

# HALAL PRODUCTS RECOGNITION USING RFID/NFC TECHNOLOGY

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**ABSTRACT:** the current research is concentrated on approving the halal capacity for aliment aftermath by applying Radio Frequency Identification (RFID) or Near Field Communication (NFC) automation to increase alive approaches in Malaysia. In the current delving, a cogent manner to analyze and attest the food character is adduced. Along with, developing a database of halal crops, halal cognizance and verification applications in order to use in android smart phones are discussed. Research on up to date technologies to inset an RFID planted recognition order applying prevalent smart phones and estimation of other procedures to find out the appropriate system is bolded.

**Keywords:** Recognition, Halal, NFC, RFID, Tag

## 1. INTRODUCTION

The Islamic devout guide to how Muslims must live accordingly their way to live, diet, own and public communication is named halal. In Halal manufacturing, retaining Halal yield integrity is an essential element so that it is needed to inset an encyclopedic and correct Tracking and detecting Technology to sustain halal crop accuracy and foster a technological mold that is able to patron the whole Halal crop Supply Chain [1].today the Information Technology (IT) field, the best formula which beseems to be is there forecasted for the universe to be further comfy and impressive being through every type of civilization and religion. RFID technology has been discovered as an efficiency differentiator for a diversity of joinery applications [5], but its capability is not yet fully utilized. Our goal is to make the mobile phone a device to help Muslims in halal shopping. In Malaysia the validation of halal products is in hand of a comity called JAKIM. customers can check the originality of the halal logo by sending message to JAKIM or checking the JAKIM portal. On the one hand this method is time consuming and on the other hand instances of the deception and abuse of the halal has been storied via the customers [6]. Today applying mobile RFID in halal detection is going to be common. The advantage of using RFID in compare with barcode is that barcode can easily be copied or damaged. Some effort in developing a perfect platform for validating halal in Malaysia is performed but no one is completely solved the problem and made the process completely straight for customers. MyMobiHalal 2.0 is a mobile-based backing application for Muslims to recognize the Halal estate [8]. other study applied 2-D barcode halal logo identifier, and then processing the image. another work was MYHALAL system it has a database but by image processing. One study stated that barcode, labels and details information by far is not sufficient to validate the information claimed by the manufacturer or food producer; instead a real-time gadget is needed to cuisine gainers with real and accredited witting to assist user-buying process that is RFID technology. The perception of Malaysian customers was measured and the result indicated users consent that a real-time framework is needed for the witting diffusion [11]. It is significant for authorities and producers to prepare accurate information, as customers hinge mainly on crop impaction, containing the Halal logo, components and producers to accredited Halal estate. Though, researchers discovered that 66% of all customers had query concerning Halal logos presented on food impaction, as plenty are dummy. 92% of

checked customers applied the authorities to cater a further accredit system that applies real time procedures. In accord with to this research, only 26% of the responders picked up RFID, but SMS and barcodes were looked up as favorable by 48% and 22% of responders, respectively. As finalized in that research, this answer might have been because of the completeness of barcodes, SMS and MMS - and the absence of influence of novel technology like RFID. 68% of the responders forcefully comply that accrediting Halal estate using RFID must be applied as well, which that would aid to diminish the number of bogus and assist Muslim customers to easily accredit actual Halal status, besides supporting Malaysia to happen the world’s biggest Halal hub.how the RFID system works and how the mobile RFID communicates with the systems components is shown in Figure 1.

1. RFID system (tags and readers)



Figure 1. The mobile device as part of the RFID system

The RFID tag usually has an integrated circuit or chip and an antenna. This enables tag responding and emitting a radio frequency. figure 2 shoes the different types of RFID tags mostly stick to the goods in shopping centers

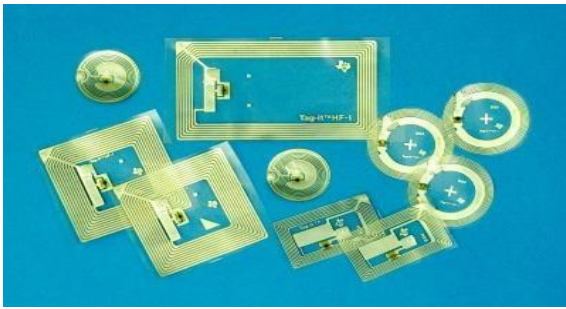


Figure 2. HF family of passive RFID tags

Figure no.3 shows the different types of RFID tags communicate with the mobile RFID device and with each other's.

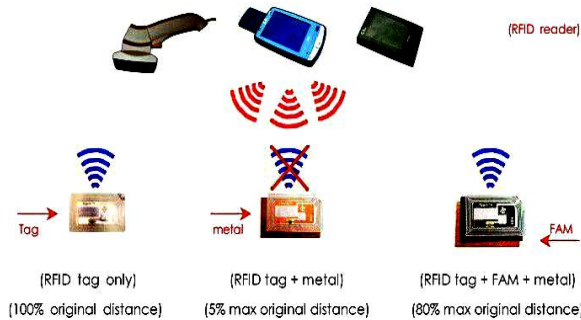


Figure 3. Different formats of RFID readers: handheld, wall mounted, portal

**2. MOBILE RFID's WIRELESS CHARACTERISTICS**

Inward the mobile RFID reader chip there are two ingredients: the digital part, which does functions on host or protocols of RFID, and the analogue ingredients, MHz RF signals. so, this wireless characteristics specified the transmitter output by permitting for least potency relying on link analysis, restriction of CMOS potency amplifier and the mobile phone's battery potency. From the other point of view, it is not needful for mobile RFID to identify a enormous amount of tags instantly as regards they are planed chiefly for the reader's transportability. A mobile RFID reader has to only appeal and dispatch information on multiple tag distinction codes, so it can construct any application favor.

**3. NEAR FIELD COMMUNICATION**

The Near-Field RFID makes the foundation of Near Field Communication (NFC). NFC is mostly sight as a spread to the near-field RFID. Similar to a usual reader, the NFC apparatus can read RFID tags relying on particular modulus; though dissimilar RFID technology, two NFC apparatus are able to communicate together in a peer-to-peer method, or one NFC machine can operate as an RFID tag and another one as a reader. Consequently, NFC devices (reader/writer mode) are compatible with ISO 14443 smart cards. There can be a variety of applications of NFC over cell phones. Imagine a busy lady who leaves her house in the morning; she secures her apartment door by touching her phone to the door knob. On her way to the train station, she purchases a coffee by touching her phone to the payment terminal at the coffee

shop. At the station, she touches her phone to the turnstile to debit her fare from her transit account. After she is seated on the train, she sees a poster for an upcoming concert she wants to attend. She touches her phone to the poster to transfer the event details to her calendar and purchase tickets. Arriving at work, she touches her phone to the door to enter the building. On her coffee break, she buys a snack from the vending machine by touching her phone to the payment panel. While meeting with a client, she exchanges contact details by touching her phone to the clients. After work, she meets a friend and shares the details of the upcoming concert by touching her phone to her friends. All of these things are possible because of the integration of NFC with cellular technology [16] as shown in figure 4 consumers can easily use their mobile sets to identify the status of the crop.



Figure 4. logo used to identify NFC tags and devices

An NFC armed mobile phone can operate as an RFID reader to read aboard or inscribe to a tag. Generally, some security problems also are there while using RFID/NFC technology which must be considered and minimized.

Halal issue in MALAYSIA:



Figure 5. Malaysia New Halal Logo

Presently, Malaysia applies Halal logo shown in fig 5 that seen in various colors involving black, blue, green, red, orange and grey. E-Halal is a web-based information system "Fig. 7" made by JAKIM that comprising a database of corporations that possess the Malaysian Halal authentication and Halal witting on other costumer crops, cuisine premises, and slaughterhouse. The index caters Halal food search applying crop barcode, food explanation and corporation explanation. Customer is able to verify the Halal estate of the food crop via Short Messaging Service (SMS) system. E-Halal applies the crop barcode as the crop identifier. One research that concentrated on Halal estate system has been done while RFID technology is applied. Jakim portal shown in Figure 6 can be easily gained by internet SMS or MMS.



Figure 6. JAKIM’s E-Halal Portal

Five adjective were known as describe criterion for a system which functions as halal intuition system: by name usability, efficiency, security, affordability and commercial viability. It is hard to contrast appointed and mature recognition technologies particularly barcodes to emerging ones like RFID. One has had wide experiment in a joinery surrounding and the other has had confined joinery exposure in Malaysia. Table 1 contrasts the available systems relying on the mentioned features.

Table 1. Comparison of existing systems based on identified attributes

Property	Barcode	Portal	SMS	MMS	RFID
Usability	4	3	3	2	5
Efficiency	4	4	3	2	5
Affordability	5	4	3	2	5
Security	3	4	3	3	5
Profitability	5	4	3	3	5
Total	21	19	15	12	25

**4. HOW OUR EMERGING SYSTEM WORKS**

Automatize the procedure of Halal estate recognition applying smartphones is considerable while helping the customers for rapid and trustworthy crop cognition. The study framework is explained in Figure 7. The framework consists of three major sections: Product tag, identification procedure and database. Product tag comprises the necessary codes which NFC-enabled smartphone can read and transit to the identification procedure. Identification application consists of decoding procedure which decodes the grabbed cods and scan the codes via database. The tags applied in this study are passive NFC tags which have no power on it and will be active by tag reader apparatus. To operate the passive tag, a NFC-enabled apparatus should stroke or bring near sufficient onto the tag.

**5. EXPERIMENTAL RESULTS**

The halal food database is determined by JAKIM department which is available on JAKIM website portal as shown in Figure 8. The database implementation process using SQLITE for Android environment is developed and discussed. Moreover, the process of writing information on NFC tags for each product is described.

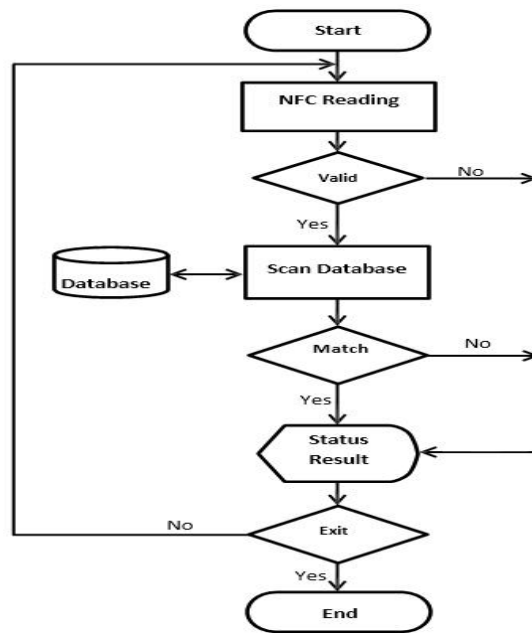


Figure 7. The process of application procedure

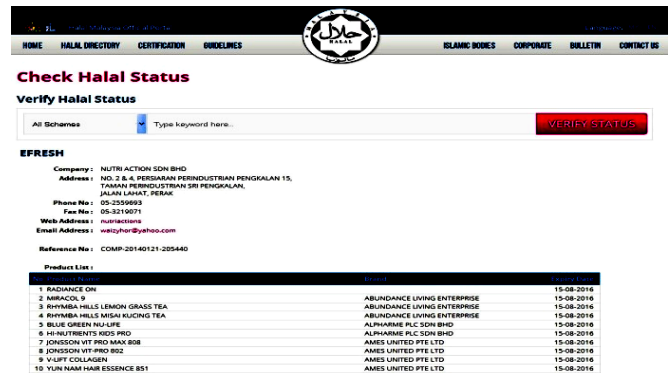


Figure 8. akim portal and its search engine for craps

Furthermore, the application is evaluated with many qualification characteristics such as usability, efficiency, security, affordability and customer satisfaction. Automating the process of Halal status identification using smartphones is significant in order to help the consumers for fast and reliable product recognition. The Halal product database for status identification is being constructed to provide the research community with a source of data that can be used to precisely compare different identification techniques. This study employed Halal product information which are collected form Halal Malaysia Official Portal. The information used to build this database contains the product name, company name, JAKIM reference number, expiry date and product id used for tag encoding. The database is updateable according to the JAKIM portal database. The Figure 9 shows the example of one product detail which is stored in Halal database.



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**Pegawai Rujukan :** ZURINA BINTI ABD GHANI  
 JOSEPHINE KOH YUNG AI  
 NORAZKHA BT DAHLAN

**Senarai produk :**

No	Produk	Tarikh Tamat
1.	CHEESEY CHIKEN BURGER	15-07-2016
2.	100 PLUS LEMON (CAN)	15-07-2016
3.	100 PLUS REGULAR (CAN/BOTTLE)	15-07-2016
4.	ABC ICE KACANG	15-07-2016
5.	ACAR RAMPAT	15-07-2016
6.	AMVERTON AMERICAN BREAKFAST	15-07-2016
7.	ASAM PEDES PARI	15-07-2016
8.	AYAM BAKAR	15-07-2016

Figure 9. Halal status check in Halal Malaysia Official Portal

SQLite Database Browser is used to develop the database for android platform application. SQLite Database Browser is a freeware open source visual tool used to create, plan and edit database files compatible with SQLite. It is used by users and developers to create, edit, and search database data using a familiar spreadsheet-like interface, without the need to learn complicated SQL commands. “Fig.10” shows SQLite Database Browser when executed. The aim of Halal food database development is to supply a digital format of information which is available and can be used by other researchers to analysis and compare the performance of different techniques. Analysis on available standard dataset can improve the algorithms and methods better than in a way using varying of dataset which makes the performance evaluation more challenging and unreliable. Moreover, the data can be removed from or added into database as reported in Halal Malaysia Official Portal. The products are required to be identified by NFC tag attached to the product packages. The encoding process is for writing the information contains Halal status for each product on the NFC tags. The information can be obtained from database. There is much software which can store and encode the data into NFC Tags such as “TagWriter” from NXP. The TagWriter can stores contacts, bookmarks, geo location, Bluetooth Handover, SMS, Mail, text messages and any information to any NFC-enabled tags as well as to products containing NFC-enabled electronics.

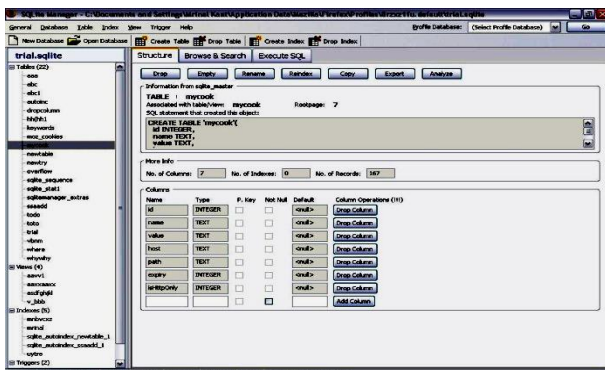


Figure 10. SQLite Database Browser (<http://sqlitebrowser.sourceforge.net/>)

Once data has been stored the application allows read and view the encoded data contained Halal status of products information. The application must install on the NFC-enabled smartphone by Android platform. The tags used for Halal status identification must be clear and without prior data on it. The erase tags option can be used for deleting the data stored on tags or to rewriting the information. The NFC tags have limited space to record the information, therefore, to reduce the data stored on tags and to speed up the scanning process for identification, each NFC tag is recorded by product ID. This ID is a numeric code used to identify each products and it is different for each product types shown in Figure 11. To record the ID the “Write tags” option is used from application “Fig.12”.



Figure 11. Tag communication options

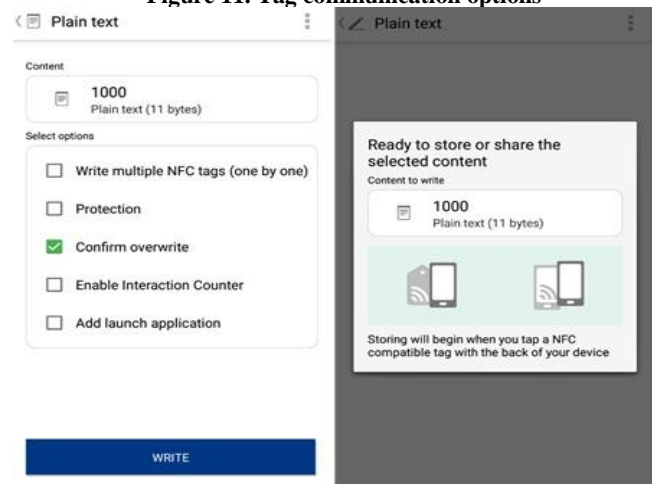


Figure 12. ID number of each crop

There are many features to record the information on each tags. The “New dataset” is used to record the new ID on the tags and then Plain text “Fig.13”. The Numeric identification code entered and save and then “SAVE & WRITE”. Identification process is designed to scan the database stored in smartphone by matching the ID filed. The ID filed is recorded as a text message in the NFC tags based on product types. In this step the product NFC tag must approach near the smartphone to read the content from tag in different status like NFC tag is empty, Product information is not available and Data found Figure13 and Figure 14.



Figure 13. New ID and the plain text



Figure 14. The product found

**6. CONCLUSION**

The objective of this research was to develop a Halal product identification using RFID technology by NFC enabled Android smartphones. This objective was met by developing a new application and database development which not only addressed the issues in the state-of-the-art methods but also achieved better results than the existing solutions on this problem. On the other hand, the most controversial issue, in halal food industry, is validation of halal status. Halal industry seeks to eradicate any chance of fraud and fake halal food. According to our study, among the all product identification, identification using RFID technology has better accuracy and result. Existing applications relied on barcodes that can be easily copied. While using NFC and RFID tags instead of barcodes minimizes the chance of fraud in halal food industry. Additionally, NFC and RFID mobile shopping technologies facilitate validation of halal status since customers can do that just by their personal smart phone. In addition, using developed application the customer is able to use their own mobile reader devices to identify the items, search for the Halal item of interest along more detail of product. These facilities will be possible by applying NFC and RFID technologies. Furthermore, developed identification technique has been compared with previous and popular product identification techniques (barcode and web portal) to evaluate the performance of identification process. Moreover, application is evaluated using many quality characteristics such as usability, efficiency, security, affordability and customer satisfaction. In future smart spaces, the customer should be able to use their own mobile reader devices to identify the items, search for the next item of interest, localize and navigate. These facilities will be possible by applying NFC and RFID technologies. On the other hand, the most controversial issue, in halal food industry, is validation of halal status. Halal industry seeks to eradicate any chance of fraud and fake halal food. Existing applications relied on barcodes that can be easily copied. While using NFC and RFID tags instead of barcodes minimizes the chance of fraud in halal food industry. Additionally, NFC and RFID mobile shopping technologies

facilitate validation of halal status since customers can do that just by their personal smart phone. Moreover, identification of any product with more information about it by employing RFID and NFC technology is expected for future work. RFID technology can be used for many applications and developing those application bases on NFC smartphone could be a solution for future work on this research area.

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