

Fridge of the Future: Never Run Out of Food Again

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ABSTRACT

This research paper examines the concept and implementation of a self-ordering refrigerator, which utilizes smart technology to streamline the grocery shopping experience. This concept has aroused from the thought that, both parents work these days and are busy with many things. As they have to manage many things, they sometimes forget to keep a track of the groceries available. It also adds to their burden. So in their busy schedule they could just open this app which can show them the quick and nutritious recipes for the groceries available. Since the app also self-orders groceries, the user can just pick up the items from the door step without much worry. The paper presents an in-depth analysis of the technology involved, including sensors, machine learning algorithms, and artificial intelligence. The advantages of this innovative system are discussed, such as reducing food waste, saving time, and enabling personalized shopping experiences. Additionally, the paper explores the potential challenges associated with the implementation of this technology, including privacy concerns and the cost of implementation. The study concludes that a self-ordering refrigerator has the potential to revolutionize the way consumers shop for groceries, providing a more efficient and personalized experience.

Keywords: Smart technology, sensors, artificial intelligence, food waste, nutrition, recipes

I. INTRODUCTION

In recent years, the emergence of smart home appliances has changed the way we interact with everyday household items. One such innovation is the self-ordering refrigerator, which has the potential to revolutionize the way we shop for groceries. This technology enhances the grocery shopping experience, saving time and reducing food waste.

The concept behind a self-ordering refrigerator is relatively simple. The refrigerator is equipped with sensors that can detect when certain items are running low or have been used up. This information is then transmitted to the user's smartphone or tablet, and the groceries are also self-ordered as per the users taste and nutrition required. This eliminates the need for manual inventory tracking and allows consumers the advantage of not needing to keep a track of the groceries every time.

The advantages of this technology are numerous. By reducing the amount of food waste generated by households, self-ordering refrigerators can help to mitigate the negative environmental impact of food production and disposal. Additionally, this technology can save consumers time and energy by eliminating the need for frequent trips to the grocery store. Perhaps most importantly, self-ordering refrigerators enable

personalized shopping experiences, as the technology can learn a user's preferences and make personalized purchases based on user's health information.

While the benefits of self-ordering refrigerators are clear, there are potential challenges associated with their implementation. Privacy concerns are a major issue, as the technology must collect and store data on users' purchasing habits in order to function. Additionally, the cost of implementing this technology may be prohibitively high for some consumers.

Despite these challenges, the potential benefits of self-ordering refrigerators make them an intriguing prospect for consumers and manufacturers alike. This research paper will examine the technology behind self-ordering refrigerators, the advantages and challenges associated with their implementation, and the potential impact they could have on the grocery shopping experience.

II. METHODS AND MATERIAL

The implementation of a self-ordering refrigerator involves the use of various technologies, including sensors, machine learning algorithms, and artificial intelligence.

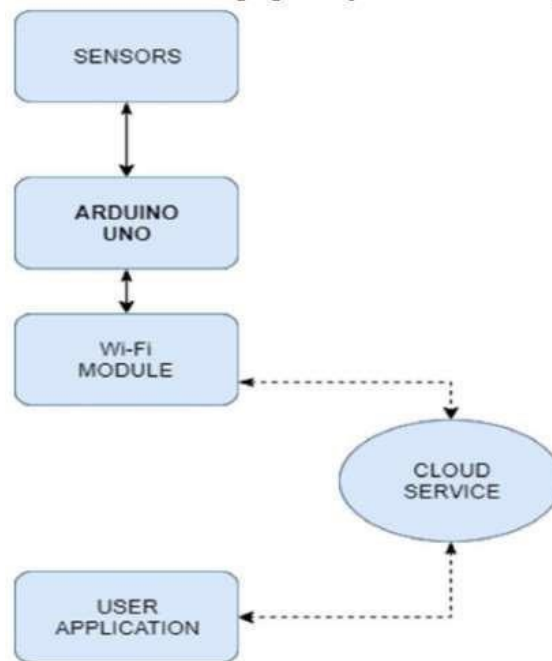


Fig.1 Implementation of smart fridge

The purpose of this technology is to control the quantity of food inside the fridge as well as the quality of the food. The various sensors communicate with the Arduino UNO, which in turn shares the data to the Wifi Module from where the data is transferred to the cloud. Users can access the data in the cloud using mobile applications. This is the process of the implementation of the smart fridge as shown in fig.1 .

The following are some of the methods and materials required for the development and functioning of a self-ordering refrigerator:

1. **Sensors:** Self-ordering refrigerators are equipped with sensors that detect when certain items are running low or have been used up. These sensors can be weight sensors, optical sensors, temperature sensors and odour sensors.

2. Machine learning algorithms: In order for a self - ordering refrigerator to function effectively, it must be able to learn a user's preferences and make personalized purchases based on their past purchases. Machine learning algorithms are used to analyse the data collected by the refrigerator's sensors and provide recommendations to the user.
3. Artificial intelligence: Self-ordering refrigerators use artificial intelligence to make decisions about when and how to reorder groceries. AI algorithms can analyse data on a user's purchasing habits, as well as external factors such as weather and seasonality, to make accurate and timely purchases.
4. Internet connectivity: Self-ordering refrigerators require internet connectivity in order to communicate with the user's smartphone or tablet and place orders for groceries. This requires the use of either Wi-Fi or cellular connectivity.
5. Mobile app or online platform: In order for users to interact with a self-ordering refrigerator, they must have access to a mobile app or online platform that allows them to view their inventory, place orders, and receive recommendations.
6. Cloud storage: The data collected by a self- ordering refrigerator, including information on a user's purchasing habits and inventory levels, must be stored securely in the cloud to ensure that it can be accessed from anywhere and analysed by machine learning algorithms and artificial intelligence.

Bhargava, A. Bansal [1] This paper highlights the use of image processing and computer vision technology in the field of food industry and agriculture. The most important quality characteristics of agricultural products are size, colour, shape, texture and defect. To replace manual inspection of food, computer vision system is used which provide authentic, equitable and non-destructive rating. The computer vision based quality inspection comprises of four main steps, namely, acquisition, segmentation, feature extraction and classification.

K. Srinivasa Rao , M. Bhanu Sridhar , L. Pavan (2021)

[2] This paper provides a comprehensive method for identification and prediction of fruits as follows, the web cam is used to collect the data and send them to a host where it is intended to be processed over the internet. Fruits identification and classification have been done using OpenCV python. And the processed data is sent to firebase. Firebase can be accessed by user through MIT app and get alert notifications through mail.

Haidawati Nasir, Wan and others(2018) [3] Smart refrigerator system is developed which can alert the user about their food condition in the refrigerator. The system will send the message to the users to let them know how long they have stored certain food in the refrigerator. When the limit (the period which is set by the user) is reached, the system will send a warning message so that the user will use the food as soon as possible before it spoiled. This avoids the spoilage and wastage of food.

Sudha Kousalya, G Reddi, Priya Vasanthi, B Venkatesh(2018)[4] This paper gives a basic idea of how to control different home appliances and provide security by using Arduino Uno controlled from a desktop application. An embedded system is implemented that meets the main functions of home automation for the management of lighting, habitat security, and temperature & humidity control. For these reasons, a desktop application was created to interact with an Arduino via the serial port.

Overall, the development and functioning of a self- ordering refrigerator involves the use of sophisticated technologies that must be carefully integrated and tested in order to ensure that they function effectively and provide a positive user experience.

III. RESULTS AND DISCUSSION

This IoT technology makes user's work easier and convenient. This technology allows users to keep track of their food, helps them plan meals and reduce the amount of expired food. Additionally, the fridge has the ability to order groceries. This saves users time and it is convenient too.

With the smart applications, temperature, humidity, smell detection, ice-ready can be monitored. It also gives notification facility to users regarding the groceries ordered, alert messages and so on. This technology is cost-effective and can be used for any refrigerator.

A. The Refrigerators

The refrigerators have sensors embedded in them which makes everything possible. It can contain RFID scanners, weight detectors, humidity and temperature sensors. All information collected is then collected and analysed by the artificial intelligence to make appropriate decisions.

B. The Mobile Application

The mobile application which is downloaded in the user's mobile is interactive and gives various information to the user. The user will be able to find the items available in the refrigerator. He/she will be able to find different recipes that can be prepared for the available groceries. If there is any item which will expire soon, a notification will be sent to the user to utilize that item as soon as possible to avoid food wastage. If any food has become stale/spoiled/expired, it will notify the user to remove the item as soon as possible.

Whenever an item's quantity is reduced, the application will communicate with other applications that are set by the user (For example, application like amazon food, bigbasket, grofers, etc.) to order items immediately.

The applications uses artificial intelligence and machine learning to predict the users taste based on past preferences. Within the average budget, it will order best nutritious food possible based on the season, etc. The application should also keep a track of the users' and their family health like allergies, etc.

The user will also have an option to increase the quantity of the groceries in case they are expecting guests or stop the self-ordering facility in case they are out of station for a few days. They can monitor the items available through their phone and take any decisions they require.

C. The Food Items

In this research paper, we are mostly concentrating on the groceries as groceries are required to be brought regularly and can't be kept in stock for many days. The online ordering apps can change their packaging in such a way so that a user can just remove the outer packet layer and store it directly in the refrigerator. The items will contain the barcodes which will be scanned in the fridge by the RFID readers to get all the information about the item. Further, once the item is partially used and stored in the refrigerator again the fridge can use its weight sensors to check for the quantity of the weight available.

IV. CONCLUSION

In conclusion, the implementation of a self-ordering refrigerator has the potential to revolutionize the way we shop for groceries. By utilizing sophisticated technologies such as sensors, machine learning algorithms, and artificial intelligence, this innovative technology can provide a more efficient, personalized, and sustainable shopping experience.

The benefits of self-ordering refrigerators include reduced food waste, convenience, and personalized recommendations. However, there are also challenges associated with their implementation, such as concerns around privacy and cost.

To ensure the successful adoption and use of self-ordering refrigerators, manufacturers must focus on developing secure and transparent data storage solutions, as well as creating cost-effective products that are accessible to a wide range of consumers. Additionally, the technology must be designed in a way that is easy to use and understand.

In summary, the self-ordering refrigerator is a promising innovation that has the potential to transform the way we shop for groceries. With careful attention to design, privacy, and accessibility, this technology can provide significant benefits for consumers, while also promoting sustainability and reducing the negative environmental impact of food production and disposal.

V. REFERENCES

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