Smart Fridge

Project proposal

Group 04

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1. Introduction

Our project introduces a cutting-edge smart tracking system designed for modern refrigerators. In today's fast-paced world, managing perishable goods and essential commodities like chill water can be challenging, especially when away from home. The proposed solution aims to revolutionize this aspect by implementing advanced tracking technology within refrigerators. It provides real-time monitoring of refrigerator contents, allowing users to track items, receive notifications, and access detailed status descriptions through a web app, even from miles away.

The significance of our project lies in streamlining household goods management, optimizing grocery shopping, and enhancing convenience for busy individuals. The primary objectives include simplifying users' hectic lifestyles through remote monitoring, ensuring they never run out of essential items unexpectedly. Additionally, the project aims to facilitate better resource utilization by minimizing waste and optimizing grocery expenditure through intelligent monitoring capabilities such as door closure alerts and smart containers.

2. Background and Context

2.1 The problem and opportunity being addressed.

In today's busy world, keeping track of what's in the fridge can be a hassle, especially when away from home. Our smart tracking system for refrigerators aims to solve this by letting users monitor their fridge contents remotely. It helps in knowing the status of fruits, vegetables, remaining weights of essentials, and chill water levels. This addresses the problem of food waste and ensures users never run out of essentials unexpectedly. By bridging this gap, our system promotes convenience, reduces waste, and enhances overall household efficiency.

2.2 Prior research.

We did prior research on the smart fridges currently Available in the market,

Following are some findings,

- Control temperature and the freezer using a mobile app. Eg: LG ThinQ
- Smart Diagnosis. Eg: LG smart diagnosis

  Smart diagnosis can easily access the current state of the fridge or help you troubleshoot your issue when the appliance malfunctions or fails.
- Knock Twice and see what is inside the fridge.
- Elegant look.
- More space and allocated space for different items.

Literature Review: Smart Fridge Technology

- Roy et al. (2017) proposes a smart fridge that aids in **better health and nutrition**. The design monitors food items, recommends healthy recipes based on existing ingredients, and tracks eating habits for personalized insights.
- Both P. S. B. et al. (2018) and Kumari et al. (2019) emphasize the use of **IoT sensors** in smart fridges. These sensors monitor internal conditions like temperature, humidity, and gas levels,

enabling alerts for potential issues. Additionally, Kumari et al. propose integrating with online grocery stores for direct ordering from the fridge.

- **Kumari et al. (2019)** specifically focuses on transforming traditional refrigerators into smart appliances through **computational intelligence**. Their system utilizes sensors to monitor temperature and humidity and can control lighting and ventilation for optimal food storage conditions.
- Silambarasan et al. (2020) showcase a smart fridge system utilizing **IoT and Android**. This system utilizes sensors to monitor various parameters and sends alerts for expiring food items. Additionally, it allows for control using an Android app, providing remote access and management capabilities.

2.3 Explanation of why this project is necessary or timely.

- Develop a smart tracking system for real-time inventory monitoring
- Reduce food waste and optimize resource utilization
- Align with evolving needs of modern households

3. Objectives

Our project aims to enhance user convenience through the development of a sophisticated yet user-friendly interface for remote monitoring of refrigerator contents. Key objectives include providing real-time updates and notifications to efficiently manage fruits, vegetables, essential goods, and chill water levels. Additionally, the system aims to significantly reduce food waste by offering precise tracking and timely alerts on perishable goods. This proactive approach promotes sustainable consumption patterns and aids in better grocery planning. Furthermore, the project targets the optimization of grocery expenditure by offering actionable insights into consumption habits, avoiding over-purchasing, and minimizing perishable goods wastage. Overall, our smart refrigerator tracking system seeks to prioritize convenience, sustainability, and economic efficiency in modern household management.

4. Project Scope

Our project aims to create a smarter system for modern refrigerators. We're a system that can be added to newly made fridges. We'll use special technology called DAQ cards, along with machine learning and IoT (Internet of Things).

4.1 What We'll Do:

- DAQ Card Technology: We'll use DAQ cards to gather data from above mentioned sensors and control the system accordingly.
- Machine Learning: We'll teach our system to analyse this data and learn from it. This helps to understand the fruits and vegetables in the fridge.
- Internet Connection: Our system will connect to the internet. This means you can check and control your fridge from anywhere using your phone or computer.

4.2 What You'll Get:

- A system design that fits into new fridges easily.
- Technology to monitor the goods in your refrigerator.
- Remote access to your fridge through an app or website.

- Easy-to-understand guides on how to use and maintain the system.

4.3 What is not in our scope:
- We can't change existing fridges to work with our system easily.
- Our project doesn't involve making new fridges from scratch.
- Compatibility might vary between different fridge brands or models.

Our project is all about making your fridge smarter and more convenient to use. With our system, you'll have better control over your food storage and save energy too. It's our step towards a future where everyday appliances make life easier for everyone.

5. Methodology

Camera and AI Integration:

- We will install cameras inside the refrigerator to capture images of its contents. Training a machine learning model and utilizing it, the system will identify remaining fruits and vegetables inside the fridge. This allows users to receive detailed information about the status of fruits and vegetables directly on their app, regardless of their location.

Weight Measurement:

- We plan to design a smart container for the fridge using the weight sensors using LEDs and Light Dependent Resistors (LDRs) to measure the weight of consumables stored in specific containers (e.g., sugar, butter). This innovative approach allows for the tracking of product weight, enabling the system to notify users through the app or an integrated display when supplies are depleting.

Door Closure Alerts:

- To conserve energy and maintain temperature, door contact sensors will detect when the fridge door is not properly closed. In such events, the system will trigger a combination of a buzzer, LED light, and push notifications to users after passing the waiting time.

Chill Water Level Monitoring:

- Water level sensors will keep track of the chill water available, ensuring users are notified through LED indicators or app notifications before the supply runs out.

7. Timeline

- Prepare a budget and buy necessary components – March 04
- Complete the development of the weight measuring sensor – March 21
- Creating the prototype of the fridge – March 31
- Assembling other sensors – April 5
- Testing and debugging – April 30

7. Conclusion

In summary, our project aims to make using the refrigerator easier and more efficient for modern lifestyles. By using smart technology and careful design, we want to help users manage their food better and use resources wisely. Ultimately, we hope to give people more control over how they store and consume food, leading to a healthier and more environmentally friendly society.

With your approval and support, we can bring this vision to life and make a meaningful impact on society.

8. References

1. A. Roy, S. G. Bandyopadhyay, and J. Pal, "A smart fridge with an ability to enhance health and enable better nutrition," **Int. J. Multimed. Ubiquitous Eng.**, vol. 4, no. 2, pp. 69-80, 2009.

2. J. L. Torralbo-Muñoz, A. V. A. Gómez, M. D. G. López, and R. M. G. Márquez, "SmartFridge: The Intelligent System that Controls your Fridge," **2018 15th International Symposium on Ubiquitous Computing and Applications (IUCA)**, pp. 76-81, 2018, doi: 10.1109/IUCA.2018.00018.

3. P. S. B., N. S., M. S., and B. M., "The Implementation of IoT Based Smart Refrigerator System," **2018 International Conference on Intelligent Systems and Information Systems (ICISIS)**, pp. 0702-0707, 2018, doi: 10.1109/ICISIS.2018.8547790.