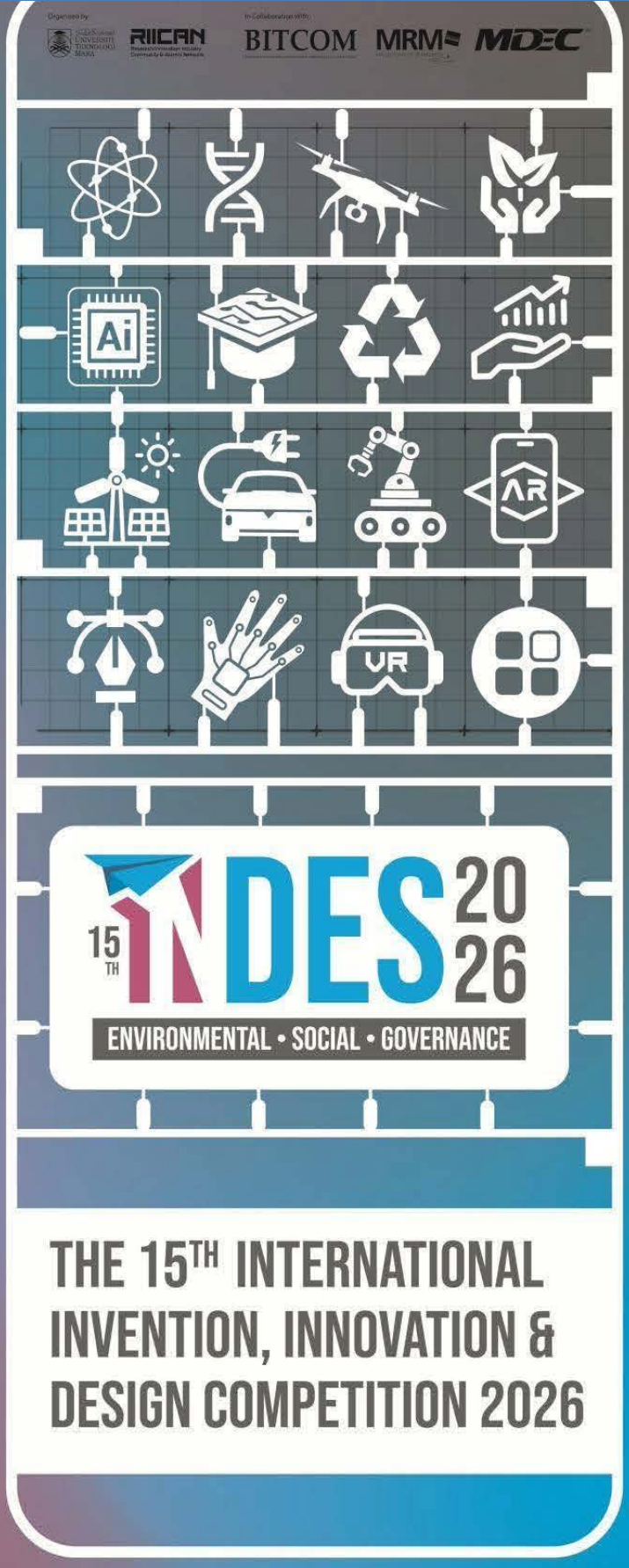


E-BOOK OF

EXTENDED ABSTRACT

E-BOOK OF EXTENDED ABSTRACT

THE 15th INTERNATIONAL
INVENTION, INNOVATION &
DESIGN COMPETITION 2026

Organized by:
Office of Research, Industry,
Community & Alumni Network
UiTM Perak Branch

© Unit Penerbitan UiTM Perak, 2026

All rights reserved. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or by any means; electronic, mechanical, photocopying, recording or otherwise; without permission on writing from the director of Unit Penerbitan UiTM Perak, Universiti Teknologi MARA Perak Branch.

Unit Penerbitan UiTM Perak,
Universiti Teknologi MARA,
Perak Branch, 32610
Seri Iskandar Perak, Malaysia.

Perpustakaan Negara Malaysia Cataloguing in Publication Data

No e- ISBN 978-967-2776-67-3

Cover Design: Asrul Nizuan Ariffin

Typesetting : Georgia

EDITORIAL BOARD

Editor-in-Chief

Muhd Syahir Abdul Rani

Managing Editors

Muhammad Wajihuddin Johari
Paul GnanaSelvam A/L Pakirnathan
Nazirul Mubin Mohd Noor
Nurdiyana Mohamad Yusof
Halimatussadiah Iksan

Copy Editors

Sheema Liza Idris
Nurul Munirah Azamri
Zarlina Mohd Zamari
NoorAileen Ibrahim
Farahidatul Akmar Awaludin
Siti Syairah binti Fakhruddin
Noor Fazzrienee JZ Nun Ramlan
Madaha binti Hanafi @ Mohd Ghani
Halimatun Saadiah Abd Mutalib
Hanitha A/P Satthiananthan
Syaza Kamarudin
Iza Faradiba Mohammad Patel
Nuramira Anuar
Noorlinda Alang
Noraziah Azizan
Faridatul Akma Wan Mohd Rashdi
Azurawati Zaidi
Ong Elly
Noran Nur Munira Khalili
Amirah Athirah Amir Yazid
Nurshahirah Azman
Daljeet Singh Sedhu A/L Janah Singh
Budiman Sabri Ahmad
Amirul Farhan Ahmad Tarmizi
Sarah Sakinah Assa'adah Johari

DEVELOPING A FRICTIONLESS WEB-BASED AR FRAMEWORK FOR VISUAL ARTISTS: A SCALABLE ECOSYSTEM

Dr Hasleena Binti Hamzah
Dr Wan Irma Sabrina Binti Idris
Pn. Suhaila Binti Ahmad Zaki
Pn. Mariah Binti M Johari
Ms Jeevamalar A/P Kumarasamy

Faculty of Creative Industry, University Tunku Abdul Rahman

hasleena@utar.edu.my, sabrina@utar.edu.my, suhailaz@utar.edu.my, mariahj@utar.edu.my, jeevamalar@utar.edu.my

ABSTRACT

Visual artists face significant challenges in maintaining a digital presence as proprietary software ecosystems shift, necessitating a move toward platform-independent solutions. Furthermore, traditional art institutions struggle to engage audiences who resist the technical friction of downloading dedicated mobile applications, a process known to cause a 50% drop in user engagement. This research proposes a universal, frictionless Web-based Augmented Reality (WebAR) framework developed exclusively on the Kivicube platform. By leveraging Kivicube's no-code visual editor and professional-grade asset support, the framework enables visual artists to transform traditional 2D portfolios, including hand-drawn cartoonist sketches and fine-art watercolours, into interactive 3D experiences accessible via standard mobile browsers. This study evaluates the framework through case studies involving heritage preservation, watercolour storytelling, and commercial graphic toolkits. Results demonstrate that the framework preserves artistic integrity through texture displacement and provides a two-step Scan & Play journey, effectively democratising AR creation for the visual arts and reaching 3.5 billion devices.
Keyword: Web-based AR, Augmented Reality, Visual Art

1. INTRODUCTION

Currently, the visual arts community is at a crossroads, with artists needing to find sustainable platform-agnostic technology to continue their digital content creation without being forced into app or software dependency (AppMaster, 2023; Platt, 2025). Meanwhile, traditional galleries must bridge a generational gap to draw in tech-native crowds who want deep engagement but resist the hassle of downloading an app for a single experience. Some sources have estimated losses of up to 50% engagement at the hurdle of app downloading alone (Platt, 2025). With the development of this generalised WebAR solution created entirely within the Kivicube ecosystem, artists can now deliver a seamless art experience with art value and technical accessibility at the forefront of the solution for artists who may not consider themselves tech savvy (KivicubeAR, 2025).

1.1 The Frictionless Journey

This study centres on optimising the user interaction flow through what is termed the Frictionless Kivicube Journey, which reduces the conventional six-step mobile application installation process to a streamlined two-step interaction: scanning a QR code and granting camera access. This facilitates immediate engagement with augmented reality (AR) content (Platt, 2025; KivicubeAR, 2025). In addition, the framework promotes no-code empowerment by leveraging Kivicube's visual editor, enabling visual artists to develop complex interactions, such as image tracking and face filters, without requiring advanced programming knowledge (KivicubeAR, 2025; Tang et al., 2024). From a technical standpoint, the use of the Kivicube Pro Plan supports high-density 3D assets of up to 100MB and high-resolution visuals, ensuring aesthetic fidelity while minimising performance issues such as stuttering (Kivicube, n.d.; AppMaster, 2023). Furthermore, as a WebGL-compatible solution, the framework offers universal accessibility across standard mobile browsers, overcoming the limitations of platform-specific applications and extending its reach to a broad global user base (Vignesh et al., 2023; Platt, 2025).

1.2 Theoretical Framework: Preserving Art Value

To maximise impact, user experience (UX) design must balance pragmatic, utilitarian and hedonic, pleasurable attributes (Wafa, 2023). While traditional AR often focuses on information delivery, this framework prioritises hedonic attributes to stimulate user imagination and emotional resonance (Wafa, 2023; Widjaja et al., 2025). Preserving artistic integrity is achieved through GPU-based GLSL shaders, where the system performs texture displacement, allowing a visual artist's original 2D data, such as a cartoonist's hand-drawn lines or a watercolourist's organic paint bleeds, to influence 3D geometry (Interactive & Immersive HQ, 2023; Yang et al., 2025). This ensures that technology serves the artist's existing visual world rather than defining it (Menescal, n.d.). By embedding digital content into the art ontology, cultural heritage evolves from a static information carrier to a digital living organism that continuously reconfigures expressions based on audience interaction (Yang et al., 2025).

2. METHODOLOGY

2.1 Multimedia Development Life Cycle

The development process adopts the Multimedia Development Life Cycle (MDLC) model to ensure a systematic and structured workflow (Undiksha, 2025). At the conceptual stage, high-contrast trigger images are identified within the visual artist's portfolio to enhance recognition accuracy in augmented reality environments (Artivive, n.d.). This is followed by the design phase, where the user experience (UX) flow is mapped to establish a coherent and linear digital narrative that effectively bridges physical and virtual spaces (Wafa, 2023). In the material collecting stage, appropriate digital assets, including 3D models in GLB/GLTF formats and transparent video elements, are generated in accordance with platform constraints, particularly Kivicube's 100MB file limitation (KivicubeAR, 2025; upGrad, 2026). The assembly phase involves integrating these assets into the Kivicube Pro dashboard, alongside configuring interactive click triggers to manage and enhance visual dynamics (KivicubeAR, 2025). Finally, the testing phase consists of performance evaluations to ensure optimal functionality, including maintaining stable frame rates of up to 60 FPS on mobile browsers to minimise latency and prevent visual lag (AppMaster, 2023).

2.2 Case Study Development

This study further explores three applied contexts to demonstrate the versatility of the proposed framework. In the domain of heritage preservation, focusing on the works of the visual artist LAT, the approach involves translating iconic black-and-white hand-drawn sketches into interactive 3D environments (Hamzah, n.d.). By utilising line-work data to inform 3D geometry through shader-based techniques, the resulting digital layer preserves the distinctive hand-drawn aesthetic, avoiding the appearance of generic three-dimensional models (Interactive & Immersive HQ, 2023; Yang et al., 2025). In the context of watercolour fine art, particularly the work Wknd I Am In love, the study leverages Kivicube's capability to support transparent video overlays, enabling animated paint floral blooms to appear within the user's view while maintaining the subtle gradients and textures of traditional watercolour on paper (KivicubeAR, 2025; Lim, 2022). This approach has been shown to achieve an average user dwell time of approximately two minutes, indicating sustained engagement (Platt, 2025). Additionally, the framework is extended into a generalised graphic artist Wayang Kulit by Sabrina Tan toolkit, offering a scalable commercial application whereby scanning printed visual materials, such as posters, activates interactive 3D character masks or animation layers via cloud recognition. This system supports up to 500 target images within the Kivicube platform, enabling broader adoption across creative industries (Tang et al., 2024; Kivicube, n.d.).

3. FINDINGS

The findings of this study show clear uses and effects in several creative areas. In heritage preservation, focusing on the visual artist LAT, translating shaders is effective for preserving artistic integrity. Line-work can directly affect 3D geometry, as seen in Figure 1. However, implementation faces important copyright issues, which means proper licensing and legal clearance are necessary before deployment.

For watercolour artists, the findings indicate that WebAR may be effective where simultaneous application occurs alongside SocialAR platforms such as Snapchat Lens Studio or TikTok Effect House. These platforms fit better with how audiences engage. SocialAR offers more visibility through virality and user-generated content, making it a smarter promotional tool. In graphic design, AR turns static materials into interactive experiences, especially in packaging and promotional items. Scanning physical artefacts can trigger dynamic digital content such as 3D icons, instructional visuals, or product simulations, improving both functionality and user engagement.



Figure 1 Mock-up representation of a WebAR experience translating LAT's two-dimensional line artwork into interactive digital overlays, accessible through smartphone-based scanning.

4. CONCLUSION

The Frictionless Artist AR Framework represents a paradigm shift from static preservation to the dynamic evolution of art (Yang et al., 2025). By centring on the Kivicube ecosystem, the framework ensures that any visual artist's legacy, whether heritage-based sketches, fine-art watercolour, or modern graphic design, remains future-proof, interactive, and accessible globally (Kivicube, n.d.; Platt, 2025).

Disclaimer on Copyright and Usage

This study includes the use of visual materials associated with the works of LAT for research and conceptual prototyping purposes only. The development presented is limited to a mock-up stage and is not intended for commercial distribution, sale, or public monetisation. All original artworks, characters, and visual references remain the intellectual property of Muzium Perak and their respective rights holders. The use of these materials is solely for academic exploration, analysis, and demonstration within the scope of this research.

REFERENCES

AppMaster. (2023, July 20). Integrating augmented reality (AR) into web development. AppMaster Blog. https://appmaster.io/blog/integrating-ar-into-web-development

Artivive. (n.d.). AR-Step-by-Step guide: How to create augmented reality art [Video]. YouTube.

Hamzah, H. B. (n.d.). Reimagining LAT: Mobile augmented reality museum experience for cultural preservation and youth engagement [Unpublished grant proposal]. Universiti Tunku Abdul Rahman.

Interactive & Immersive HQ. (2023, August 1). Web AR, social AR, and AR apps for live events. https://interactiveimmersive.io/blog/ar/web-ar-social-ar-and-ar-apps-for-live-events/

Kendall, S. (2023, July 3). What is an AR social filter? Rose Digital. https://rosedigital.com/insights/what-is-an-ar-social-filter

Kivicube. (n.d.). Pricing and plans. Kivicube WebAR Platform. https://www.kivicube.com/pricing

KivicubeAR. (2025). KivicubeAR - Simple AR creation tool for everyone [YouTube Channel]. YouTube.

Lim, K. (2022). Expanding multimodal artistic expression and appreciation methods through integrating augmented reality. International Journal of Art & Design Education, 41(4), 548-566. https://doi.org/10.1111/jade.12434

Menescal, N. (n.d.). 7 AR artists who are raising the bar for augmented reality art. Basa Studio. https://basa-studio.com/stories/7-AR-artists-who-are-raising-the-bar

Platt, P. (2025, April 7). Is WebAR better than AR apps? Rock Paper Reality. https://rockpaperreality.com/insights/webar/is-webar-better-than-ar-apps/

Tang, Y., Leong, W. Y., & Fang, S. (2024). Exploration of AI and AR technologies in the character design of "Dream of the Red Chamber". INTI Journal, 2024.

Undiksha. (2025). Pengembangan media pengenalan benda sejarah Museum Buleleng berbasis Web-Based Augmented Reality (Thesis Chapter IV). Universitas Pendidikan Ganesha.

upGrad. (2026, April 17). Top 20+ augmented reality (AR) projects in 2026. upGrad Blog. https://www.upgrad.com/blog/augmented-reality-projects/

Vignesh, A. S., Gracy, S., Naath, H. K., & Kannan, R. (2023). Web based AR visual tracking system. International Journal of Progressive Research in Engineering Management and Science, 3(5), 735-739.

Wafa, S. N. (2023). 'The Tree': Deliberating user experience design in augmented reality art creation. Atlantis Press, 706, 257-265.

Widjaja, Y., Junaidi, & Solihatin, E. (2025). Evaluating the effectiveness of augmented reality in mixed reality exhibition spaces: A multidisciplinary perspective. Journal of Applied Data Sciences, 6(3), 1695-1707.

Yang, J., Wu, R., & Yu, J. (2025). Wafer 0813: Exploring alternative roles for generative AI in future digital heritage exhibitions. Guangzhou Academy of Fine Arts.

E-BOOK OF EXTENDED ABSTRACT THE 15th INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2026

eISBN 978-967-2776-67-3

9 789672 776673

Date of Publication: 13 July 2026

UNIT PENERBITAN UITM PERAK

(online)