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13TH INDES 2024

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THE 13TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION 2024

EXTENDED ABSTRACTS

e-BOOK

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LEVERAGING QR TECHNOLOGY FOR SUSTAINABLE LIVING IN ALOR SETAR

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ABSTRACT

This study explores the innovative application of QR technology in promoting sustainable living in Alor Setar, Kedah, a region renowned for its picturesque paddy fields. By enhancing pedestrian infrastructure and incorporating digital innovations, this project aims to strike a balance between urban development and environmental conservation. By leveraging Quick Response (QR) codes, this project envisions creating interactive installations that enhance the pedestrian experience. These installations will provide Augmented Reality (AR) experiences offering educational and entertainment value. The primary objectives are twofold: to improve pedestrian amenities and to design sustainable facilities that foster social interaction and community engagement. The QR-coded sidewalks will guide residents and visitors through scenic routes, highlight cultural landmarks and local biodiversity, thereby encouraging walking as a mode of transport. AR experiences will overlay historical narratives and ecological insights into real-world views, enriching the understanding of Alor Setar's heritage and environmental significance. Additionally, this initiative seeks to create social hubs with QR-enabled installations that promote communal activities and local crafts. Ultimately, the integration of QR technology into Alor Setar's urban planning promises to create a model of sustainable living that can be replicated in other cities facing similar challenges.

Keyword: QR technology; sustainable living; pedestrian infrastructure; augmented reality; community engagement

1. INTRODUCTION

1.1 Integration of QR code and AR Experience

The integration of QR code technology in urban planning presents an innovative approach to creating engaging and interactive experiences for visitors. In Alor Setar, Kedah, the implementation of QR code scanning enables tourists and residents to explore the city's famous landmarks through augmented reality (AR) experiences, providing educational and immersive insights into the region's rich cultural heritage and natural beauty. This project aims to leverage such technology to promote sustainable living, enhancing both the functionality and appeal of urban spaces while maintaining the scenic charm of Alor Setar's paddy fields. Reducing the urban heat island effect is the crucial component of this sustainability initiative. By incorporating polycarbonate roofs and solar panels into the city's infrastructure, the project not only aims to mitigate temperature increases but also harnesses renewable energy sources to power public amenities. These dual- approach objectives ensure that urban development in Alor Setar is both climate-conscious and energy-efficient, align with the broader goals of sustainable development.

1.2 Integration of Sustainable Development Goals (SDG)

Furthermore, the project integrates the Sustainable Development Goals (SDGs) into its design approach, emphasizing environmental stewardship, social inclusivity, and economic viability. The construction of clearly marked and well-designed pedestrian crossings encourages a more walkable city, enhancing safety and accessibility for all. By fostering community engagement and promoting eco-friendly practices, this initiative supports the long-term sustainability of Alor Setar.

2. METHODOLOGY

The methodology for this project involves a comprehensive use of ArcGIS Instant Apps to plan, implement, and manage the QR code technology and other sustainable infrastructure. The process begins with the collection of spatial data, including the locations of key cultural and historical sites, pedestrian pathways, and potential installation points for QR codes. This data is then uploaded to ArcGIS software, where it is analyzed to identify optimal locations for interactive installations and pedestrian enhancements. The next step involves designing the QR code experiences using ArcGIS Instant Apps. A flowchart outlining this process includes:

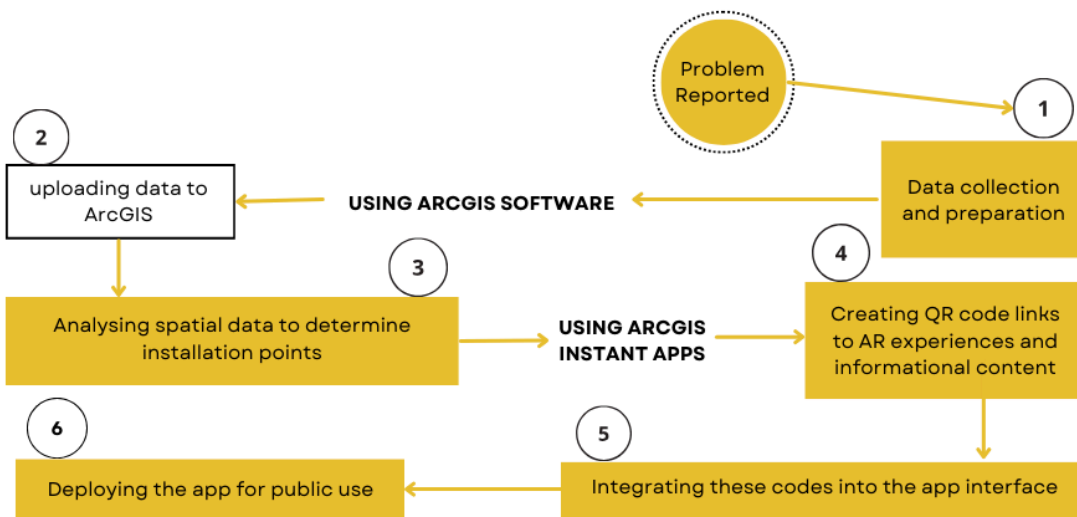


Figure 1 Workflow methodology of leveraging QR technology for sustainable living

Each step is meticulously planned to ensure that the technology enhances user engagement while promoting sustainable practices. Finally, the implementation phase focuses on the physical installation of QR codes, solar panels, polycarbonate roofs, and pedestrian crossings. Regular monitoring and evaluation are conducted using ArcGIS tools to assess the effectiveness of these interventions in reducing the urban heat island effect, improving pedestrian safety, and promoting community engagement. Feedback from users is collected through the app to continuously refine and enhance the experience.

3. FINDINGS

The deployment of QR code technology has significantly enriched the visitor's experience in Alor Setar. Tourists using the QR codes, as reported in the questionnaire survey during data collection, expressed a high level of engagement and satisfaction, noting the ease with which they could access detailed information about Kedah's landmarks and cultural sites. The AR experiences were highlighted as a major attraction, offering a unique and immersive way to explore the city's heritage and natural beauty.

The introduction of polycarbonate roofs and solar panels has shown promising results in reducing urban heat island effect. Temperature measurements taken before and after the installation indicate a noticeable decrease in ambient temperatures in areas with these modifications. Additionally, the solar panels have successfully generated a portion of the energy required to power public amenities, demonstrating the feasibility of integrating renewable energy sources into urban infrastructure. The alignment with the Sustainable Development Goals has been well-received, with particular emphasis on improving pedestrian infrastructure and community spaces. The clearly marked and well-designed pedestrian crossings have enhanced safety and accessibility, encouraging more residents and visitors to walk rather than drive. This shift not only promotes physical health but also reduces traffic congestion and associated emissions, contributing to a cleaner, more sustainable environment.

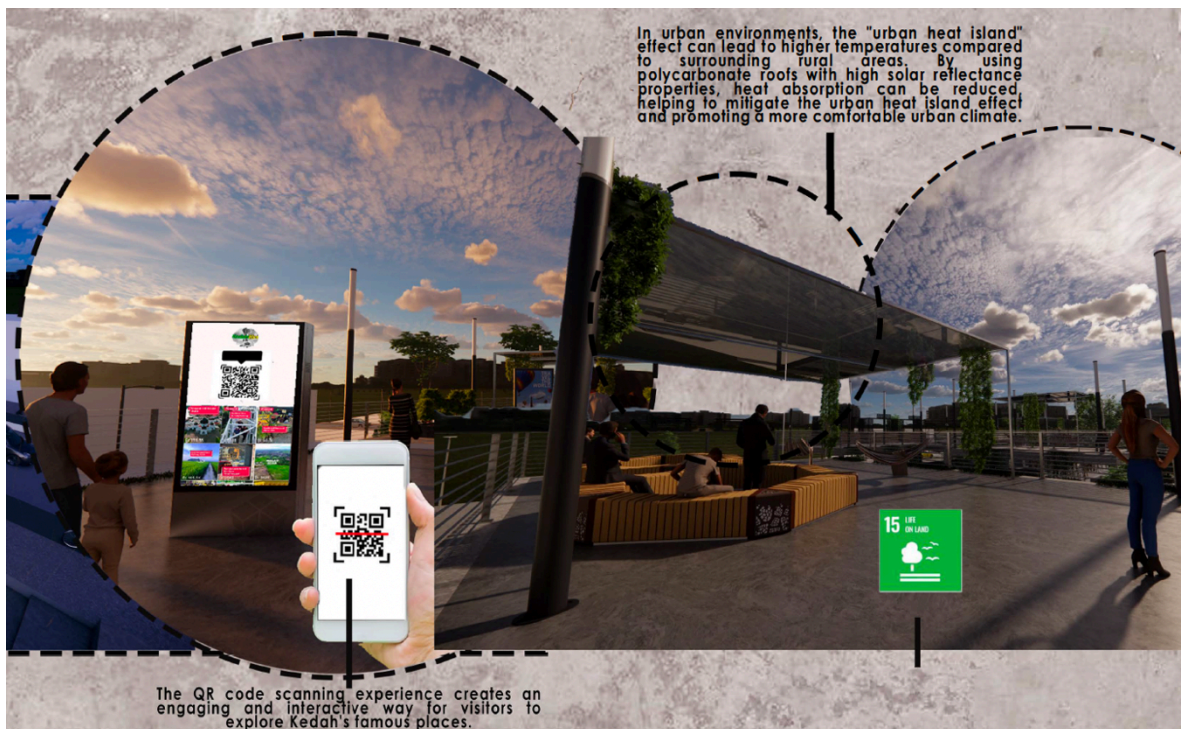


Figure 2 Deployment of QR code technology and the integration of SDG

4. CONCLUSION

In conclusion, the innovative use of QR technology, combined with sustainable infrastructure practices, has successfully enhanced the urban experience in Alor Setar. The project's multifaceted

approach, incorporating AR experiences, solar energy, and culturally significant installations, has not only improved visitor engagement but also contributed to the city's sustainability goals. By aligning with the Sustainable Development Goals, the initiative has created a model for urban development that prioritizes environmental stewardship, social inclusivity, and economic viability. The positive outcomes observed in Alor Setar serve as a blueprint for other cities aiming to balance urban growth with sustainability, demonstrating the potential of technology-driven solutions in fostering sustainable living.

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