

# Fridge-O-Matic

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**Abstract**— Nowadays, refrigerators are a must when it comes to storing food items over a longer period of time. Refrigerators make people's lives simpler when it comes to storage of food items. Now, a concept has been implemented wherein the user interfaces with the refrigerator and do various jobs which are related to not only storage of food items but also buying groceries online in urgency. This project aims at not only making the lives of common people simpler but it also makes the lives of physically disabled people simpler. Existing systems used barcode or RFID scanning to keep track of the stock. The products currently available are expensive as the user has to purchase the whole refrigerator. The Smart Refrigerator module is designed to convert any existing refrigerator into an intelligent cost effective appliance using sensors. The smart refrigerator is capable of sensing and monitoring its contents. The smart refrigerator is also able to remotely notify the user about scarce products via android app and email. It also facilitates the purchase of scarce items by providing a link of the online vendor of that particular item. The core functionality of the smart fridge, is to maintain, with minimum effort, an inventory list of food items which might want to be purchased as soon as they run out.

**Key words:** Login, Smart, Appliances, Kitchen

## I. INTRODUCTION

Both Research and Industry have focused on the development of the Smart Home Environment For example, more than 100 homes offering smart technology have been built in South Korea and another 30,000 were planned. Research has also focused on developing smart homes for the elderly. Developing Smart Appliances is directly proportional to Developing Smart Home environment. It is a critical factor in the realization of the smart home environment. Kitchen is one of the most important place for a Smart home as it consists of many Appliances which provides better services to the household. The focus of our project is on the smart fridge. Many efforts in the development of the smart refrigerator have been made, none of which has been energy efficient or cost effective. The modern living and the fast paced environment doesn't allow the user to keep a track of the food items inside the refrigerator. Although efforts have been put by the industry to develop the smart refrigerator, the current or the existing technology is still not cost effective or energy efficient. The technology is too complicated or complex for a simple household user who have little knowledge of how all the mechanism behind the smart refrigerator works. The internet connectivity at most of the places is still poor and there is limited network connectivity i.e. either low internet speeds or low support. The barcode is not uniform to record the essentials of the product that includes the expiration date. The smart home environment or the networked home doesn't have enough security to protect the outflow of data from the house. The privacy of user and the house can be compromised by attackers. There is no unique operating system for remote

device use to control the smart system. There is no standard for the area, resulting products conforming to different specifications by different producers. The smart refrigerator or the internet refrigerator as it is called, is used to monitor the items inside it and notify about scarce products. The idea of connecting home appliances to the internet or the smart home environment has been seen as the future and is highly regarded as the next big thing.

## II. PROPOSED SYSTEM

The proposed design aims to implement a smart a smart refrigerator system, which is easy to use and economical for the user. The system's block diagram is as shown in above figure. The main component of the system is raspberry pi which is acting as small computer, limit switch to check whether door is open or closed. We have used Raspberry pi 3 model B which is the newest version in raspberry pi. Each object will have unique barcode for tracking of product present in fridge. Whenever user inserted any product in fridge he/she will scan the barcode using android application and all the details will get display with expiry date and quantity.

This system is capable of notifying the user through android application about the door of the fridge if its open or close , about the quantity of particular product and its expiry date, If the date is near then notification will come. Android application will suggest the user about the recipes which can be made using the products available in fridge with youtube link. And user can also able to order the grocery from their android application.

Robotic tray trolley is made using arduino controller which can be controlled by app and taken from fridge to predefine destination.

## III. FEATURES

- 1) Raspberry Pi 3 model B
- 2) Barcode Scanner for Entry & Exit of Product.
- 3) Expiry Reminder of product 4 days before
- 4) Recipe Suggestion (Interfacing with YouTube)
- 5) Automatic online grocery Shopping / from local shop/Nearby Shop based on consumption of Previous 15 Days
- 6) Message if door is left open through IOT
- 7) Android App with Login Facility
- 8) Manually assigning expiry date
- 9) Manually entry and removing of product
- 10) Voice recognition in android app based robotic tray - robotic trolley which will carry something and will follow the predefined path to reach from fridge to destination
- 11) Arduino controller trolley side with DC motors
- 12) Raspberry pi and arduino communication through WIFI.

#### IV. FLOW OF WORKING OF FRIDGE-O-MATIC

- 1) User will have one android application to see the quantity and expiry of each product and scan the barcode of each product. Before that user have to login in application and after that he/she can see the all details about the product.
- 2) Each product has its own ID, expiry date, name and image stored in database (DB). Whenever a product is been placed inside the fridge, barcode of that product is scanned using android application.
- 3) The ID of that product is compared with barcode and the product is stored and considered as inside the fridge in DB. Similarly if the product is is taken out then also its barcode is scanned, so that the in DB the product is considered to be out of the fridge. The image of product (offline image) is also displayed over raspberry pi LCD.
- 4) If a product's expiry date is near (in 2 days) then user will be notified in the app.
- 5) The users can check list of products available in their fridge through the android app. Also recipes related to those products will also be available in app (youtube video links).
- 6) Based on the previous consumption of different products user will be notified about online grocery Shopping / from local shop/Nearby Shop.
- 7) If the door of fridge is kept open for more than 1 minute then user will be notified through app. Limit switch is there to detect if the door is open or close.
- 8) A robot trolley with tray is made using arduino and DC motors, user can control the trolley using android app. Wifi module is used for communication between android app, Raspberry Pi and Arduino controller.
- 9) The destination will be predefined and when an object is placed on the trolley it will be delivered to predefined destination.

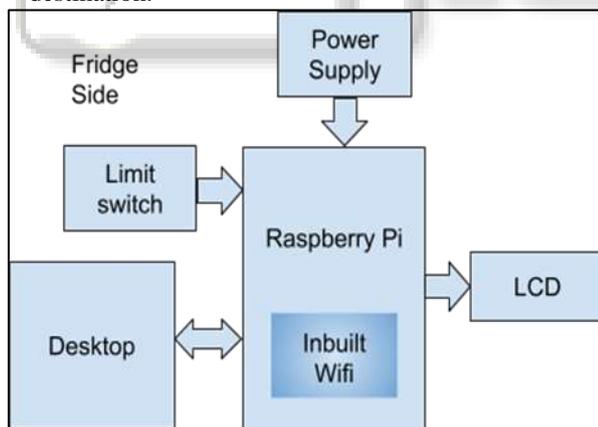


Fig. 1:

#### V. HARDWARE COMPONENTS & SOFTWARE USED

##### A. Hardware Requirements

- 1) Raspberry Pi 3 model B
- 2) Arduino Uno Controller-ATmega 328
- 3) Wifi Module- ESP8266
- 4) Motor Driver-L293D
- 5) DC motor- 30 rpm, 12V
- 6) LCD Display- 20x4 Lcd display
- 7) Barcodes on A4 size paper

- 8) Limit switch
- 9) Android Mobile
- 10) Power cable
- 11) Desktop / PC
- 12) Power Supply

##### B. Software Requirements

- 1) RASPBIAN OS - OS for RPI
- 2) Arduino IDE- Arduino Programming
- 3) python for RPI coding
- 4) Basics 4 android (B4A) / Android studio for android app.
- 5) VNC viewer(not compulsory)

#### VI. ADVANTAGES

- 1) The smart fridge makes daily life of people very easy.
- 2) The user is notified about product details such as when the product will expire, when you need to by product etc.
- 3) The message comes with information about the product which is low on quantity inside the fridge and comes with a predefined link which facilitates online purchasing.
- 4) User can even find recipes w.r.t. groceries kept in fridge in the app.

#### VII. APPLICATIONS

This concept can be used in hospitals, houses, etc. The idea of a smart fridge can be extended to any other electronic device.

#### VIII. FUTURE SCOPE & CONCLUSION

As this was developed for certain functions happening inside the refrigerator there are lots more to be done as future enhancement. It should provide the nutritional value of the food. The future smart refrigerator can use image processing for maintaining the quality of the food. If any malfunctioning happens inside the refrigerator, it can directly send the status to the customer care using SMS. Moreover, we plan to extend our system and apply it to other smart home applications, such as applying it to monitoring cabinets, drawers, or even living rooms.

In this project we presented a low-cost smart refrigerator, which presents Smart Home concepts with Internet of Things (IoT) technologies for reducing food waste and facilitating more convenient living at home. This smart refrigerator is developed using various electronic hardware component and python as programming language and it minimizes user's intervention. The ideas presented in this project works well in the context of a smart refrigerator, the concept can be adapted and implemented in all contexts that require managing and tracking storage items or inventories in enclosed small and medium sized areas.

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