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## Implementation of Augmented Reality with Marker Based Tracking on Custom Gift Products by Tricksy.co

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**Abstract.** This research explores the integration of Augmented Reality (AR) technology into custom gift products by Tricksy.co to create a more interactive and personalized gift-giving experience. By utilizing EyeJack Creator, a platform for creating AR photo markers, the system allows customers to design gifts that display personalized videos when scanned. The process includes generating AR markers, integrating QR codes, and ensuring compatibility with both iOS and Android devices. System testing confirmed that the AR markers successfully displayed the videos as intended, with smooth functionality across different platforms. However, slow internet connections impacted the speed of AR content downloading. This study highlights the potential of AR to revolutionize the gift industry by adding a unique digital layer to physical gifts, offering both emotional and interactive value.

**Keywords** Augmented, Reality, Custom, Gift, Marker

### 1. INTRODUCTION

Giving gifts has now become a social trend that creates a system of exchange for various products. Since ancient times, gifts have not only been a symbol of appreciation but also reflect the social and emotional relationship between the giver and the recipient. In the modern era, gifts are no longer just material forms but also a way to create a deeply personal experience (Merati, 2022). Consumers in the digital age show an increasing demand for personalized products, which provide more excellent emotional value (Wardhana, 2024). This trend is supported by the fact that 55% of personalized gifts are more likely to be kept longer than regular gifts, emphasizing the appreciation for personalization (Giftrabbit, 2023).

One innovation that supports this trend is custom gifts, which allow consumers to design gifts according to their preferences. Such products not only have a higher sentimental value but also strengthen the emotional bond between the giver and the recipient (Pizzetti et al., 2024). A similar transformation is also occurring with hampers, combining visual aspects with personalization, increasing their appeal among modern consumers (Nova et al., 2021).

Technological advancements, such as Augmented Reality (AR), open new opportunities in the gift-giving experience. One approach widely used in Augmented Reality technology is Marker Based Tracking. Markers serve as references for the system to place and display digital elements in the real world with high precision (Satria et al., 2023). AR allows the recipient to enjoy interactive visual content, such as videos that can be accessed through smartphones. This

adds a new dimension, where the gift is not just a physical item but also a unique digital experience (Kyguoliene & Braziulyte, 2022).

The global gift market continues to grow, with consumers increasingly valuing gifts with emotional worth. Research shows that 46% of Gen Z consumers use social media to search for gifts online, reflecting the influence of digitalization in this process (Giftrabbit, 2023). Additionally, the global personalized gift market is projected to reach 53.9 billion USD by 2032 (Market Research Future, 2024), indicating the huge potential of this industry.

With this trend, this research aims to explore the implementation of Augmented Reality (AR) in custom gift products by Tricky.co as an innovation in gift-giving. This research seeks to combine elements of creativity and technology to create gift products that not only provide a deep emotional experience but also offer unique interactions. Therefore, this research is expected to help Tricky.co redefine the art of gift-giving in the digital era through a more personal, interactive, and innovative approach.

## 2. STUDY THEORETICAL

### Augmented Reality (AR)

Augmented Reality (AR) is an innovative computer graphics technology that enables the visualization and animation of models or objects by integrating virtual elements, both 2D and 3D, into the real world (Fransiska et al., 2017). According to Wardani (2015), AR provides a direct or indirect view of physical objects by adding virtual information displayed on them. These virtual objects aim to present information that humans cannot directly detect, thus adding functional value to reality. AR serves as a tool to help users understand and interact with the real world. Unlike Virtual Reality (VR), which completely replaces reality, AR only enhances the real world with digital elements that enrich the user's perception.

Augmented Reality also enables the integration of virtual objects with the real world, creating a unique perspective where digital objects appear as if they are part of the real environment. This technology blends the physical and virtual worlds (Saputro and Saputra, 2015). An illustration diagram of Augmented Reality can be seen in Figure 1 below.

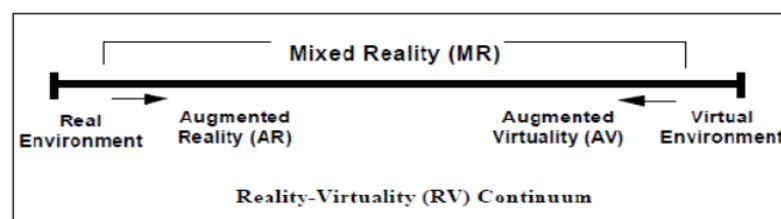


Figure 1. Augmented Reality Illustration (Saputro and Saputra, 2015)

The working process of Augmented Reality (AR) can be explained in several stages as follows (Aditama et al., 2019):

- a. The camera captures information from a marker in the real world and sends it to the computer.
- b. The computer software tracks the marker's shape and calculates the number of video frames captured.
- c. Once the marker is detected, the software uses mathematical calculations to determine the camera's position relative to the marker.
- d. A graphic model is then displayed on top of the marker, making the virtual object appear as if it is part of the real world on the screen.

This process illustrates how AR enables users to see and interact with virtual objects projected into the real world, making the experience more interactive and realistic.

### **Marker Based Tracking**

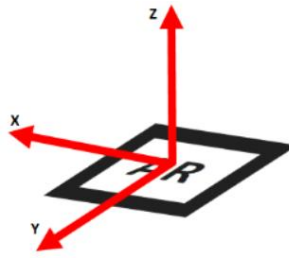
A marker is a pattern or sign created as an illustrated image printed using a printer, which a camera can then recognize. These markers consist of boundary lines and image patterns, typically in black and white. Common characteristics used to identify one or more objects within an image include size, position or location, as well as the orientation or angle of the object relative to the reference line used (Prayugha & Zuli, 2021).



**Figure 2.** Marker Example (Satria & Prihandoko, 2021)

Marker Based Tracking is one of the methods widely used in Augmented Reality technology. This technique works by tracking the marker using three axes, X, Y, and Z, and utilizing the virtual coordinate point (0,0,0) in three-dimensional space (Satria et al., 2023). The virtual coordinate point on the marker determines the virtual object's position that will be placed in the real environment. The position of the virtual object will align with the marker,

with the object located along the Z-axis and perpendicular to both the X-axis (left or right) and the Y-axis (front or back) of the marker's virtual coordinate (Satria & Prihandoko, 2021).



**Figure 3.** Virtual Coordinate Points on Markers (Satria & Prihandoko, 2021)

According to Christopher (2021), several sequential steps are carried out during the tracking process to accurately detect and track markers (Satria & Prihandoko, 2021):

1. Input Image

The process begins with real-time image processing, where each frame of the captured video is processed one by one.

2. Thresholding Image

In this stage, each video frame undergoes a thresholding process to produce a black-and-white image to simplify the recognition of rectangular shapes and marker patterns.

3. Marker Detection

This stage consists of four main processes to detect the marker:

- **Contours Extraction:** Uses the black-and-white image to extract contours and obtain the coordinates of the four sides of the marker.
- **Corner Detection:** Identifies the four corners of the marker to assist in determining its position.
- **Pattern Normalization:** Normalizes the marker's shape to facilitate matching with a template.
- **Template Matching:** Matches the marker pattern with an existing template for verification.

4. Pose and Position Estimation.

The final stage estimates the position and orientation of the virtual object on the marker. This process involves coordinate transformation to determine the camera's position relative to the marker using the observed screen coordinates

## **Custom Gift Product**

In the context of products, "custom" refers to the process of creating or modifying something according to an individual's needs, preferences, or specifications. Customization or personalization has become an increasingly popular trend, especially in marketing and the consumer goods industry. This is because millennials often desire unique products that better align with their personal preferences (Al-Kahfi et al., 2020).

According to the Indonesian Dictionary (KBBI), a gift is something given as a token of remembrance, appreciation, or respect. A gift can also be a souvenir or memento given during a farewell. Giving gifts is a common practice among many people to present something special to someone important in their lives (Andrian et al., 2021). The gifts can vary, ranging from items that serve only decorative purposes to items that combine decorative and practical functions or even consumable items (Tusino et al., 2023).

Based on the explanation above, a custom gift can be defined as a gift designed or modified to meet the needs and preferences of a specific individual. By adding personal elements, a custom gift makes the act of giving more unique and relevant. This product can be in the form of decorative items, items that combine decorative and practical functions, or consumable items.

## **3. METHODS**

This research employs the Research and Development (R&D) methodology, aiming to produce a product like Tricky.co, a custom gift service equipped with Augmented Reality (AR) features and digital music. This method was chosen to design, develop, and test the effectiveness of the resulting product (Sati et al., 2023). The following are the stages involved (Santoso & Christian, 2020):

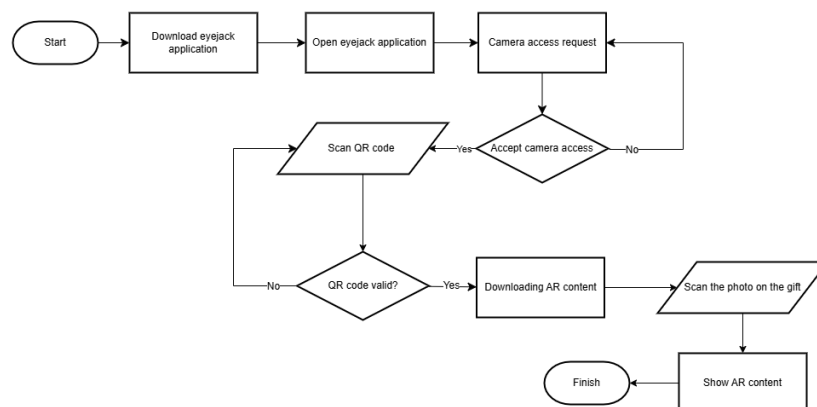
1. Literature Study: This stage includes a review of the EyeJack technology as an AR platform that supports the creation of photo-based markers to display videos that are compatible with both iOS and Android devices. The study also analyses market trends showing interest in interactive and personalized gifts.
2. System Design: In this stage, the system is designed using EyeJack Creator to create photo-based AR markers that display videos according to customer requests. The photo marker and QR code are integrated into the gift package. Before the marker can be scanned, the recipient must use the QR code to download the EyeJack app and access the project directory, which has been customized according to the order. Once logged into the app, the

recipient can scan the photo marker to display the video that has been uploaded to the EyeJack system.

3. **System Implementation:** The system uses EyeJack Creator to generate photo markers that display videos according to the order. The markers and QR code are included in the gift.
4. **System Testing:** Testing is conducted by scanning the QR code to download the app and access the project directory and scanning the photo marker using the EyeJack app on iOS and Android devices to ensure the video displays correctly.
5. **Analysis of System Testing Results:** The test results are evaluated based on the success of the marker in displaying the video, the speed of QR code scanning, and the ease of use.

## 4. RESULTS & DISCUSSION

### Design System

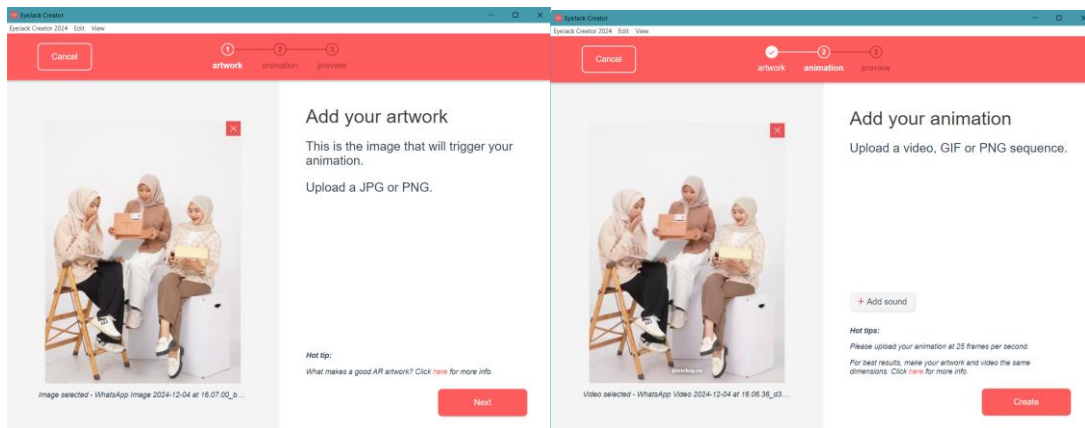


**Figure 4.** Design System Flowchart

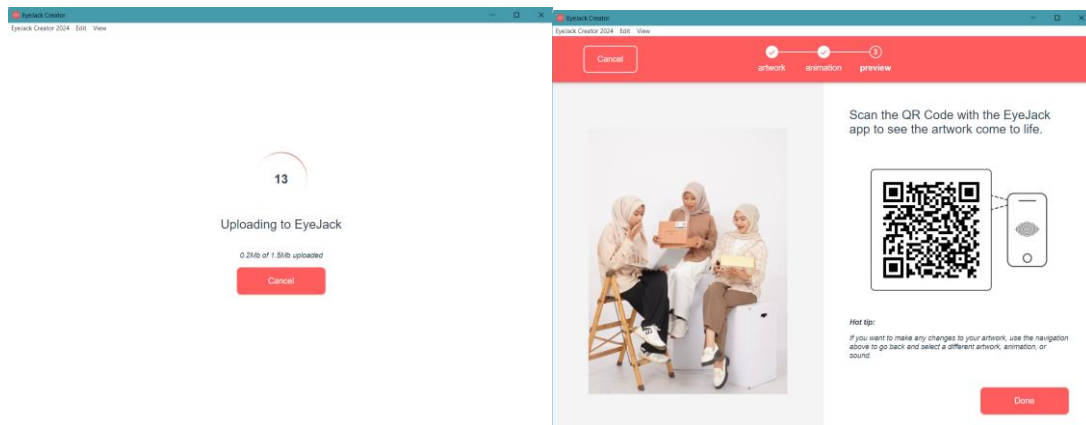
In the system design stage, Tricksy.co develops an Augmented Reality (AR)-based workflow to create an intuitive interactive gift experience. The process begins when the recipient is instructed to scan the QR code on the gift package. Scanning the QR code provides a link to download the EyeJack app on iOS or Android devices. This step ensures that the recipient can access the platform to display interactive content. Once the app is successfully installed, the recipient is prompted to grant camera access, which is a crucial step for the app to function correctly for scanning. After camera access is granted, the recipient scans the QR code again for validation. The system automatically downloads AR content according to the customer's order if the QR code is valid.

The final step is for the recipient to scan the photo marker on the gift using the EyeJack app. This marker is used to project a personalized video that has been previously uploaded by the customer, providing an engaging and unique visual experience for the gift recipient. This system design workflow is crafted to maximize ease of use while ensuring a personal and innovative experience. By integrating AR technology and QR codes, this system offers a modern solution for gift needs that involve technological interaction.

## System Implementation



**Figure 5.** Photo Upload Process for Augmented Reality Markers



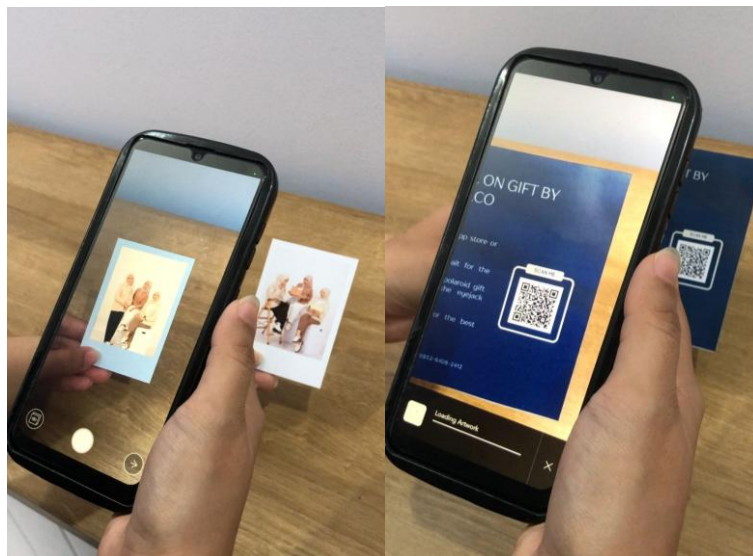
**Figure 6.** Process of Uploading and Creating QR Codes for AR Content

The system implementation at Tricksy.co uses EyeJack Creator to create photo-based Augmented Reality (AR) markers directly linked to the customer's personalized video. The first step involves uploading the photo as the AR marker. This photo is uploaded in JPG or PNG through the EyeJack Creator app. The photo will then serve as the marker that displays multimedia content, such as videos or animations when scanned using the EyeJack app.

After successfully uploading the photo, the system uploads the content to the EyeJack server. During this process, the system prepares the AR content to be displayed. Once the photo is uploaded, the EyeJack Creator app generates a QR code linked to the photo. This QR code can be scanned using the EyeJack app on a mobile device. When the QR code is scanned, the programmed content, such as the customer's personalized video, will appear interactively on top of the scanned photo, creating an Augmented Reality experience that blends with the photo. Thus, EyeJack Creator allows users to create a personalized and engaging AR experience based on the uploaded image or photo.

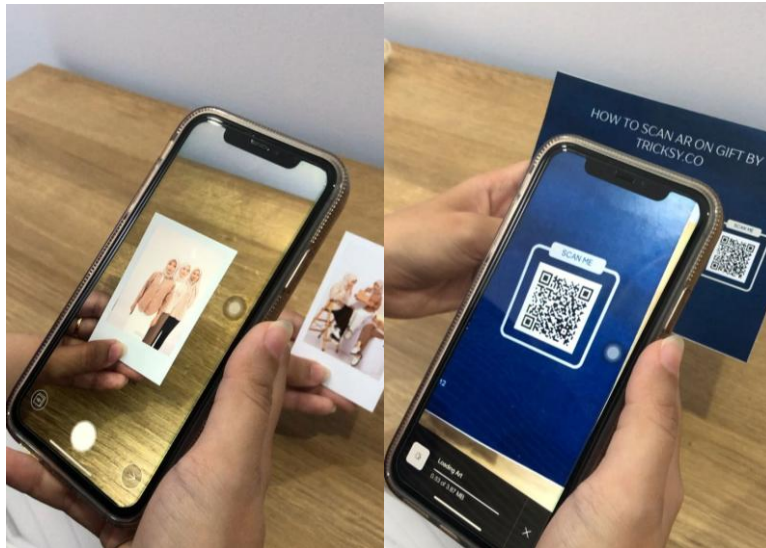
### **System Testing**

System testing was conducted to ensure that all features function as designed. The testing began by scanning the QR code to ensure users could download the EyeJack app and access the project directory according to the order. Next, the photo marker was scanned using the EyeJack app on both iOS and Android devices.



**Figure 7.** Augmented Reality Testing on Android Device





**Figure 8.** Augmented Reality Testing on iOS Device

The test results showed that the photo marker successfully displayed the personalized video according to the file uploaded by the customer, which the admin had integrated into the system. The scanning process ran smoothly on both iOS and Android platforms, with quick and stable app response times. The system was compatible with various devices and network qualities, although slow internet connections could affect the speed of AR content downloading, causing slight delays in video display. System testing ensured that all features functioned as designed, starting with scanning the QR code to confirm users could download the EyeJack app and access the customized project directory. The photo marker was then scanned using the app on both platforms to ensure the video appeared correctly.

## 5. CONCLUSION

The implementation of Augmented Reality (AR) technology in Tricksy.co's custom gift service has proven to be successful in creating a personalized and interactive gift experience. The system, which utilizes EyeJack Creator to generate photo-based AR markers linked to customize videos, provides a seamless and engaging user experience. The testing results indicate that the system operates effectively on both iOS and Android platforms, with smooth marker scanning and quick response times. It has also demonstrated compatibility with various devices and network qualities, though slower internet connections may impact the speed of AR content downloading. Overall, the integration of AR and custom gifts offers a modern solution for creating memorable and unique gift experiences, highlighting the potential of this technology to enhance personalization and interactivity in the gift-giving process.

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