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Design of an Interactive Multimedia Gallery Based on Experiential Architecture and Environmental Analysis in Surabaya

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ABSTRACT

Rapid digital transformation in urban environments has changed the way people access information and experience cultural spaces, increasing the demand for interactive and immersive architectural environments. In Surabaya, the availability of multimedia-based cultural facilities that integrate spatial experience and digital interaction remains limited. This study aims to develop a design framework for an Interactive Multimedia Gallery using an Experiential Architecture approach that integrates environmental responsiveness and multisensory spatial experience. The research focuses on a site located on Mayjend Sungkono Street, Surabaya. A qualitative-descriptive method combined with a design-based research approach is applied, including field observation, literature review, and environmental analysis. The findings indicate that environmental factors such as solar orientation, wind patterns, noise levels, and urban context significantly influence spatial zoning and design strategies. These conditions determine the arrangement of public, transitional, and immersive spaces within the gallery. Furthermore, experiential design strategies such as spatial sequencing, lighting modulation, material articulation, and interactive multimedia integration contribute to creating an immersive user experience. The study concludes that integrating environmental analysis with experiential architecture is essential for producing adaptive, interactive, and context-responsive cultural spaces in urban environments.

Keywords: *Interactive Multimedia Gallery, Experiential Architecture, Spatial Sequencing, Environmental Analysis, Urban Cultural Space, Surabaya*

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INTRODUCTION

The rapid advancement of digital technology has significantly transformed the way people access information, interact with content, and experience cultural spaces. Contemporary urban societies increasingly demand environments that extend beyond static information delivery and instead provide immersive, interactive, and multisensory experiences. In this context, architectural design is no longer limited to functional and aesthetic considerations, but increasingly focuses on the creation of meaningful spatial experiences that actively engage users through perception, movement, and sensory interaction (Pallasmaa, 2012; McLuhan, 1964).

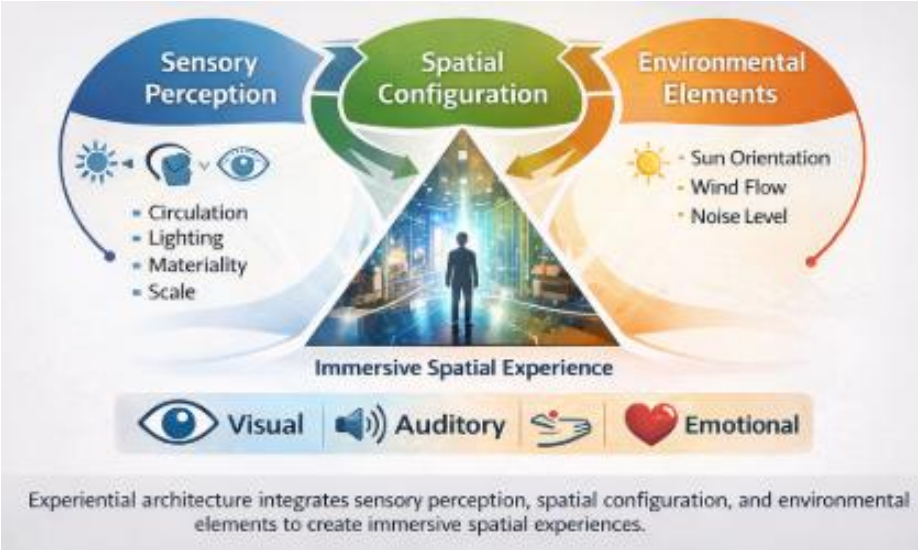

Figure 1. Diagram: Experiential Architecture Integration
Source: Author's Illustration (2026).

As one of Indonesia's major metropolitan cities, Surabaya demonstrates strong potential for the development of digital-based cultural and educational facilities due to its rapid urban growth, diverse cultural assets, and increasing integration of technology in public life. However, many existing public exhibition spaces remain conventional, relying on static displays with limited interactivity and weak multisensory engagement. This condition highlights a gap between technological advancement and the quality of spatial experience in contemporary cultural architecture (Lynch, 1960).

Figure 2. Diagram: Environmental Analysis (Sun – Wind – Noise)
Source: Author's Illustration (2026).

Interactive multimedia galleries emerge as a strategic response to this issue, offering a platform where digital technology and spatial experience are integrated into a unified system. These environments allow users to engage with content through visual,

auditory, and interactive media, enhancing both cognitive understanding and emotional engagement. However, the effectiveness of such spaces is not determined solely by technological systems, but also by how architectural design shapes perception, movement, and spatial interaction (Manovich, 2001).

The concept of Experiential Architecture provides a relevant framework for addressing this challenge. This approach emphasizes the orchestration of spatial sequences through elements such as light, materiality, scale, and circulation to construct a narrative spatial experience. Architecture is therefore positioned as an active medium that guides users through a series of sensory and spatial transitions, producing immersive and memorable experiences (Pallasmaa, 2012; Norberg-Schulz, 1980).

In addition to experiential considerations, environmental responsiveness plays a crucial role in shaping spatial quality. Site-specific conditions such as solar orientation, wind patterns, noise levels, and urban context directly influence user comfort and environmental performance. Therefore, integrating environmental analysis into the design process is essential to produce adaptive and context-sensitive architectural solutions (Lynch, 1960).

Figure 3. Diagram: Interactive Multimedia Environment
Source: Author's Illustration (2026).

Furthermore, spatial experience in multimedia architecture is strongly influenced by circulation and movement. The arrangement of spatial sequences—from public zones to immersive exhibition spaces—plays a key role in shaping user perception and engagement. A well-designed circulation system can construct a narrative journey that enhances exploration, interaction, and emotional connection within the built environment.

Despite the increasing relevance of digital and experiential architecture, most existing studies still treat environmental analysis and spatial experience as separate domains. In the context of multimedia gallery design, there remains limited integration between site-specific environmental conditions and immersive architectural strategies, particularly in rapidly developing urban areas such as Surabaya. This indicates the need for a more integrated design approach that combines experiential architecture with environmental responsiveness (Manovich, 2001; Norberg-Schulz, 1980).

This study contributes to architectural design discourse by proposing an integrative

framework that combines experiential architecture principles with environmental analysis in the context of interactive multimedia galleries. Unlike previous approaches that separate digital interaction from spatial and environmental design, this study synthesizes both into a unified design strategy to enhance spatial quality and user engagement.

Based on these considerations, this study aims to develop a design proposal for an Interactive Multimedia Gallery located on Mayjend Sungkono Street, Surabaya, using an Experiential Architecture approach grounded in environmental analysis. The proposed design is expected to create an adaptive, immersive, and engaging spatial environment that responds effectively to urban conditions while enhancing user experience.

METHOD

This study employs a qualitative research approach combined with a Design-Based Research (DBR) framework. The research is design-oriented and iterative, focusing on the development of an architectural proposal through continuous cycles of analysis, synthesis, and evaluation. This approach is suitable for architectural studies because it integrates contextual understanding, environmental analysis, and design development within a single systematic framework (Barab & Squire, 2004; Zeisel, 2006).

The study is conducted on Mayjend Sungkono Street, Surabaya, which serves as the primary case study location. The site is selected using purposive sampling due to its strategic position as a high-activity urban corridor with strong accessibility, commercial intensity, and potential for public cultural development. In this context, the "population" refers to the surrounding urban environmental conditions and spatial users, while the "sample" consists of the selected site boundary, immediate urban context, environmental parameters, and observed spatial behavior patterns (Lynch, 1960).

Data collection is carried out through multiple qualitative methods to ensure comprehensive spatial and contextual understanding. Field observation is conducted to identify environmental conditions such as solar orientation, wind flow, noise levels, accessibility, circulation patterns, and surrounding urban activities. Literature study is used to establish theoretical foundations related to experiential architecture, phenomenology, multimedia spatial design, and environmental responsiveness. In addition, spatial documentation is carried out through mapping, sketching, photography, and satellite imagery analysis to support contextual interpretation of the site. If necessary, a comparative case study is also conducted to analyze similar interactive multimedia or cultural facilities as design references (Pallasmaa, 2012; Manovich, 2001; Norberg-Schulz, 1980; Zeisel, 2006).

Data analysis is conducted using descriptive and interpretative qualitative methods, focusing on the relationship between environmental conditions, spatial configuration, and user experience. The analysis includes environmental evaluation (sun, wind, noise, accessibility), spatial evaluation (zoning, circulation, and spatial sequencing), and experiential evaluation (sensory engagement, narrative space, and interaction patterns). These findings are then synthesized into architectural design strategies such as spatial zoning, circulation structuring, building orientation, environmental control, and

integration of interactive multimedia systems.

The analytical process is guided by experiential architecture and phenomenological theory, which emphasize that architectural space is not only a physical container but also a medium of sensory and emotional experience shaped by human perception and environmental context (Pallasmaa, 2012; Norberg-Schulz, 1980). Therefore, the final outcome of this study is not statistical but conceptual and spatial, producing an adaptive, immersive, and context-responsive design proposal for an Interactive Multimedia Gallery in Surabaya.

FINDING AND DISCUSSION

RESEARCH RESULT

The findings of this study are derived from site analysis and the application of experiential architecture principles in the design of an Interactive Multimedia Gallery located on Mayjend Sungkono Street, Surabaya. The analysis focuses on environmental conditions, spatial characteristics, and user experience to generate a responsive and immersive design strategy.

1. Environmental Analysis

The environmental analysis indicates that the site possesses strong potential for development due to its strategic urban location and high accessibility. However, several environmental challenges must be addressed, particularly solar exposure, noise levels, and urban density.

The findings of this study are derived from site analysis and the application of experiential architecture principles in the design of an Interactive Multimedia Gallery located on Mayjend Sungkono Street, Surabaya. The results focus on environmental conditions, spatial configuration, and experiential design parameters as an integrated architectural system (Zeisel, 2006).

The environmental analysis indicates that the site has strong development potential due to its strategic urban location and high accessibility. However, several physical constraints are identified, particularly related to solar exposure, wind patterns, and noise levels. Solar analysis shows high radiation intensity on the western side of the site, requiring passive mitigation strategies such as façade shading systems, secondary skins, and vegetation buffers to reduce heat gain and improve thermal comfort (Lynch, 1960). Wind analysis indicates a dominant airflow from the east, which supports the use of natural ventilation strategies, particularly in semi-open and transitional spaces. Meanwhile, noise analysis reveals higher intensity along the main road frontage, while interior areas of the site provide more stable acoustic conditions, enabling functional zoning based on environmental hierarchy (Norberg-Schulz, 1980).

Figure 4. Macro Zoning Configuration Showing Spatial Hierarchy (Public–Semi–Private Zones)
Source: Author's Illustration (2026)

Based on these environmental conditions, the spatial program is structured into three main zoning layers: public, semi-public, and immersive zones. The public zone is located at the front of the site to respond to accessibility and urban visibility requirements, accommodating functions such as entrance areas, lobbies, and communal spaces. The semi-public zone functions as a transitional layer that contains interactive exhibitions, workshops, and digital installations, bridging public access and immersive experience. The immersive zone is positioned at the rear of the site, where environmental conditions are more controlled, and accommodates VR-based exhibitions, projection spaces, and sensory installations requiring low light and acoustic isolation (Manovich, 2001).

The spatial configuration is further developed through an experiential circulation system that guides users through a sequential journey from public to immersive spaces. This spatial sequence is designed to create gradual transitions in sensory intensity, starting from open and accessible areas, moving through interactive transitional zones, and culminating in fully immersive environments. Such spatial progression supports narrative-based architectural experience, where movement becomes an essential component of perception and engagement (Pallasmaa, 2012).

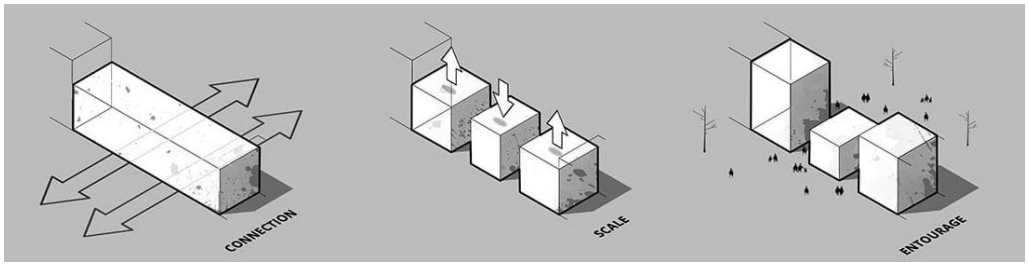

Figure 5. Spatial Sequence Diagram Representing Experiential Progression
Source: Adapted from Zumthor (2006) and Author's Interpretation (2026)

In addition to spatial organization, environmental responsiveness is integrated into the architectural strategy. Climate-based design responses include shading systems for solar control, natural ventilation strategies for airflow optimization, and spatial buffering for noise mitigation. These strategies ensure that environmental factors are not treated as constraints, but as generative elements that shape spatial quality and user experience (Norberg-Schulz, 1980).

The integration of interactive multimedia systems is a fundamental component of the design. Technologies such as projection mapping, sensor-based interaction, and virtual reality installations are embedded directly into the architectural space, creating a unified relationship between digital media and physical environment. In this context, architecture functions as a medium that supports and amplifies interactive experiences rather than serving as a passive container (Manovich, 2001).

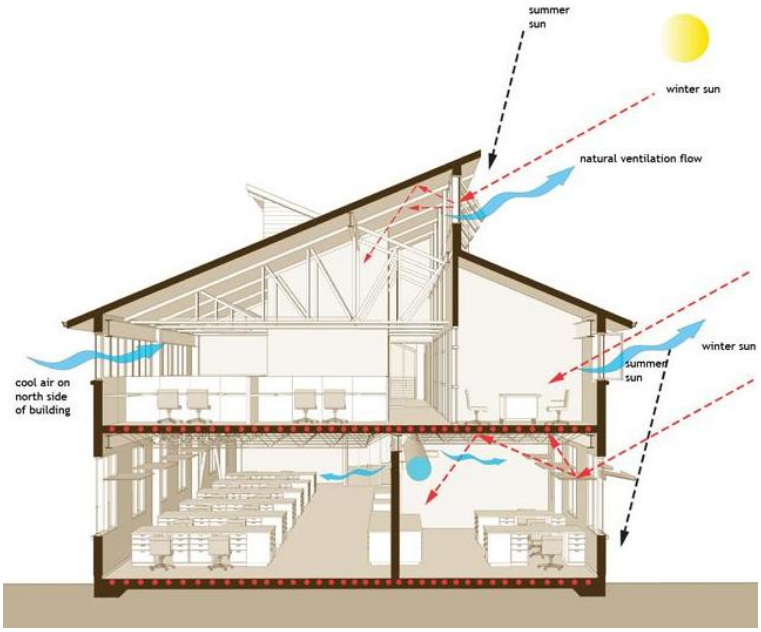

Figure 6. Climate-Responsive and Environmental Adaptation Strategy
Source: Author's Illustration (2026)

The final spatial configuration demonstrates a synthesis between experiential architecture and environmental responsiveness, where spatial hierarchy, circulation, and environmental systems work together to create an immersive and adaptive environment. The design emphasizes sensory engagement through changes in light, materiality, spatial scale, and digital interaction, reinforcing a multisensory architectural experience (Pallasmaa, 2012).

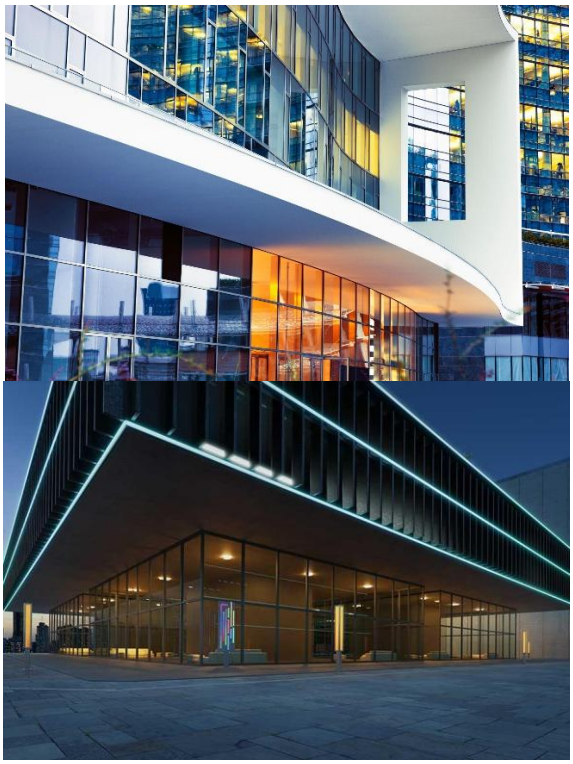

Figure 7. Final Architectural Visualization of the Multimedia Gallery Design
Source: Author's Design Visualization (2026)

From a theoretical perspective, the findings align with experiential architecture principles that emphasize sensory perception and embodied spatial experience. However, this study extends the framework by positioning environmental conditions—such as sunlight, wind, and noise—as active design drivers that shape spatial experience rather than passive contextual data. This integration demonstrates that experiential quality can be strengthened through environmental responsiveness embedded within spatial design logic (Norberg-Schulz, 1980; Pallasmaa, 2012).

Although the study successfully establishes an integrated conceptual framework, it remains limited to qualitative and design-based analysis without quantitative validation such as energy simulation or acoustic performance measurement. Therefore, further research is recommended to evaluate the technical performance of the proposed design in real environmental conditions (Zeisel, 2006).

Overall, the study confirms that the integration of experiential architecture and environmental analysis provides a strong foundation for designing interactive multimedia spaces that are adaptive, immersive, and capable of generating meaningful spatial experiences within an urban context (Manovich, 2001).

Discussion

This study demonstrates that the integration of experiential architecture with environmental responsiveness produces a more comprehensive approach to designing interactive multimedia spaces. The findings indicate that spatial experience is not only shaped by visual and formal design elements such as lighting, materiality, and spatial sequencing, but is also significantly influenced by environmental conditions including solar exposure, ventilation, and noise levels. In this sense, environmental factors function not merely as contextual constraints but as active components that shape spatial and experiential quality (Lynch, 1960; Pallasmaa, 2012).

When compared with previous studies on experiential architecture, the findings are consistent with Pallasmaa (2012), who emphasizes the importance of multisensory engagement in shaping meaningful spatial experiences. The integration of lighting, materiality, and spatial sequence in this study supports his argument that architecture should engage all human senses. However, this research extends the theoretical framework by incorporating environmental responsiveness as an integral component of experiential design, whereas earlier studies tend to focus primarily on sensory perception without strong integration of site-specific environmental performance (Norberg-Schulz, 1980).

Furthermore, in relation to digital and interactive architecture theory, Manovich (2001) argues that interactive media environments enhance user engagement through digital systems and interfaces. This study supports that perspective but extends it by demonstrating that digital interaction alone is insufficient without spatial and environmental integration. The findings show that the effectiveness of multimedia architecture increases when environmental strategies such as shading, ventilation, and acoustic control are embedded within spatial design logic.

Despite these contributions, the study has several limitations. The research is conceptual and design-based, and therefore does not include quantitative validation such as energy simulation, thermal performance analysis, or acoustic measurement. As a result, the environmental performance of the proposed design has not been tested under real operational conditions, which may limit the technical generalizability of the findings (Zeisel, 2006).

In addition, the study focuses on a single site context in Surabaya, which limits the applicability of the findings to other urban environments with different climatic and spatial conditions. The interpretation of user experience is also qualitative and conceptual, without empirical behavioral testing such as post-occupancy evaluation or user experience surveys, which may affect the precision of experiential assessment (Zeisel, 2006).

The implications of this study suggest that future research should incorporate quantitative simulation methods, such as thermal comfort analysis, daylight simulation, and acoustic performance modeling, to validate environmental effectiveness. In addition, user-centered evaluation methods such as behavioral mapping and post-occupancy evaluation are recommended to strengthen experiential validation in

architectural research (Zeisel, 2006).

From a practical perspective, the findings provide a design framework that integrates experiential architecture with environmental responsiveness in the development of interactive multimedia spaces. This approach can be applied in the design of cultural and educational facilities in urban contexts, where spatial experience, digital interaction, and environmental performance must operate simultaneously to produce meaningful architectural environments (Pallasmaa, 2012; Manovich, 2001).

Overall, the study confirms that the integration of experiential architecture and environmental analysis provides a strong foundation for developing adaptive, immersive, and user-centered multimedia architecture in contemporary urban environments.

CONCLUSION

This study concludes that the design of an Interactive Multimedia Gallery using an Experiential Architecture approach in Surabaya is relevant in addressing the contemporary demand for immersive, interactive, and multisensory cultural spaces. The integration of environmental analysis with spatial design strategies demonstrates that architectural outcomes are strongly influenced by the relationship between site conditions and experiential spatial organization, where both aspects must be considered simultaneously in design development (Pallasmaa, 2012; Lynch, 1960).

The findings indicate that environmental factors such as solar orientation, wind patterns, noise levels, and urban context play a significant role in shaping spatial configuration and architectural decision-making. The application of environmental-responsive strategies, including shading systems, natural ventilation, zoning hierarchy, and buffer zones, contributes to improving thermal comfort, spatial efficiency, and environmental adaptation within the proposed design framework (Norberg-Schulz, 1980; Lynch, 1960).

Furthermore, the implementation of experiential architecture principles, particularly spatial sequencing and user-centered design, enables the creation of a structured yet dynamic spatial experience. The gradual transition from public to immersive spaces enhances user engagement by creating a narrative spatial journey that supports sensory stimulation and emotional connection within the built environment (Pallasmaa, 2012).

In addition, the integration of interactive multimedia technologies strengthens the role of architecture as an active medium that facilitates user participation. The combination of physical spatial design and digital systems generates a hybrid environment that reflects contemporary shifts in cultural and educational architecture, where technology and space operate as a unified experiential system (Manovich, 2001).

However, this study is limited to a conceptual design approach and does not include quantitative validation methods such as energy simulation, daylight analysis, or acoustic performance evaluation. As a result, the technical performance of the proposed design under real environmental conditions has not been empirically tested, which may affect its operational validation (Zeisel, 2006).

Future research is recommended to incorporate simulation-based design evaluation and user behavior studies, such as post-occupancy evaluation (POE) and spatial experience analysis, to enhance the accuracy of environmental and experiential performance assessment. These methods would strengthen the integration between theoretical design and real-world application in architectural practice (Zeisel, 2006).

Overall, this study demonstrates that the integration of experiential architecture and environmental responsiveness provides a strong foundation for designing adaptive, interactive, and immersive multimedia cultural spaces. The proposed design is expected to contribute to the development of contemporary urban architecture that enhances user experience while responding effectively to environmental and contextual conditions (Pallasmaa, 2012; Manovich, 2001).

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