INTRODUCTION TO KALIMANTAN CULTURE USING AUGMENTED REALITY TECHNOLOGY

by Chaulina Alfianti Oktavia

INTRODUCTION TO KALIMANTAN CULTURE USING AUGMENTED REALITY TECHNOLOGY

Chaulina Alfianti Oktavia, Achmad Buyung Riyadi

Departement of Information System, Sekolah Tinggi Informatika & Komputer
Indonesia, Malang, 65146, Indonesia
Departement of Information Technology, Sekolah Tinggi Informatika & Komputer
Indonesia, Malang, 65146, Indonesia
E-mail: chaulina@stiki.ac.id, 181111002@mhs.stiki.ac.id

Abstract

Central Kalimantan is a province consisting of 13 regencies and 1 city with the capital city of Palangkaraya. Many people, especially the younger generation, do not know the various cultures of Central Kalimantan such as traditional houses, clothes, traditional weapons, and so on. To facilitate the introduction of this culture an application is designed using Android-based Augmented Reality technology. Augmented Reality was designed using marker technology. From the test results, markers can be detected properly and can recognize and display Central Kalimantan cultural objects such as traditional houses, clothing, traditional weapons, and others. With the Augmented Reality application, it can make it easy for users to recognize the culture of Central Kalimantan. Based on the test results which included testing the AR Central Kalimantan application, the content of the AR Central Kalimantan application, and the display aspect obtained a score of 86%, it can be concluded that the application has been running well.

Keywords: *central borneo culture; augmented reality; android; mobile*

Abstrak

Kalimantan Tengah adalah sebuah provinsi yang terdiri dari 13 kabupaten dan 1 kota dengan ibu kota Palangkaraya. Banyak orang, terutama generasi muda, tidak mengetahui berbagai budaya Kalimantan Tengah seperti rumah adat, pakaian, senjata tradisional, dan lain-lain. Untuk memudahkan pengenalan budaya ini, sebuah aplikasi dirancang menggunakan teknologi Augmented Reality berbasis Android. Augmented Reality dirancang menggunakan teknologi marker. Dari hasil pengujian, marker dapat terdeteksi dengan baik dan dapat mengenali serta menampilkan objek budaya Kalimantan Tengah seperti rumah adat, pakaian, senjata tradisional, dan lainnya. Dengan aplikasi Augmented Reality, dapat memudahkan pengguna untuk mengenali budaya Kalimantan Tengah. Berdasarkan hasil pengujian yang meliputi pengujian aplikasi AR Kalimantan Tengah, konten aplikasi AR Kalimantan Tengah, dan aspek tampilan mendapatkan skor 86%, dapat disimpulkan bahwa aplikasi telah berjalan dengan baik.

Kata Kunci: *Kultur Kalimantan tengah, augmented reality; android; mobile*

1. Introduction (12 pt, bold)

Central Kalimantan is characterized by its division into 13 regencies and a single city, with Palangkaraya serving as its capital. This provincial structure contributes to a rich tapestry of cultural and customary practices, encompassing traditional architecture,

weaponry, attire, dance, music, ceremonial rituals, and crafts[1]. Each of these elements reflects the unique identity and heritage of the region, showcasing the diverse ways in which the communities of Central Kalimantan express their traditions and values. From the information provided, it's clear that Central Kalimantan boasts a distinctive cultural identity, setting it apart from other areas[2]. Unfortunately, a significant portion of the population, particularly the youth, remains unfamiliar with the region's diverse cultural practices. This lack of awareness among younger generations could result in disinterest towards their cultural heritage, a concerning trend given that these young individuals are the ones expected to uphold and perpetuate the cultural traditions of Central Kalimantan[3].

The diminishing connection of the younger generation with their local culture can be attributed to insufficient cultural education. A notable factor behind the youth's dwindling enthusiasm for Indonesian culture is the inadequate engagement and suboptimal leveraging of modern technology, such as Augmented Reality (AR), in the educational processes at middle and high school levels[4]. In the contemporary digital age, technological proficiency is essential, a necessity further emphasized by the COVID-19 pandemic, which has necessitated a shift towards virtual learning environments. This situation underscores the urgent need for integrating advanced technological tools in cultural education to foster a deeper appreciation and understanding of cultural heritage among young people[5]. Implementing Augmented Reality (AR) in the educational curriculum, particularly for arts and cultural subjects with a focus on Central Kalimantan's rich heritage, could serve as a revolutionary approach to engaging the youth. This method promises not only to captivate students' interest but also to provide them with a more intimate understanding of Central Kalimantan's culture[6].

By leveraging AR technology, learners can experience a closer and more interactive connection with the traditions and customs of the region, potentially sparking a lasting appreciation and curiosity for their cultural roots[7]. Augmented Reality (AR) technology merges virtual elements with the real world by superimposing digital objects onto the live view through a user's device, creating an immersive illusion that these virtual objects coexist within the user's physical space. This technology offers novel experiences to the younger demographic, presenting an engaging and innovative way to interact with media through smartphones[8]. Given the widespread use of smartphones across various demographics, AR technology is accessible to a broad audience, making it particularly appealing to the younger generation. This accessibility positions AR as a potent tool for introducing and educating these individuals about diverse topics, including cultural heritage, in a captivating and interactive manner[9].

The potential of Augmented Reality (AR) extends beyond mere entertainment, serving as an educational bridge that connects the digital savvy of the younger generation with the depths of cultural knowledge. By embedding cultural artifacts, historical narratives, and traditional practices within an AR framework, educators can craft compelling, interactive experiences that resonate with the interests and technological inclinations of young learners. This approach not only democratizes access to cultural education but also revitalizes traditional content, making it more relatable and engaging for a generation that might otherwise feel disconnected from its cultural roots[10]. Through AR, the stories and traditions of a community can be brought to life in vivid detail, encouraging a deeper connection and understanding among the youth.

Furthermore, the implementation of AR in cultural education could foster a new form of cultural preservation and transmission. As young individuals interact with their heritage in a manner that is both modern and engaging, they become active participants in the preservation of their culture. This involvement could inspire a sense of responsibility and pride in maintaining cultural traditions, ensuring that these practices are not only remembered but also celebrated[11]. Additionally, the scalability of AR technology means that these educational experiences can be shared widely, reaching audiences beyond the confines of traditional classrooms and museums, and possibly sparking a global interest in the rich cultural tapestry of regions like Central Kalimantan.

To address the fading interest in the cultural heritage among the younger generation, it is crucial to incorporate modern technological advancements into the educational framework, especially in the realm of cultural learning. Augmented Reality (AR), as mentioned, serves as a promising tool in this endeavor, providing an immersive and interactive experience that can significantly enhance the learning process[12]. By integrating AR into cultural education, learners can virtually explore Central Kalimantan's rich traditions, from the intricate designs of traditional houses and clothing to the dynamic movements of traditional dances, all through the screen of their smartphones. This not only makes cultural education more engaging but also more accessible, breaking down geographical and logistical barriers that might prevent exposure to these cultural treasures.

Furthermore, the implementation of AR technology in cultural learning can act as a bridge between traditional knowledge and the digital age, making it relevant to the tech-savvy younger generation. Schools and cultural institutions in Central Kalimantan could collaborate with tech developers to create AR applications tailored to showcase the province's culture in an appealing and educational manner.[13] Such initiatives could involve virtual tours of historical sites, interactive lessons on traditional crafts, or even AR-enhanced performances of traditional dances and music. By tapping into the interactive and gamified elements that AR technology offers, educators and cultural preservationists can ignite a renewed interest in Central Kalimantan's cultural heritage, ensuring its transmission to future generations while fostering a sense of pride and identity among the youth.

2. Research Methodology

The methodology follows a structured approach to both the research and the development of the system utilized within the study, adopting the Waterfall model as the guiding framework. The Waterfall model, a widely recognized System Development Life Cycle (SDLC) paradigm, is renowned for its linear and sequential methodology in information systems or software development projects[14]. This model delineates the process into distinct, orderly phases, commencing with the initial planning phase and extending through to the maintenance phase, with each stage methodically executed following the completion of the previous one[15]. This structured approach ensures a clear progression and delineation of tasks, facilitating a thorough and disciplined execution of the research and system development processes.

Each phase in the waterfall model in making this application is shown in Figure 1 below [16]. (one blank single space line, 12 pt)
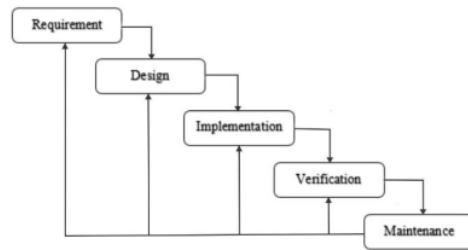
Figure 1. Waterfall Model

Within the Waterfall method, the project development journey is segmented into five critical stages: requirements, design, implementation, verification, and maintenance. During the requirements phase, the focus is on gathering and analyzing information to define what the software should achieve, aligning closely with the end-users' needs and expectations. This step is crucial for establishing a clear and comprehensive foundation for the project. Transitioning from the requirements phase, the design stage involves transforming these defined requirements into a detailed blueprint for the software[17]. This blueprint outlines the architectural structure, including how software components interact, data flow, and user interface designs. A key component of this stage is the creation of use case diagrams, which visually map out the interactions between users and the system's functionalities[18]. For the application aimed at introducing the culture of Central Kalimantan, a use case diagram would illustrate the various ways users can engage with the cultural content, providing insights into the user experience and system capabilities.

The use case diagram, as mentioned, serves as an essential tool for visualizing the scope of the application and the required interactions. By detailing the relationships between users and system activities, it ensures that the software design is user-centric and meets the project's objectives effectively[19]. For the Central Kalimantan cultural introduction application, this diagram would likely highlight features such as exploring traditional dances, music, crafts, and historical narratives, thereby setting the stage for the subsequent phases of implementation, verification, and maintenance[20].The use case diagram of the Central Kalimantan cultural introduction application can be seen in Figure 2.
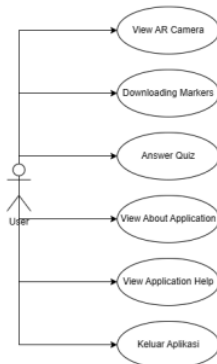

Figure 2. Use Case Diagram

Following the design phase, the project advances to the implementation stage, where the conceptualized design is transformed into a functioning software application. In the context of an application that employs marker-based tracking for Augmented Reality (AR), this phase involves programming the AR camera to recognize specific markers. When the system identifies a marker that matches predefined conditions, it triggers the display of a 3D object, thereby merging digital content with the real-world environment as seen through the device's camera[21]. This process is crucial for ensuring that the application responds accurately and efficiently to user interactions within the AR space. After implementation, the project moves into the verification stage. The purpose of this phase is to rigorously test the application to uncover any defects or issues that deviate from the specified requirements[22]. This systematic testing process is essential for validating the functionality, performance, and user experience of the application. It involves checking all features, including the marker-based tracking accuracy and the correct display of 3D objects, to ensure the application meets the intended design specifications and user needs.

The final stage in the Waterfall model is maintenance. This ongoing process addresses the need for periodic updates and refinements to the software application. Maintenance is crucial for the application's longevity and relevance, as it allows for the correction of any errors that emerge post-launch, the improvement of existing features, and the introduction of new functionalities. This stage ensures that the application remains compatible with evolving technological standards and continues to meet user expectations over time[23]. In essence, maintenance supports the continuous improvement and adaptation of the software system to enhance user satisfaction and engagement.

3. Results and Discussion

The results achieved from this study are an Android-based augmented reality application to display an introduction to Central Kalimantan culture. Utilizing Unity 3D for the application development framework, EasyAR for augmented reality capabilities, and Blender for crafting the 3D models, this application represents a convergence of advanced technologies to create an immersive cultural education tool. By leveraging Unity 3D, the project benefits from a powerful and flexible development environment that enables the integration of complex AR functionalities provided by EasyAR, along with the high-quality 3D objects modeled in Blender. This combination of technologies ensures that users have a seamless and engaging experience as they explore the diverse cultural heritage of Central Kalimantan through their Android devices. The application serves not only as a technological achievement but also as an educational resource, bridging the gap between traditional culture and digital innovation to make learning about Central Kalimantan's culture accessible and appealing to a broad audience.

3.1 Results

The results of this application that has been implemented and run on Android-based smartphones. The implementation of making 3D objects, background design, and marker design, to the coding implementation process that has been carried out is displayed according to the system design in the initial display design. The following are the results of the development in the design stage of the Augmented Reality Application as an alternative medium for introducing Central Kalimantan culture. You can see Figure 3 for the Main Page Display. The main page is the first page that appears when you first open

the application, on this page, there are 6 main menus namely AR Camera, download markers, quizzes, about, help, and exit and the display for this main page is shown in Figure 3.

Figure 3. Main Page

The marker in this application is in the form of a card, there is a picture of the culture of Central Kalimantan along with the name of the culture. The results can be seen in Figure 4.

Figure 2. Marker

The outcome of implementing the Augmented Reality (AR) Camera feature within the application, as observed through experimental trials, reveals its capability to accurately recognize and respond to designated markers. Upon scanning one of the specified markers with the AR Camera, the system successfully detects it and proceeds to superimpose the corresponding 3D object into the camera's viewfinder. This seamless interaction between the physical marker in the real world and the digital content overlay provides a tangible example of how the application bridges the gap between the tangible and the virtual.

This experimental result underscores the effectiveness of the marker-based tracking system in facilitating an interactive and immersive experience. Users can explore various aspects of Central Kalimantan culture, such as traditional artifacts, costumes, or architectural structures, in a vivid and engaging 3D format.
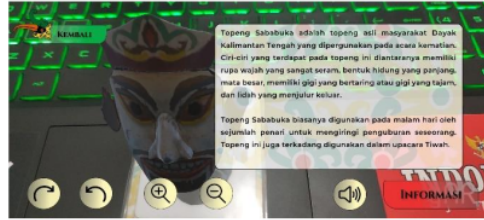
Figure 3. AR Kamera menu

The accuracy of marker detection and the quality of the 3D renderings are crucial for maintaining the application's educational and engagement objectives, offering users a unique and informative cultural discovery experience. This innovative approach to cultural presentation leverages AR technology to bring Central Kalimantan's heritage to life, providing an interactive platform for cultural education and appreciation. The marker scanning process can display 3D objects that match the markers can be seen in Figure 5. There is also a quiz feature on the quiz menu which can be seen in Figure 6.
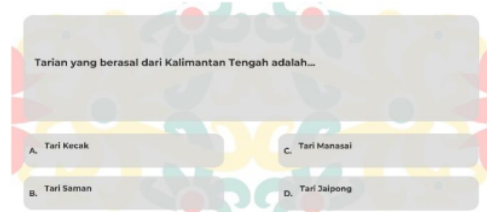

Figure 4. Quiz

3.2 Testing Result

In this study, the Likert scale serves as the primary instrument for gauging attitudes, opinions, and perceptions among individuals or groups regarding specific social phenomena. This methodological choice is particularly effective for assessing respondents' level of agreement or disagreement with a series of statements, offering a nuanced insight into their perspectives[5]. In the context of this research, the Likert scale is tailored to feature a 1–4 answer category range, providing a concise yet comprehensive framework for capturing the nuances of respondent feedback. Each response option within this scale is assigned a numerical value or weight, ranging from 1 to 4, where each number corresponds to the degree of endorsement or opposition toward the statement presented.. The details are as follows;

Table 1. Application Feasibility Index Scale

No	Index	Information
1	1	:Very Unsuitable
2	2	: Not Suitable
3	3	: Suitable
4	4	: Very Suitable

To compute the percentage of the application's suitability or eligibility, the formula applied involves dividing the total observed score by the maximum possible score, and then this quotient is multiplied by 100% to convert it into a percentage. This method yields a clear, quantitative measure of how well the application meets the expected criteria, with the potential outcomes ranging from 0% (completely unsuitable) to 100% (fully suitable). The scale for interpreting these

percentages is typically detailed in a table, which categorizes the range of percentages into various levels of suitability,;

Table 22. Application Feasibility Index Scale

No	Index	Information
1	0%-24.99%	Very Less
2	25%-49.99%	Less
3	50%-74.99%	Good
4	75%-100%	Very Good

Based on the described methodology and the results from the evaluation of the Central Kalimantan Augmented Reality (AR) application—which encompassed tests on the application's functionality, content quality, and user interface design—the application achieved a commendable performance. Garnering an index score of 86% from a pool of 26 respondents who answered 16 questions, the application falls within the "very good" interval of suitability or eligibility. This high score indicates that the application is well-received among its users, effectively engaging them with the cultural content of Central Kalimantan and providing a user-friendly experience. The outcome reflects positively on the application's design and its ability to fulfill its educational and cultural dissemination objectives, suggesting that it successfully meets the needs and expectations of its target audience to a significant extent.

4. Conclusion

The research conducted on the use of Augmented Reality (AR) technology for creating an application introducing the culture of Central Kalimantan has led to several key conclusions. Firstly, it demonstrates that AR technology is not only applicable but also effective in crafting educational tools aimed at cultural dissemination. The success of the Central Kalimantan cultural introduction application underscores AR's potential to serve as an innovative medium for cultural education, offering an immersive and interactive learning experience that traditional methods may lack. Moreover, the application's ability to incorporate quizzes and interactive content enhances user engagement and aids in reinforcing the learning outcomes, thereby deepening users' understanding of Central Kalimantan culture. This approach not only makes learning about culture more engaging and informative but also leverages the widespread use of digital technology to reach a broader audience. The positive reception and the effectiveness of the AR application in introducing Central Kalimantan's culture suggest a promising avenue for using augmented reality in cultural education. It is hoped that this application will act as a bridge, connecting younger generations and others interested in cultural exploration to the rich heritage of Central Kalimantan, thus fostering a deeper appreciation and understanding of diverse cultural backgrounds in an increasingly digital world.

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