

# Halal Cosmetics: Identification of Toxic & Haram ingredients through Mobile Application using Optical Character Recognition (OCR)

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**Abstract-** Beauty gives the confidence one deserves. There are so many products to enhance beauty but sometimes the product that consumers choose are harmful with respect to ingredients. There are 1.8 billion Muslims in the whole world, and they want to be assured that the ingredients, handling, processing, distribution, transportation, and types of cosmetics used are halal compliant. Therefore, to alleviate these problems, this mobile application will be providing knowledge about skin and hair care products to consumers. It is the easiest way to know about the potentially toxic and haram ingredients in skin and hair care products. It allows the user to scan the ingredients listed on the product and identify whether any of the items listed might be toxic and haram to be consumed or not, using optical character recognition.

**Index Terms-** Halal ingredients, Cosmetics, Mobile application, Optical Character Recognition

## I. INTRODUCTION

According to the environmental working group, an average adult will use up to nine different care products each day, which results in 126 different chemical ingredients being exposed to the body daily [1].

There are some issues regarding the identification of the skin and hair care ingredients that are haram and toxic. The main problem as a Muslim, being aware of what type of products can be consumed are very important. But much research shows that there is a lack of halal awareness among Muslims regarding products [2]. On the other hand, Halal products are also not fully beneficial for the user's hair and skin as most of the companies buy cheap chemicals that are harmful to skin and hair just to earn profits. As a result, they end up damaging their hair and skin. There are more than 1000 toxic ingredients that are not possible for everyone to remember. Therefore, most people do not know which chemical (ingredient) is safe to use or not.

There are several challenges that need to be taken into account in the detection of halal cosmetics. Cosmetic ingredients derived from animals such as gelatin, lecithin,

glycerol, fatty acids, and collagen are very difficult to verify as halal. Some coloring agents may be derived from insects, and are qualified as haram. Moreover, ingredients that are of bovine origin pose another challenge as the animals may be slaughtered in a non-halal manner. Not only is the use of halal ingredients required in the production but also the overall cosmetic product is an issue, in order to meet the requirements of Islamic rules. A case in point, a lacquered nail must be penetrable by water to allow sufficient rinsing, and cosmetic products applied on the skin must also be penetrable to water or be completely rinsed off to allow Muslims in order to perform prayers accordingly. While the detection methods for haram materials are in place, the development of halal cosmetics and the assessment of product performance are still in their infancy. Cosmetics production is dominated by non-halal cosmetic manufacturers. Whose production methods do not conform to the requirements of halal science, hence, emphasizing the need to develop guiding documents for such purpose. Moreover, there is a global dearth of guiding documents in the development and assessment techniques in the production of comprehensively halal cosmetics.

This paper aims to propose a mobile application and its conceptual framework named Halal Beauty Scanner. Such application can be used by Muslim community to scan through a product's ingredients using optical character recognition technique and identify whether a product is safe to be applied on hair and skin or not.

## II. LITERATURE REVIEW

In previous mobile applications, two different ways has adopted to identify the ingredients in the products. One is to scan the ingredients list in a product and identify it. The second is to scan the barcode which identifies the products and tells the user about them.

Below a brief overview of the different technologies and their applications is given.

#### A. Radiofrequency.

The article from Lee & Kim [3] takes on the topic of RFID and privacy concerns this technology brings along with it. A popular technology, RFID will most likely be spread more and more throughout society as time goes on, so the concerns are valid. RFID's ability to be read without line-of-sight and difficulty in efficiently limiting who can read them is where the focus of concern lies. The mobile RFID readers further complicate this with their increasing availability. The article concludes this technology is a promising uprising technology, but the introduction of mobile readers needs to be considered when developing technical solutions and legislation to protect personal privacy. This kind of identification is used for instance in connection with toll roads for the identification of cars. Special equipment on the car emits the information. The identification is efficient, but special equipment is needed both to send and to read the information. The information is also inaccessible to humans.

#### B. 3.4. Bar code.

Researchers [4] look at the topic of barcodes. The bar code consists of several dark and light lines representing a binary code for an eleven-digit number, ten of which identify the particular product. The bar code is read optically, when the product moves over a glass window, by a focused laser beam of weak intensity which is swept across the glass window in a specially designed scanning pattern. The reflected light is measured and analyzed by a computer. Due to early standardization, bar codes are today widely used and constitute about 60 % of the total market for automatic identification. The bar code represents a unique number that identifies the product, and a price look-up (PLU) is necessary to retrieve information about price, etc. The binary pattern representing the barcode takes up much space considering the small amount of information it contains. Also, the barcodes are not readable to humans. Hence, they are only useful when the information can be printed elsewhere in a human-readable form or when human readability is not required.

#### C. Acoustic Barcode

A new kind of barcode, called an acoustic barcode, has recently surfaced. This is a tactile barcode that produces a sound when scraped, either with a fingernail, the reading device, etc. The sound produced is decoded into an ID that refers to the information. [5].

#### D. Magnetic stripe

Information contained in magnetic stripes is widely used on credit cards etc. Quite a large amount of information can be stored on the magnetic stripe, but specially designed readers are required, and the information cannot be read by humans [6].

#### E. Optical Character Recognition

Optical character recognition is needed when the information should be readable both to humans and to a machine and alternative inputs cannot be predefined. In comparison with the other techniques for automatic identification, optical character recognition is unique in that it does not require control of the process that produces the information [7].

### III. METHODOLOGY

The sequence diagram is an interaction diagram that shows how processes operate with one another and in what order [8]. A sequence diagram shows object interactions arranged in a time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Figure 1 shows the details of the sequence diagram adopted in this study. As can be seen, the process starts with the user scanning the ingredients from the skin/hair care product's label using the camera of the mobile phone. The application will then extract the details and compare the list of the ingredients with the database. Once the comparison process is completed, detail of ingredients will then be displayed to the user. Also, it will recommend some safe skin/hair care product brands to the user.

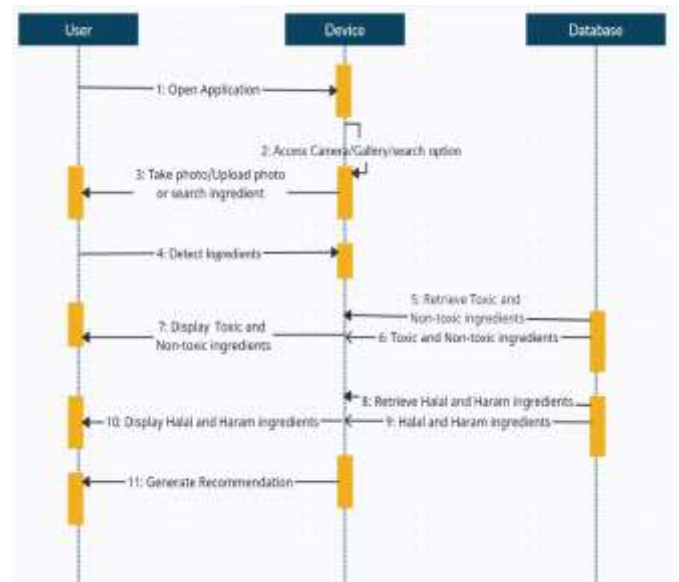


Figure 1: Sequence diagram of main activities in Halal Beauty Scanner

#### IV. IMPLEMENTATION:

The first step in reading the image of an ingredient obtained from a skin/hair care product is image thresholding which is used to remove background and unnecessary objects from the image. After that, the OCR tool is used to recognize the ingredients and read the whole ingredient image of the skin/hair care product. The OCR solution for skin/hair care ingredients product checking was implemented using the JAVA programming language. Java has very strong community support with lots of helpful packages and libraries. The Google vision kit was used for implementing the OCR function [9]. For image preprocessing steps, the OpenCV library was used. [10]. It is used for various image transformations, removing background noises, etc.

#### V. DISCUSSION

To ensure that the application has fulfilled its intended use, a series of User Assessment Test (UAT) were carried out during the Beta Testing phase. In addition, such a phase is also carried out to identify whether there are any requirements that the application needs to be included. In each session, the participants were given several activities to be conducted using Halal Beauty Scanner in a smartphone provided to them. Table I shows the list of activities carried out by each participant. As can be seen, despite that all activities can be completed by all participants, there are issues with the accuracy of the characters processed using OCR.

Table 1. Activities of beta testing

The process to be Tested	Pass/Fail	Comments
User needs to choose either taking a picture using the camera or using the existing ingredients label from phone album or Google images to check the status of each ingredients	Pass	User can do the task successfully
The user needs to take a new picture to check the status of each ingredient	Pass	Problem identified: The application cannot read some letters from the picture due to bad lighting issues (not enough lights in the room).
User needs to search the ingredients	Pass	Users can view ingredient information successfully.

Such problem mainly attributable to the lack of sufficient lighting in the room and/or having a smart phone with less than an 8-megapixel camera and/or Wi-Fi is disabled.

#### VI. CONCLUSION

This study aims to propose the use of optical text recognition (OCR) in a mobile application to assist a Muslim in identifying the halal (permissible) status of a particular skin/hair care product to be applied. Despite some issues which needed to be improved, the application clearly shows some potential to ease Muslim consumers, to retrieve important and relevant information regarding a particular skin/hair care product. In addition, to improve the speed and performance of the application, future improvements can be made. This would minimize the need for the user to constantly interact with the database directly.

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