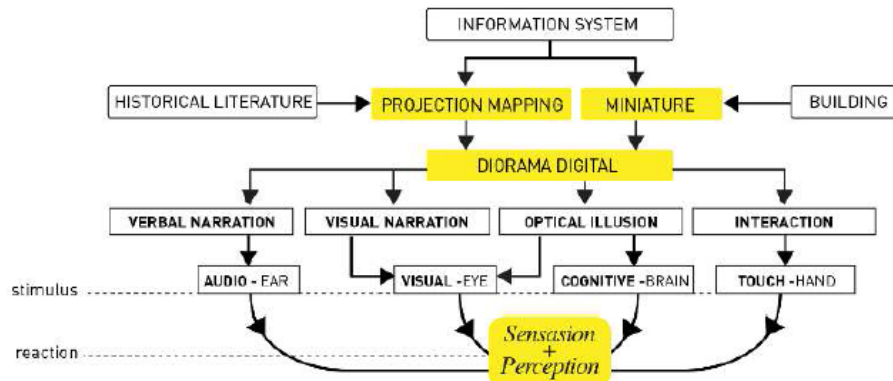


Figure 1. Information System Through Diorama Digital]

The information system is applied to the diorama in order to display more than one event or story. It is offered by a digital diorama is a verbal narrative, the visual narrative, optical illusions and interactivity in operation. The result, in the form of stimulus in the ear (audio), eyes (visual), brain (cognitive) and hand (touch), which gives a sensation reaction in human perception. Sensations felt by the audience in watching digital diorama can increase the effectiveness in conveying historical events. This sensation raises curiosity even further so that the audience gets the historical information in an interesting way.

Table 2. Comparison of Ordinary Diorama and Digital Diorama

<b>Advantages of Digital Diorama</b>	
<b>Ordinary Diorama</b>	<b>Digital Diorama</b>
Telling only an event story	Being able to tell multiple events
momentopname, in which all the elements is 'frozen' in time	There is no limitation of time in the telling of events
Static	Dynamic, with animation
Realistic visual language	Can be served with a variety of visual language
The role of audio as a sound effect	The role of audio as the narrator, sound effects and background song
There is no interaction with the audience	Can be operated interactively by the audience
Requires a large dimensional space to tell the story of the region	Requires a relatively small spatial dimensions, which display a wide area can be presented through the optical illusion
Watching the ordinary form of the model	Watching with optical illusion sensation
<b>Disadvantages of Digital Diorama</b>	
<b>Ordinary Diorama</b>	<b>Digital Diorama</b>
Physical form and detail diorama can be seen from different angles	Details on the diorama can only be seen from a particular viewpoint
Details diorama can be touched (physical)	Details diorama can not be touched (virtual)

Comparison diorama form above serves to explain the effectiveness of the diorama as historical information system. It is not always be an effective digital diorama than usual diorama. It depends on the function and purpose of the diorama itself.

## 2.2 Observation and Analysis of Gedung Merdeka

Gedung Merdeka is located in the central district, Jl. Asia Afrika 65, Bandung. In this building the Asian-African Conference was held in 1955. Today, the building serves as a venue for important events in International scale. Also serves as a museum of Asian-African Conference. The building's characteristic is a modern style, early art deco, with round columns at the entrance, and at the top of the column ends with the lighting. Other ornaments are decorated with art deco plaster at the head of the column.

Analysis of Gedung Merdeka refers to the field observations on Gedung Merdeka to gain scale in the region. Making this model first made virtually with 3D programs to get the mapping right and appropriate. To get a detailed look ahead, conducted field observations on the face of the building. These observations were done with the facade image capture and digitally mapped to create a panoramic photo.



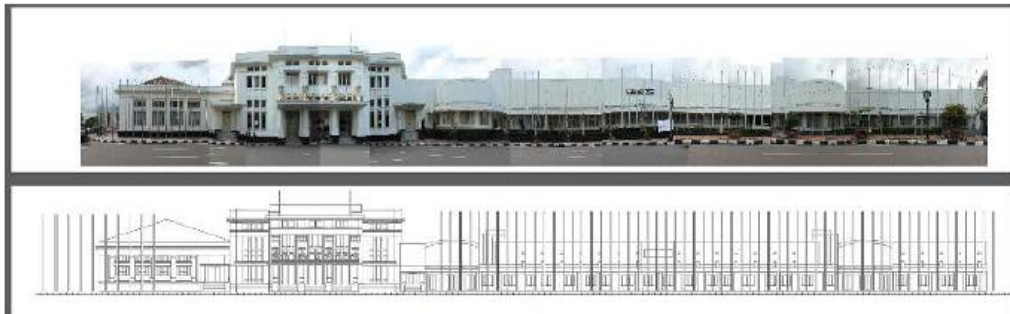


Figure 2. Front View Mapping of Gedung Merdeka

The mapping is intended as a reference in the design of miniature and digital material.

### 2.3 Storytelling Analysis of Gedung Merdeka's Histories

The series of events in the history of Gedung Merdeka along with the physical changes and their functions are summarized in the order of time as the design of a visual narrative storyline. The period is based on the important events that happened. Analysis of the period history is based on the year of several important events relating to Gedung Merdeka. The periods are Colonial Period (1900-1940an) that tells Parijs van Java golden age in Bandung, Period of Independence (1942-1945an), Development Period (1955-2000an) that tells the peak in the implementation of the 1955 Asia-Africa Conference, the 50th anniversary year on year 2005, and Current Period (2014).

The concept of the design is a visual narrative of history that can trace the story interactively accessed by users. The several periods will lead the user to explore a particular year and a particular incident that occurred at Gedung Merdeka. The design is focused on the events of Asian-African Conference in 1955 as a sample. In this sample displayed the visual state of Gedung Merdeka during the Asian-African Conference with the assistance of a narrator of audio and sound effects that support it.

### 3. Design Results

The technique design of a digital diorama is using the spatial augmented reality principle that utilizes light projections on 3-dimensional objects. The dimension and the visual narration, as following, describe the design results of Gedung Merdeka's digital diorama.

### 3.1 Dimension

Anthropometric studies produce an effective dimension for digital diorama, which measures 50 cm long, 100 cm wide and 50 cm high diorama with a height of 90 cm from the ground. The effective range of the observer with a digital diorama is 180 cm. Designing the dimensions and shape of the diorama described in the picture below.

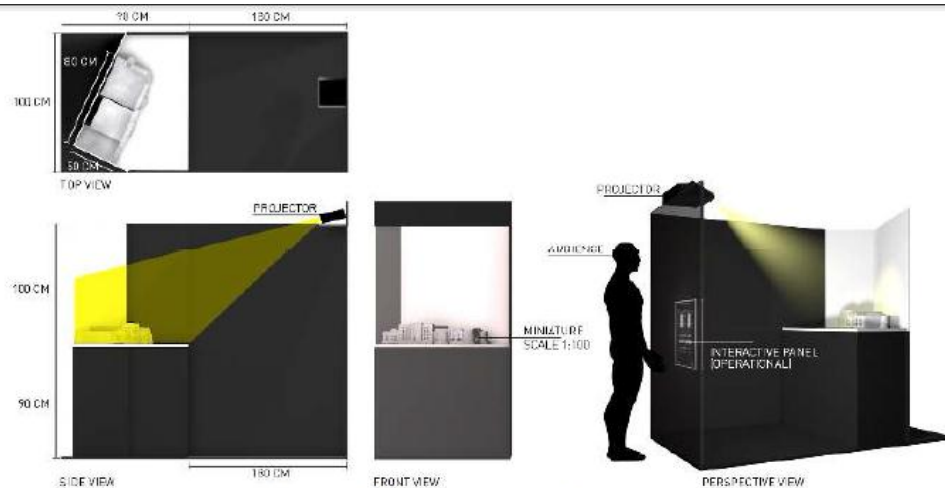


Figure 3. Diorama Digital Dimensional

### 3.2 Storytelling

Story telling in a digital diorama referring to the principle of story telling in the projection mapping, as presented Panuntun (2011), which has the characteristics of using a visual narrative, responding facade, has the role of audio, high visibility visual, as well as the film intervention in public places.

Visual narratives in a digital diorama of digital material projection mapping. In it includes animation several important events that occurred at Gedung Merdeka projected on a miniature field of Gedung Merdeka. Projection Mapping covers the entire field of miniature and can be seen to be effective in a



Figure 4. Projection Mapping on Diorama Digital

#### 4. Conclusion

Implementation of digital media at the museum provides a new experience in viewing historical objects. Digital Diorama is one form of media evolution in the museum exhibition utilizing digital technology and optical illusions. The viewpoints in an optical illusion caused new paradigm in the concept of learning, where imagination becomes a major aspect in receiving information.

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Effectiveness diorama is seen on of how the diorama conveys a multiple event and offers historical information systems in new media at the museum.

The principle of spatial augmented reality is 'adding' virtual objects in the form of a diorama to make reality more interesting visitors to the museum. In this study, the principle of spatial augmented reality manifested through projection mapping techniques. The addition of virtual objects in this diorama is also a new edge in digital diorama, the limited space in the diorama, where the optical illusion is very influential in creating a wider space than actual space.

Digital diorama raises many potential interactions that can be controlled by the visitors to the museum. Interaction here relate to the desire of visitors in tracing the history of the content information presented by the diorama. This interaction is used to achieve the objectives in the affective diorama, which creates an impression that is more on the visitors to the museum, so the historical information presented to be effective.

The role of digital diorama is not to be construed as a substitute for the previous diorama form, but rather as an alternative media and new supporters in the evolution of the diorama. Previous diorama form (conventional) is still needed in media exhibition in the museum. It is determined from the purpose to designed diorama, because conventional diorama also has another advantage compared with digital diorama. The number of alternative media in a museum exhibition is expected to increase the value and effectiveness of museums in presenting and preserving history, because history is very important as a starting point of development of a city or country. The development of display objects to show off the latest technology can help the museum in creating other forms of media to show off an attractive and effective. This triggered increased interest in the museum, in addition to the present facility historical information, as well as recreational facilities in the city.

## References

- [1] Bitgood, Stephen. **Evaluating the Effectiveness of Dioramas: A Critical Review**, Publics et Musees, 9, (1996), pp. 37-53
- [2] Bimber, Oliver. **Spatial Augmented Reality, Merging Real and Virtual Worlds**. A K Peters, Ltd. United States of America. (2005)
- [3] DH, Harastoeti. **100 Bangunan Cagar Budaya di Bandung**. CSS Publish, Bandung (2011)
- [4] Hutagalung, Ridwan. & Nugraha, Taufanny. **BRAGA: Jantung Parijs van Java**, Ka Bandung, Jakarta, (2008)
- [5] Katam, Sudarsono. & Abadi, Lulus. **Album Bandung Tempo Doeloe Edisi 200 tahun Bandung**. Khazanah Bahari, Bandung, (2010)
- [6] Katam, Sudarsono. **"Oud Bandoeng" dalam Kartu Pos**. Khazanah Bahari, Bandung, (2009)
- [7] Kartodiwirio & Sudarsono Katam. **Bandung: Kilas Peristiwa di Mata Filatelis Sebuah Wisata Sejarah**. PT Kiblat Buku Utama, Bandung, (2006)
- [8] Kontjoro-Jakti, Prof. (Emeritus) Dr. Dorodjatun. **Menerawang Indonesia pada Dasawarsa Ketiga Abad Ke-21**. Pusaka Alvabet, Jakarta, (2012)
- [9] Panero, Julius. & Zelnik, Martin. **Human Dimension & Interior Space**. Whitney Library of Design, New York, (1979)
- [10] Panuntun, M Adi. **Transforming Public Space Through Film Intervention: The Role Of Design Thinking**. Dissertation: MA Design Management, School Of Design, University Of Northumbria, (2010)