Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

Implementation of Augmented Reality-Based Promotional Application for Traditional Food at Cakwe Medan Pak Budi

Haryanto[1], Eka W Fridayanthie[2], Maulana Firdaus[3], Alwi Budiman[4], Mochamad Nandi Susila[5]

Faculty of Engineering and Informatics, Bina Sarana Informatika University
Jl. Kramat Raya No.98, RT.2/RW.9, Kwitang, Kec. Senen, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10450

Article Info

Keywords:
Promotion,
Augmented Reality,
Fast Corner Algorithm.

ABSTRACT

Technological advances have had a major influence on the field of information and communication technology. There are several ways to recognize technical progress in the food sector. Today, food stores offer more than just food to every visitor or client. When opposed to eating at home, the store is the place to look for the variety of foods it offers. Each store will be able to provide something unique, which presents a problem for store owners who must constantly contend with intense competition. This is very important because Toko Cakwe Medan must be able to provide food quickly to satisfy every guest/customer. The Fast Corner algorithm is Edward Rosten's approach used to determine corner points after the image is converted to black and white. The approach that uses corner point determination techniques begins by identifying a point p from the input image. The 16 pixels adjacent to p are then verified. Fast Corner Detection excludes a significant percentage of non-corners by utilizing a high-speed type of Fast Corner Detection in its implementation. This research displays products in 3D. From this analysis, it was identified that the scanned product was an interesting promotional idea to attract Jadoel food enthusiasts, create attractive promotional media, and a food product that could satisfy customers who wanted to buy.

Corresponding Author:
Haryanto
Faculty of Engineering and Informatics, Bina Sarana Informatika University
Jl. Kramat Raya No.98, RT.2/RW.9, Kwitang, Kec. Senen, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10450
haryanto.hyt@bsi.ac.id

INTRODUCTION

Technological advancement has had a profound impact on the field of information and communication technology, permeating various industries, including the food sector (Sari et al., 2023). In the current digital age, food stores no longer simply offer products; they also strive to provide a unique customer experience. Unlike eating at home, visiting a food store allows consumers to explore diverse menus and enjoy distinctive atmospheres, making each store a potential destination for culinary exploration However, this competitive differentiation also brings challenges. Business owners, especially in traditional or small culinary ventures,

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

must constantly innovate to stay ahead of intense market competition. The need for creative marketing strategies is paramount, particularly those that leverage emerging technologies such as Augmented Reality (AR) and mobile marketing (Saurina, 2016; Sari et al., 2023).

AR is a technology that overlays virtual objects onto the real world through mobile devices, providing an immersive and interactive experience (I. P. Sari et al., 2022). This technology has gained traction as a promotional tool because it enables users to engage with products in new and dynamic ways, increasing attention, curiosity, and ultimately, purchase intention (Saputri & Sibarani, 2020).

Multimedia development further supports the effectiveness of AR-based applications. By combining text, images, audio, and animation, multimedia facilitates engagement and knowledge retention (Tafakkur et al., 2023). When AR is incorporated into multimedia marketing, it enhances customer interaction and creates lasting impressions, particularly important for promoting traditional or culturally rooted food products. In this context, the development of an AR-based promotional application for "Toko Cakwe Medan Pak Budi" is expected to transform how customers perceive and interact with traditional food offerings. By allowing users to visualize 3D models of food items, the application not only attracts attention but also provides essential product information such as price and composition (Abdurahim, 2023).

To ensure the development process is systematic and structured, this study adopts the Waterfall model, a widely recognized methodology in software engineering. This model outlines five sequential phases, requirement analysis, design, implementation, testing, and maintenance, ensuring clarity in development and minimizing risk (Harahap et al., 2021). During the initial stages of the study, observations revealed that the business lacked effective promotional tools and still relied on a manual, cash-based transaction system. This limitation hindered efficient customer interaction and data management. Addressing these issues through AR technology would modernize promotional activities and improve operational efficiency.

The application design incorporates marker-based tracking, a technique that uses visual markers to detect and display virtual objects in real time. This approach ensures accurate object positioning and enhances the immersive experience (Saputri & Sibarani, 2020). It also allows users to interact with 3D representations of products through mobile devices. To support the implementation, the Vuforia SDK is used as the core AR development platform. Vuforia enables seamless integration of real and virtual environments, allowing 3D objects to be rendered and displayed through smartphone cameras (Harahap et al., 2021). This SDK is compatible with various mobile platforms, especially Android. The Unity 3D engine complements Vuforia by enabling the creation of real-time 3D environments. Unity supports interactive features such as object manipulation and animation, making it suitable for developing engaging and user-friendly promotional applications (Pasek & Wijaya, 2022). Together, Unity and Vuforia form a robust framework for AR app development.

Since the majority of mobile users in Indonesia rely on Android devices, the application is specifically developed for the Android platform. Android offers numerous development tools and libraries that facilitate integration with AR technologies and backend services, such

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

as SQL databases and GPS (Sugiharto, 2019). For system documentation and modeling, Unified Modeling Language (UML) is used. UML provides visual representations of system architecture, use case diagrams, and data flow models, which are essential for ensuring consistency between user requirements and technical specifications (Syahputra, 2021).

From a theoretical standpoint, this study also incorporates marker testing to evaluate the application's ability to detect and respond to different environmental conditions. This includes testing under varying distances and marker obstructions, which is critical for real-world usability (Saputri & Sibarani, 2020). Moreover, compatibility testing is conducted to ensure the application functions effectively across different Android devices and OS versions, especially those below Android 11. This step guarantees that the application is accessible to a wider audience regardless of device specifications (Sofnidar & Yuliana, 2018). Black-box testing is employed to assess the system's input-output behavior without analyzing its internal structure. This testing approach validates that all features function as intended and that users can seamlessly navigate the application without technical errors (Tafakkur et al., 2023). The fusion of AR and multimedia in mobile applications presents a valuable innovation for traditional food businesses. By delivering interactive 3D experiences, the application can increase customer interest, modernize brand image, and contribute to the sustainability of local culinary heritage in the digital economy.

METHODS

This study employed a descriptive qualitative approach combined with a structured application development method to create an Augmented Reality (AR)-based promotional tool for Toko Cakwe Medan Pak Budi. The research was designed to explore the role of AR in enhancing marketing efforts for traditional culinary products, with the development process guided by the waterfall model, a sequential methodology in software engineering that includes phases such as requirement analysis, design, implementation, testing, and maintenance.

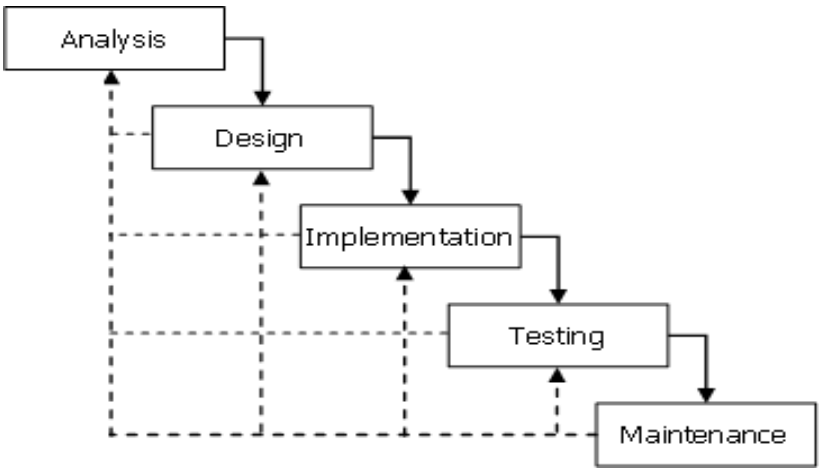

Figure 1. Waterfall Model

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

The initial stage of the research involved data collection through direct observation, in-depth interviews, and literature review. Observations were carried out to analyze user interaction with existing food selection systems and to identify potential points of improvement. These observations provided real-world insight into customer behaviors and needs. Meanwhile, structured interviews with the owner of Toko Cakwe Medan Pak Budi offered valuable information regarding the current promotional strategies used by the business, as well as the limitations of their manual transaction system. Complementing this, a literature study was conducted by reviewing previous research and scientific publications to support the conceptual framework of the application and to inform technical choices related to AR technology, multimedia integration, and user interface design.

The system development followed the waterfall model, which emphasizes a clear, linear progression from analysis to deployment. During the requirement analysis phase, the researchers identified the primary needs of both the business owner and potential users. It was concluded that the application should enable users to view food products in 3D using AR features, scan visual markers, access price and composition information, and experience an intuitive interface. These requirements formed the basis for the system design stage, during which Unified Modeling Language (UML) diagrams such as use case diagrams and activity diagrams were created to visualize application workflows and user interactions.

The implementation stage involved the development of the AR application using Unity 3D and the Vuforia SDK. Unity 3D provided a flexible platform for real-time 3D rendering and interactivity, while Vuforia was utilized to enable marker-based tracking. Programming was done in C#, and Playfab was used to manage backend data such as user accounts and product inventories. During development, 3D models of traditional food items were created to be displayed when users scanned specific markers, providing a rich and immersive experience.

Once the application reached a functional prototype stage, testing was conducted to ensure reliability and usability. Several forms of testing were applied. Black-box testing was used to assess whether the application's features responded correctly to user inputs without considering the internal code structure. Marker testing was also conducted to examine how well the system could detect markers under varying conditions such as distance and partial obstruction. Compatibility testing was performed to verify that the application operated smoothly on a range of Android devices, especially those running version 11 or below, which are common among Indonesian users.

The application was developed on a laptop equipped with an Intel Core i5-8265U processor, 12 GB of RAM, a 500 GB SSD, and an NVIDIA GeForce MX230 graphics card running Windows 11 Pro 64-bit. For testing purposes, a POCO X3 NFC smartphone with Android 13, Snapdragon 732G chipset, and Adreno 618 GPU was used, ensuring that the app was optimized for common user devices.

In terms of software tools, Unity 3D played a central role in building the application interface and integrating interactive features. Vuforia SDK facilitated the AR experience through its marker-based tracking capabilities, while Adobe Photoshop was used to design user interface components and create the visual markers needed for AR activation.

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

The scope of the application centered on providing an interactive promotional platform for Toko Cakwe Medan Pak Budi. Users of the application could scan printed markers to view 3D models of various food items, along with information on ingredients and pricing. Meanwhile, the admin side of the application was designed to allow the business owner to update product details, manage user activity, and track order histories through a dedicated web interface. This ensured that the application not only served marketing purposes but also supported business operations and customer management.

Through the structured and rigorous development process described above, this study produced a functional AR-based application that demonstrates the potential of immersive technology in supporting the promotion of traditional food businesses. The methodological rigor applied throughout each phase of development contributed to ensuring that the final product was both technically sound and aligned with the real needs of users and business owners.

RESULTS AND DISCUSSION

Application Needs Analysis

The needs analysis for the promotional application of Toko Cakwe Medan Pak Budi is as follows:

1. Users are able to view food products through the scan feature available within the application.
2. Users can also access various product-related information, such as product prices and ingredient composition.

Use Case Diagram

The Use Case Diagram represents the system design for the application of "Rumah Makan Jadoel Toko Cakwe Medan Pak Budi".

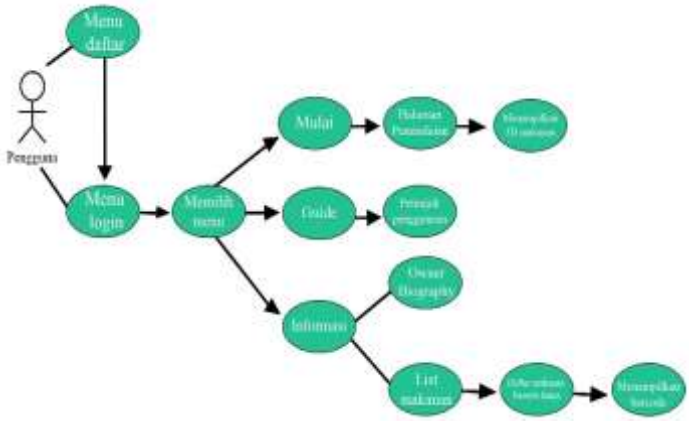

Figure 2. Research Use Case Diagram

In Figure 2, the Use Case illustrates the system design used to select object types, which are divided into four categories. Each visual object is associated with the same marker, allowing the 2D object to be aligned with the marker. The function of the "Start" button in the use case serves as a trigger to activate the marker that has been matched with the 3D visual.

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

If the marker does not correspond correctly, the camera process will reject and prevent the associated object from being displayed.

Activity Diagram

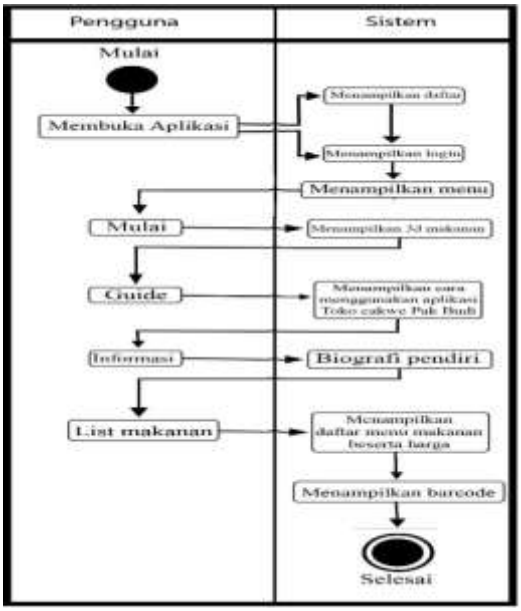

Figure 3. Research Activity Diagram

Based on Figure 3, the Activity Diagram illustrates how each page function is used within the *Makanan Jadoel* application. In process 3.2, the user selects one of the displayed objects. Once a selection is made, the system processes the corresponding object data and displays it according to the user's choice.

User Interface

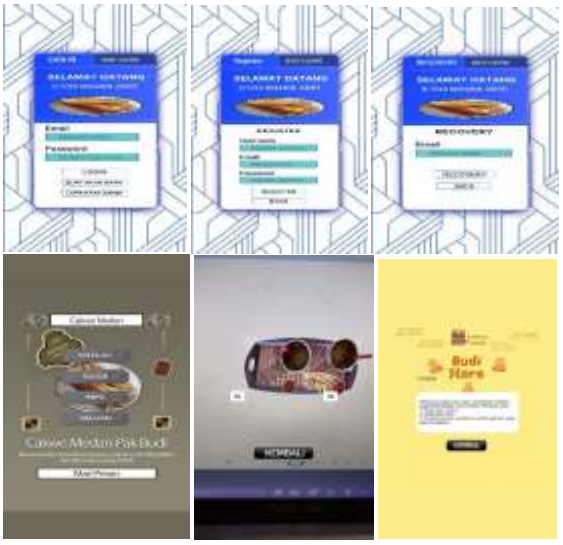

Figure 4. User Interface

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

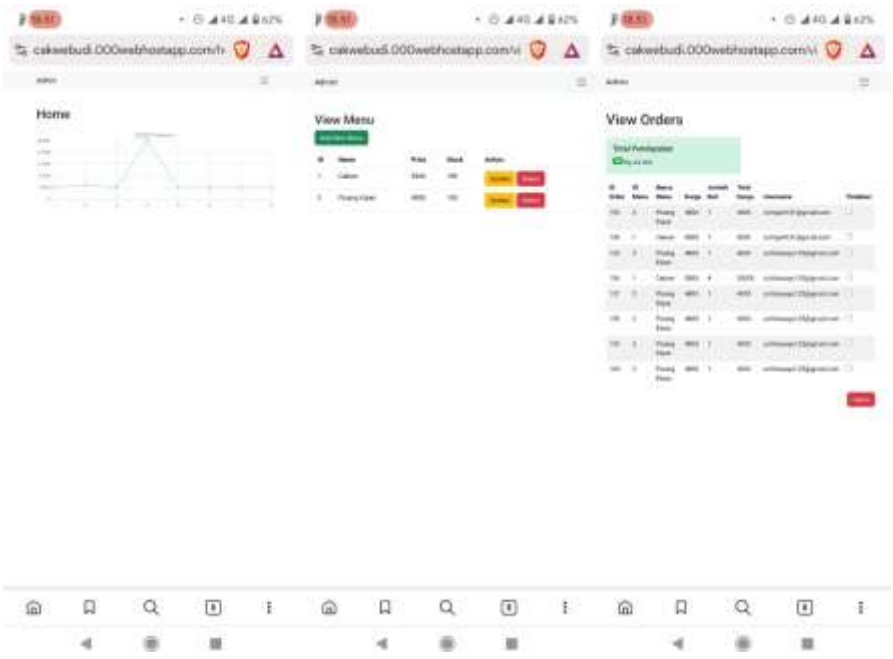

Figure 5. Admin User Interface

The image above shows the admin interface on the web platform used to update product stock data. The display of stock data can be seen in the center section of the image. When a customer purchases a product, the admin can view the purchase history of various users who have bought items from the store, which is visible on the right side of the admin interface. Revenue graphs are shown on the left side of the interface, typically used for reviewing sales income data at the end of each month.

Testing

Table 1. Start Page Testing

Input Data	Expected Outcome	Observation	Conclusion
Click the Start button to enter the Start page	Able to enter the Start page	Displays the Start menu in the form of a Scan feature	Valid
Point the camera at the predefined image	3D food appears after being scanned	Able to display the 3D food object	Valid

Table 2. Guide Page Testing

Input Data	Expected Outcome	Observation	Conclusion
Click the Guide button to enter the Guide page	Able to enter the Guide page	Displays the information menu showing how to operate the buttons	Valid

Discussion

The development of an Augmented Reality (AR)-based promotional application for Toko Cakwe Medan Pak Budi aimed to enhance customer interaction by providing a 3D

Jurnal Multidisiplin Sahombu
Volume 5, Number 05, 2025, DOI 10.58471/jms.v5i05
ESSN 2809-8587 (Online)
https://ejournal.seaninstitute.or.id/index.php/JMS/index

visualization of traditional food products. The application allows users to scan specific markers that trigger the display of three-dimensional food objects accompanied by relevant information such as product names, ingredients, and prices. The integration of marker-based tracking using the Vuforia SDK proved effective in enabling seamless interaction between the physical marker and the virtual content presented on the user's mobile device.

The initial requirement analysis led to the identification of two core user needs: the desire for visual access to food products before purchase and the need for transparent product information. These requirements were translated into core application features, including the ability to scan a marker and instantly display a 3D model of the food item, and a separate information screen displaying product details. This feature was especially crucial in increasing customer interest and enhancing the digital presence of the store in a competitive market environment.

During the design phase, use case diagrams and activity diagrams were developed to map out system functionalities. The diagrams showed how users interact with the application from launching it, scanning a marker, viewing food products, and accessing additional features such as guidance and pricing. The design phase also involved creating the user interface (UI) for both customer-facing and admin-facing systems. The admin interface, in particular, was tailored to allow the store manager to monitor sales performance, update product data, and view historical transaction records.

In the implementation phase, Unity 3D was utilized as the core development environment. The system successfully integrated 3D models of traditional foods, which could be triggered by marker detection. Marker detection accuracy was high, and response times were efficient across different lighting and distance conditions. The interface was designed to be intuitive, allowing users to interact with the application with minimal instruction. Furthermore, Playfab was used to store product data and manage backend operations.

The testing phase involved several types of validation. Black-box testing was conducted on key features including the start screen, marker scanning function, guide section, and product display. Results showed that all tested features performed as expected, with valid outputs corresponding to correct user input. In addition, marker detection testing confirmed that the AR function operated effectively even when markers were partially obstructed or scanned from different angles. Compatibility testing showed that the application functioned smoothly on Android smartphones running versions up to Android 13, including mid-range devices like the POCO X3 NFC.

Results from the admin system were also encouraging. The dashboard interface allowed the store owner to view total revenue and track purchases over time. The system could display product update history, manage user interactions, and provide graphical analysis of sales data. This functionality added value by transforming the AR-based application from a mere promotional tool into a lightweight business management system.

User interface analysis also showed that the application's design was effective in delivering an engaging experience. The visual layout was clear, with distinct sections for each function. The 3D food models were realistic and visually appealing, helping to elevate user

curiosity. Additionally, the guide section provided simple instructions for first-time users, making the system accessible even to non-tech-savvy individuals.

From a marketing standpoint, the use of AR in this application helped differentiate the business from traditional promotional practices. By enabling immersive product previews, the application increased the likelihood of customer engagement and purchase. This supports the findings of Sari et al. (2023), who emphasized the role of AR in enhancing consumer-brand interaction, particularly for small businesses seeking modern promotional strategies. Moreover, the integration of multimedia and interactive elements aligns with Tafakkur et al. (2023), who argue that dynamic content delivery increases consumer interest, especially when visual and experiential components are well-integrated. The interactivity offered by AR provides users with a sense of control and involvement, which is rarely achieved through conventional media such as posters or banners.

In terms of educational value, the application also serves as a digital introduction to traditional Medan culinary culture. Users are not only exposed to the visual appearance of the food but are also provided with background information regarding ingredients and preparation, adding a layer of cultural learning to the shopping experience. This aligns with the arguments presented by Abdurahim (2023), who noted that AR can function as both a marketing and educational tool when integrated thoughtfully.

The results of this study demonstrate that AR technology holds strong potential for modernizing traditional businesses and increasing customer engagement through interactive and immersive media. The success of this application, as evidenced by its functionality, user feedback, and business utility, indicates that similar AR-based solutions could be effectively implemented in other small and medium-sized enterprises (SMEs), particularly those in the culinary sector.

CONCLUSION

Based on the results of the study, it can be concluded that the use of 3D Augmented Reality (AR) has significant potential to enhance consumer engagement with products. AR provides a more interactive and immersive experience, allowing users to interact with menu items in three dimensions. This technology not only enhances visual appeal but also increases user interest in the promoted products. As for recommendations, the study suggests further development and regular updates of AR content to prevent user fatigue and maintain engagement. Additionally, optimizing AR usage, particularly in terms of marker availability, object detection accuracy, and user convenience, will be essential to ensure a seamless and enjoyable experience for users.

REFERENCE

Oliveira, M. A.-Y., & Ferreira, J. J. P. (2011). Business model generation: A handbook for visionaries, game changers and challengers – Book review. *African Journal of Business Management, 5*(7). http://www.academicjournals.org/AJBM

Pasek, I. M., & Wijaya, P. (2022). Aplikasi augmented reality pengenalan hewan berbasis Android menggunakan library Vuforia. *Jurnal Teknologi dan Sistem Komputer, 5*(2), 173–181.

Purwanto, N. (2020). Provisioning for new entrepreneurs using the canvas business model in the Mlaras village business group. *Jurnal Karya Abdi, 1*(02), 115–126. https://doi.org/10.32520/karyaabdi.v1i02.1264

Rahayu, S. L., & Al Fatta, H. (2016). Rancang bangun augmented reality pada data menu restoran. *Eksplora STIKOM Bali*, 22–32. https://www.eksplora.stikom-bali.ac.id/index.php/eksplora/article/view/101

Saputri, S., & Sibarani, A. J. P. (2020). Implementasi augmented reality pada pembelajaran matematika mengenal bangun ruang dengan metode marked based tracking berbasis Android. *Jurnal Komputika, 9*(28), 15–24. https://doi.org/10.34010/komputika.v9i1.2362

Sari, I. P., Batubara, I. H., Hazidar, A. H., & Basri, M. (2022). Pengenalan bangun ruang menggunakan augmented reality sebagai media pembelajaran. *Jurnal Pendidikan Matematika dan IPA*, 13(1).

Sari, S. P., Widita, C. S., Larasati, B. S., Kurnia, U. I., & Pringsewu, U. A. (2023). Peran augmented reality dan mobile marketing dalam meningkatkan promosi bisnis. *Jurnal Ilmiah Pendidikan dan Ekonomi, 3*(4), 191–199.

Saurina, N. (2016). Pengembangan media pembelajaran untuk anak usia dini menggunakan augmented reality. *Jurnal IPTEK, 20*(1). https://doi.org/10.31284/j.iptek.2016.v20i1.27

Sofnidar, & Yuliana, R. (2018). Pengembangan media melalui aplikasi Adobe Flash dan Photoshop berbasis pendekatan saintifik. *Jurnal Pendidikan dan Teknologi Informasi, 3*(2), 257–275.

Sugiharto, A. (2019). Rancang bangun aplikasi augmented reality katalog barang elektronik berbasis Android menggunakan Unity 3D. *Jurnal Sistem Informasi Universitas Suryadarma, 6*(1), 179–188. https://doi.org/10.35968/jsi.v6i2.284

Syahputra, R. (2021). Promosi tempat wisata “Asia Farm” menggunakan augmented reality. *Jurnal Teknologi Informasi dan Multimedia, 1*(1), 1–7.

Tafakkur, B. O., Puji, L., Kharisma, I., & Rizal, A. A. (2023). Implementasi augmented reality sebagai media promosi pada Lesehan Kalisari dengan metode based marker tracker. *JTIM: Jurnal Teknologi Informasi dan Multimedia, 5*(1), 10–21.

Tantriana, D. (2018). Business model canvas produk simpanan kencleng Koperasi Syariah Manfaat Surabaya. *Seminar Nasional dan Call for Paper: Manajemen, Akuntansi, dan Perbankan*, 154–169. http://conferences.uin-malang.ac.id/index.php/semnasfe/article/view/722

Warnaningtyas, H. (2020). Desain business model canvas (BMC) pada usaha batik Kota Madiun. *EKOMAKS: Jurnal Manajemen, Ilmu Ekonomi Kreatif dan Bisnis, 9*(79), 52–65. http://publication.petra.ac.id/index.php/manajemen-bisnis/article/view