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Development of Smart Kitchen System using RFID

Nikhil Jagtap*, Seema Kedar, Akash Udhanshiv
JSPM's RSCOE, UOP, Pune, Maharashtra, India

Abstract

We've been implementing an application to keep track of the food inventory i.e. observing the status of the inventory, creation of shopping list automatically without any human interaction based on the food status in the inventory and observing the level of food containers to give an alert message to the user at times when food level is critical. Giving an automation to all these daily routine tasks will reduce human efforts. Proposed system will track the level of food items and based on it the system will create the shopping list and the list will have the only food products at the critical level. Proposed system helps users easily manage kitchen and daily needed food products. Smart Kitchen system using RFID (Radio Frequency Identification) helps in minimizing work load caused in today's traditional kitchen system. Every Food Product is identified by unique identification number which is being embedded in RFID tag. The old and traditional process of working is being totally replaced by atomizing kitchen system. Proposed system is quite efficient and time and cost of people can be saved. Android is currently all over the market because of its open source nature and almost everyone has an android device. Thus, this paper discusses a mobile application using android which can efficiently handle and manage the kitchen system work.

Keywords: *Android, Radio Frequency Identification, RFID, RFID tag*

****Author for Correspondence*** E-mail: nikhil.jagtap29@gmail.com

INTRODUCTION

As the life of people getting busier, harder for people to manage day today little tasks, especially for a modern woman. Since women have been stepping out for earning penny managing kitchen have become one of the frequent job. Creating a shopping list, managing food, keeping track of all the items in the kitchen etc. have become quite difficult for a working woman. Proposed system will make these tasks easier with the help of RFID technology. Radio frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purpose of automatic identification and tracking tags are attached to objects [1]. Electronic information is stored in tags. Some tags take help of Magnetic Field (EM induction) to get power and read the data. Other tags use battery as power source. Such battery operated tags works within hundreds of meters. Those tags which do not have battery source use EM waves as power source to emit UHF waves. Barcode requires line of sight to read data but tags does not need line of sight [2]. RFID tags are used in many industries. RFID tags can be attached to clothing, possessions, or even implanted within people; the possibility of reading personally-linked information without consent has raised privacy concerns [3]. As per the current scenario, mobile has become one of the crucial requirement of a human being, people are used to of it. As of now android operating system of mobile smart phones is in demand because of its open source nature and as a result we have decided to use an android smart phone.

SYSTEM ARCHITECHTURE

System Architecture is shown in Figure 1.

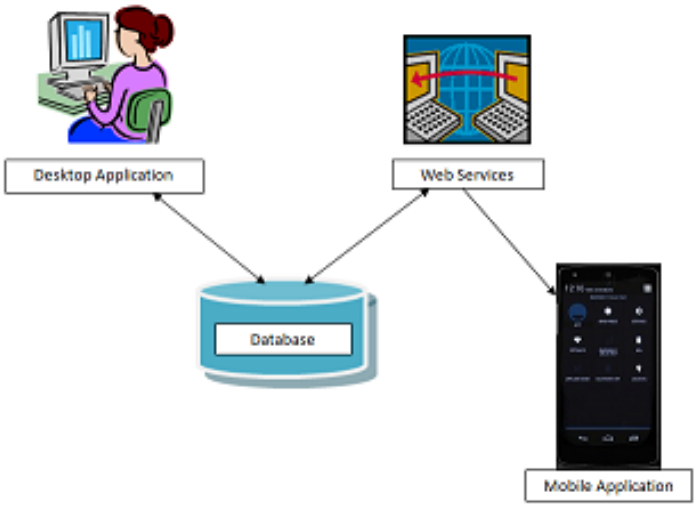

Fig.1: *System Architecture.*

Database
There is a central database in the system which is shared by desktop application as well as android application.

Desktop Application
This component consists of food inventory, shopping list, add items to database. All these modules are handled by a single admin.

Web Services
Main goal of web services is to bind the android application and the desktop application together as a single application. It plays an important role so as to achieve mobility.

Mobile Application
Mobile application is used by user to retrieve alert messages for notifications from desktop application.

IMPLEMENTATION

This paper consists of two applications:

1. Desktop Application
2. Mobile Application

Desktop Application

- This application has total four modules. All modules are connected to single database. The user of desktop application can login with his username and password. User can enter the product information with the help of add details module. User can view information stored for per passive tag with help of view details module. Food Inventory module from the system shows the entire food list to the user. This application allows user to create shopping list for the product which is at the critical level.
- The application also interacts with the RFID reader that forwards the tag data to the database through it. For inventory management the tags would be simply attached to the food packets and for dynamicity the food containers will be designed in such a way that tag will move freely up and down the container [4].
- Another important module of this system is the well designed container which has two mechanical metal poles which helps the tag to move along the vertical axis from top to a level which can be considered as the critical level. One reader is placed at the critical level that reads the respective tag [1].

i. Login: Displays the login form in desktop application (Figure 2).

ii.

Fig. 2: *Login.*

iii. Add Details: Displays form to add item details (Figure 3).

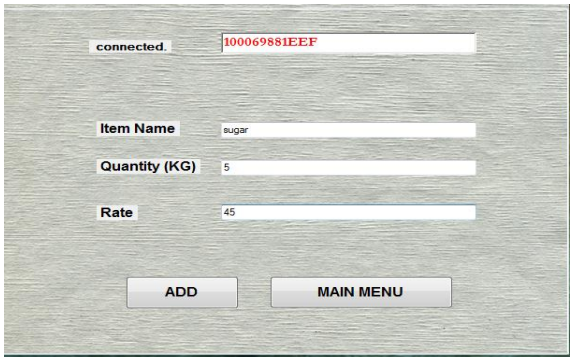

Fig. 3: *Add Details*

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iv. View Details: Displays the item information associated with the tag (Figure 4).

Fig. 4: *View Details.*

v. Food Inventory: Displays the current status of the food inventory (Figure 5).

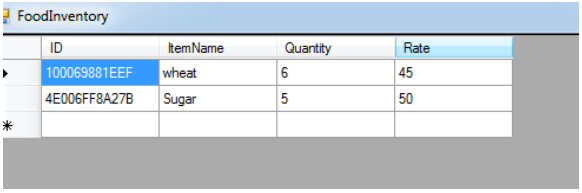

Fig. 5: *Food Inventory.*

vi. Shopping List: Displays the updated shopping list Figure 6).

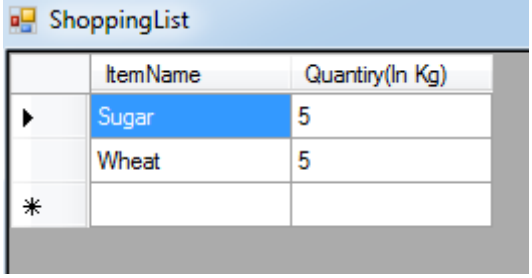

Fig. 6: *Shopping List.*

vii. Alert Message: This message is the critical level alert (Figure 7).

Fig. 7: *Alert Message.*

Mobile Application (Android Application)

Android application provides user interface. User can perform operations such as viewing shopping list, check status of food inventory, view item details. Android application can be installed on any Android phone. This application will be handled by Operator. Operator has right to manipulate the data but user can only read the data from database. User can check the details of food items wherever he/she goes and create shopping list on the current status at anyplace and anytime [3].

i. Login: Login page of the android application (Figure 8).

Fig. 8: *Login Android App.*

ii. Menu: Displays menu for android application (Figure 9).

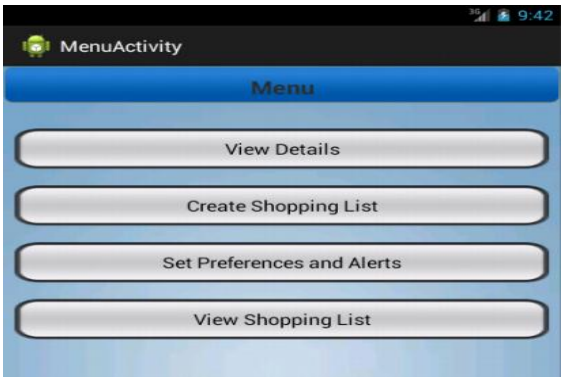

Fig. 9: *Android App Menu.*

CONCLUSION

The traditional system is handled manually and work is done by humans, so there might be possibility of errors and wrong output. With this application we overcome with the drawbacks which are present in existing traditional kitchen system. As the proposed system is combination of new technologies like RFID and Android it automates the work. Main objective of the system is to automate kitchen work as much as possible. Integrating RFID technology as well as Android technology has made the system more accurate, easy to use and fast. Hotels and Big Food Factories can make good use of this system.

FUTURE SCOPE

Use of UHF readers can automate the work more easily. This system can be integrated with a security system and asset tracking system to create an entire smart house. We can optimize design of food container and use limiting switch to the motor so as to ease the moment of RFID tag.

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