

“Skincare and Make-Up Introduction. Why not use Augmented Reality?” Presentation of AR-based Application Implementation

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ABSTRACT

The consumption of beauty products, especially skincare, is increasing day by day and consumers need to be more careful in choosing the right products to help solve the problem of choosing skincare based on their skin type. However, the lack of information and knowledge about several types of skincare and makeup products makes it difficult for consumers to choose the right products. Many still rely on manual methods to determine their skin type and color, which are prone to errors. Therefore, an application is needed that can help consumers to find out information about the ingredients of each product and information about undertone types so that consumers can understand the composition of each product to be used on their skin to solve consumer problems. This design makes a digital catalog using Augmented Reality (AR) technology as a supporting innovation media to inform a product. The main objective is to produce an application that can be used to determine the right skincare product according to the skin condition and produce the right make-up color based on the right skin tone. The research method used is the collection of data about products and skin types because the use of skincare and make-up requires additional information about each product to reduce irritation caused by users' lack of understanding in using skincare and make-up. Each product information contains different chemicals, so information about each product needs to be provided. Based on research and testing of the Android Augmented Reality-based Beauty Vibes Application, it can be concluded that this application can be implemented using supporting tools such as Unity, Blender, and Vuforia. The test results using black box show that this application is in accordance with the system. The application of skincare and make-up product introduction Beauty Vibes using Augmented Reality can provide an overview and information about beauty products using a personal smartphone. With this application, it is expected to help consumers in choosing the right skincare and make-up products according to skin conditions and undertone types. Therefore, the Beauty Vibes application can be an effective and efficient alternative in helping consumers choose beauty products.

General Terms

Skincare, Application, Augmented Reality

Keywords

Make-up, Catalog, Mobile Application, Technology

1. INTRODUCTION

The global COVID-19 pandemic has significantly affected both developed and emerging markets, especially the commercial activities, due to various pandemic restrictions that include social distancing and lockdowns [1]. During the lockdown period of COVID-19, people mostly stayed at home

and had plenty of personal time, which significantly increased individuals' interest in personal skincare and aesthetic trends, notably green cosmetics and skincare [2]. In contrast, worldwide, the beauty sector has seen declines in revenue of 20–30% in the year 2020 as a result of the global pandemic [3].

In general, consumers perceive persuasive messages given by products, then these perceptions determine consumer preferences for the products they will buy. The lack of information and knowledge of several types of skincare and make-up products makes consumers have to be more careful in choosing the right product to help solve the problem of choosing skincare based on facial skin type and must adjust it to the ingredients contained in skincare products. In determining the type of facial skin, mistakes are often made that can cause great harm, such as experiencing irritation or allergies on the facial skin. Everyone needs to know their skin type and the problems they are experiencing so that the products they use can help improve their skin condition.

Based on the problems that have been described, this research designs an application called Beauty Vibes which will be useful for presenting information about the content or composition of skincare or makeup products. This system aims to minimize losses that will occur due to mistakes in buying skin care products. Utilization of augmented reality technology in this system as a medium of promotion and information. This environment brings complete illusion to the user that the virtual rendering environment is a part of its real context [4]. For the app that augmented the user's face with virtual products, perceived personalization enhanced purchase intentions, while perceived intrusiveness had negative persuasive consequences [5]. This system was created using unity3D and Vuforia SDK.

2. RESEARCH METHOD

The system design is displayed in the form of an architecture diagram. The System Architecture above explains that the system built will use Augmented Reality technology with a scheme to display 3D objects on the user's smartphone. Users use an android smartphone that has the Beauty Vibes application installed and then select the product they want to see information about, then Augmented Reality will track the field to recognize and display the product in 3D along with the information by calling 3D objects in the database. That way the user can see the information display and 3D objects of the desired product.

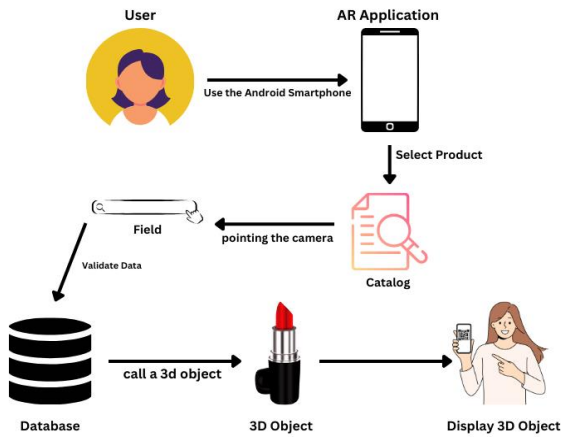


Fig. 1 Architecture Diagram

2.1 Data Collection Procedure

The use of skincare and make-up requires additional information about each product in order to reduce the occurrence of irritation due to the lack of understanding of users in using skincare and make-up. Each product has different chemical content, therefore it is necessary to collect data from products that will be used as research samples and included in the application. The data collection process is carried out by direct observation of the product and interviews with store employees.

Table 1 Skincare Sample Data

Product Name	Ingredient	Benefit
Low pH gentle Jelly Cleanser Somethinc	Vitamin B5, vegan with jelly & creamy texture, formulated with Japanese Mugwort & Tea Tree	Cleanse dust, dirt and excess oil on the skin, and camouflage acne scars and redness on the face
Grace and Glow Body Serum	Niacimide and Glutathione	Brightens the body's skin, maintains skin moisture, relieves inflammation, prevents acne on the body, and protects the body and sunlight
Moisturizer Skintific 5x Ceramide	Ceramide, Hyaluronic Acid, Cetella Asicatica	Maintain sensitive skin, address skin barrier damage, improve skin texture, camouflage acne scars

2.2 System Design Logic

Physical design of the system using 3 types of Unified Modeling Language (UML). UML diagrams are used in the analysis, construction, and maintenance of software systems

[6]. Design models are essential for multiple tasks in software engineering, such as consistency checking, code generation, and design-to-code tracing [7]

2.2.1 Use Case Diagram

Use Case is a diagram that describes the functionality of a system or application based on actors or users.

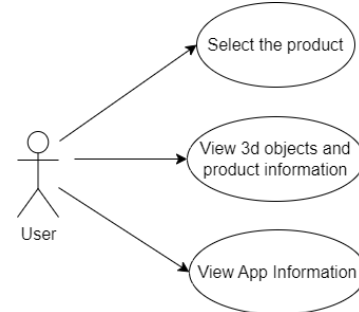


Fig. 2 Use Case Diagram

2.2.2 Activity Diagram

The next stage of design is with activity diagrams. Such diagrams contain a graphical representation of processing flows of nodes, which represent functions that take inputs and convert them into outputs [8].

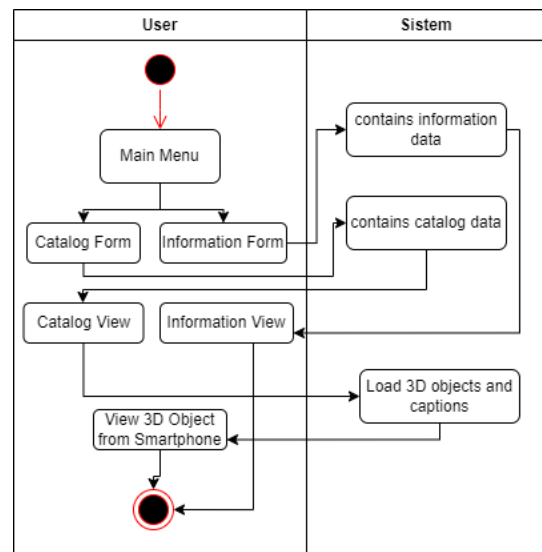


Fig. 3 Activity Diagram

2.2.3 Class Diagram

Class diagrams belong to the diagram types that capture aspects of the structure of software/systems, they show the building blocks of a system and how they are related to each other [9]. In software engineering, a class diagram in the UML is a type of static structure diagram [10].

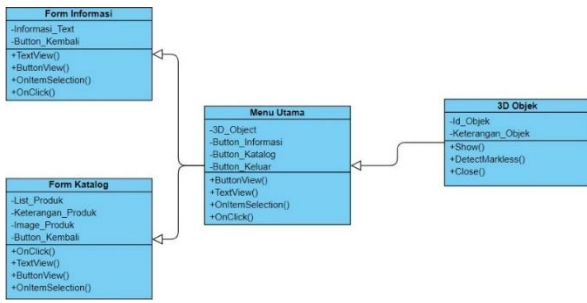


Fig. 4 Class Diagram

2.3 Interface Design

User interface design using wireframes created using whimsical. Each page has several components such as text and images. the content is made as simple as possible so that users are not confused when using the application.

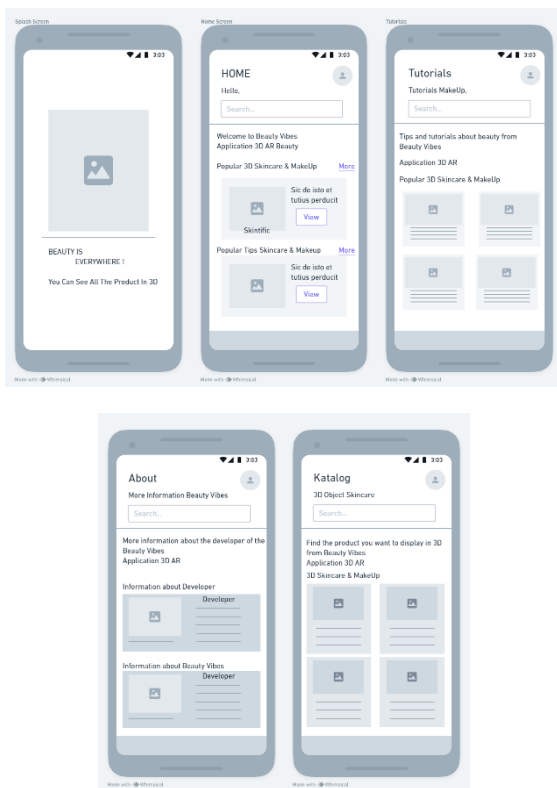


Fig. 5 Interface Design

3. RESULT AND DISCUSSION

3.1 Assumptions

This application can be used by users who use the Android operating system. Users can get various information about skincare and makeup. With this application, it is expected to increase skincare sales and minimize losses.

3.2 Hypothesis

Based on the assumptions obtained, a hypothesis is generated that supports the research, namely "Mobile-based AR 3D Beauty Vibes application can make it easier for users to choose skincare and minimize losses on sales".

3.3 Run an Experiment

This application was developed as a mobile application on the Android operating system [11]. Test and training scenarios can be supported by Augmented Reality (AR) technology [12]. Augmented reality technology built using unity 3D and Vuforia SDK. The user can scan the marker so that a 3d object about skincare will appear.

3.4 Implementations

3.4.1 Splash Screen & Home Screen

The Splash Screen page is the initial display page when the application is first run. On this page displays the company logo and tagline. On the Splash Screen there is also a program code that is used to set the route or flow on the management screen and set the pause time before entering the home page.

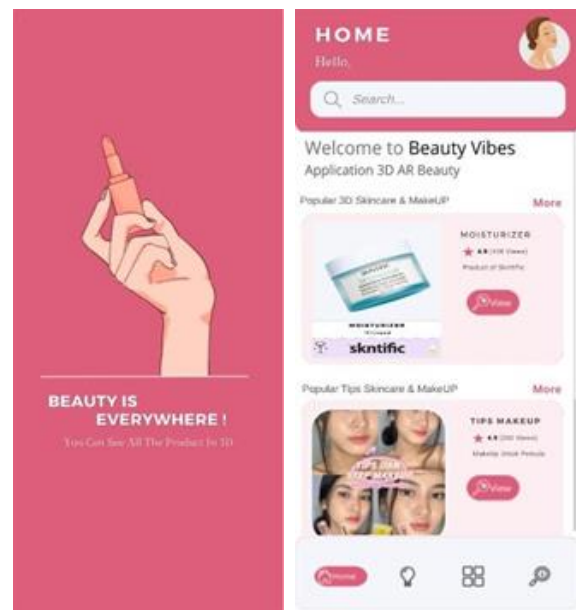


Fig. 6 Splash Screen & Home Screen

The Home page is the first display of the application after the loading process from the splash screen. On the home page there are several options regarding the features in the application such as the product catalog display and also a little information on the about menu.

3.4.2 Tips Menu & About Screen

The Tips menu is used to display several tutorials and tips on beauty in the form of a catalog which is one of the features of this Beauty Vibes application. On the tips page there are several buttons and navigation menus at the bottom of the screen from the application as the main navigation.

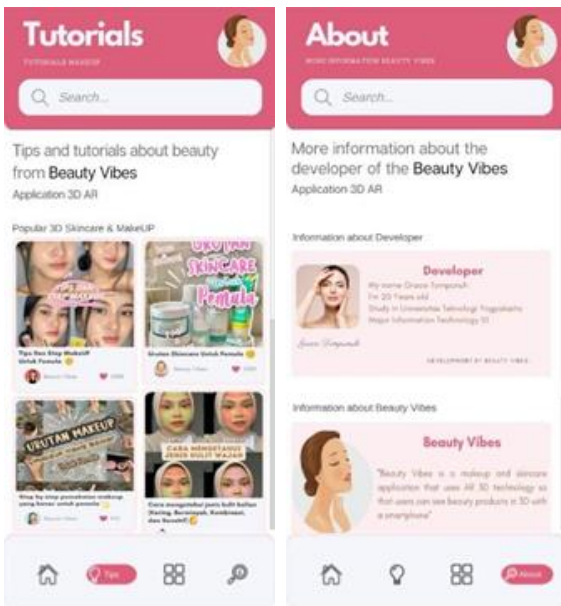


Fig. 7 Tips Menu & About Screen

The About Screen menu is used as a display to provide information about the developer and the application. The about page also still displays the navigation menu at the bottom of the screen as the main navigation.

3.4.3 AR Catalog Screen & AR Camera Screen

The AR Catalog menu is a display that is the main feature of the Beauty Vibes application. In this menu, several skincare and make-up products are displayed in catalog form and can be selected to be displayed in 3D on the AR Camera screen. This page is also connected to the main menu navigation located at the bottom of the screen.

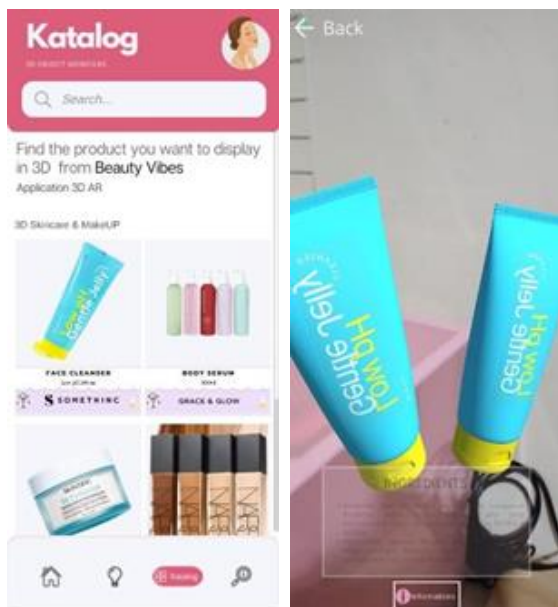


Fig. 8 AR Catalog Screen & AR Camera Screen

The AR Camera screen is a page that functions to display the Augmented Reality (AR) process by displaying the shape of 3D objects from the skincare catalog that has been selected on the previous catalog page. To run the AR Camera, permission is

required for the camera feature on the user's smartphone. On the AR Camera Screen page there is a back button as navigation to return to the catalog page.

3.4.4 Tips Detail Screen

The Tips Detail screen is a sub-screen or detail of the tips screen which functions to provide more complete information from the tips catalog display. On this page there is a back button that serves to return to the tips catalog page.



Fig. 9 Tips Detail Screen

3.5 Discussion of Result

With a rapid increase in size and complexity of software today, the scope of software testing is also expanding [13]. The test method that will be carried out in this research is to use black box testing. Feature interaction set in black box model detected by high-dimensional model representation-based method [14].

System testing aims to see whether this Beauty Vibes application generally runs well or not. There are several tests carried out in the first stage including testing the screen or page whether it runs according to the system or not.




Table 2 System Testing Result


Screen	Menu	Description	Status
Splash Screen	Loading Screen	Successfully display the opening screen with a certain time and immediately switch to the home screen	Succed
Home Screen	App Home View	The home page can display the home page according to the navigation and catalog information displayed.	Succed

Tips Screen	Tips Screen View	Successfully display the tips page along with the tips catalog and tips details when clicked.	Succed
Catalog Screen	3D AR Product Catalog Display	The catalog page successfully displays clickable 3D AR products and brings up the AR Camera.	Succed
About Screen	Display Information About the App	The about page successfully displays information about the developer and application information	Succed
AR Camera	AR Camera Display	The AR Camera page successfully opens the main camera of the user's smartphone and displays 3D objects.	Succed

This test is carried out on the AR Camera screen using Markerless Ground Plane Horizontal then the marker target is to detect a flat plane such as a floor or table. Ground Plane indication is detected when there is a display in the form of a box field as the scale and position of the 3D object to be displayed.

Table 3 AR Camera Testing

Condition	Display	Description	Status
Ground Plane Big Area		Markerless can detect on a large flat field, characterized by the presence of a cursor for scaling on the screen	Succed
Ground Plane Small Area		Markerless can detect flat planes with narrow dimensions	Succed
Big Scale & Big Object		When the markerless cursor is scaled large, the 3D object is also displayed to scale.	Succed

Small Scale & Small Object		When the markerless cursor is scaled to small, 3D objects can be displayed according to their small scale.	Succed
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4. CONCLUSION

Based on research and testing of the Beauty Vibes application based on Android Augmented Reality introduction to skincare and make-up products, it can be concluded that the skincare and make-up product introduction application can be implemented using supporting tools such as Unity, Blender, and Vuforia. Then, the results of tests that have been carried out using the black box testing method show that the application developed by researchers runs according to the system design and the Beauty Vibes skincare and make-up product introduction application can be used to provide an overview and information about beauty products using a personal smartphone.

The application is developed using augmented reality technology which is a development of computer science.

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