SMARTFRIDGE

a FRIDGE that is Sustainable, Manageable, Automated, Responsive, and can Teach users correct values

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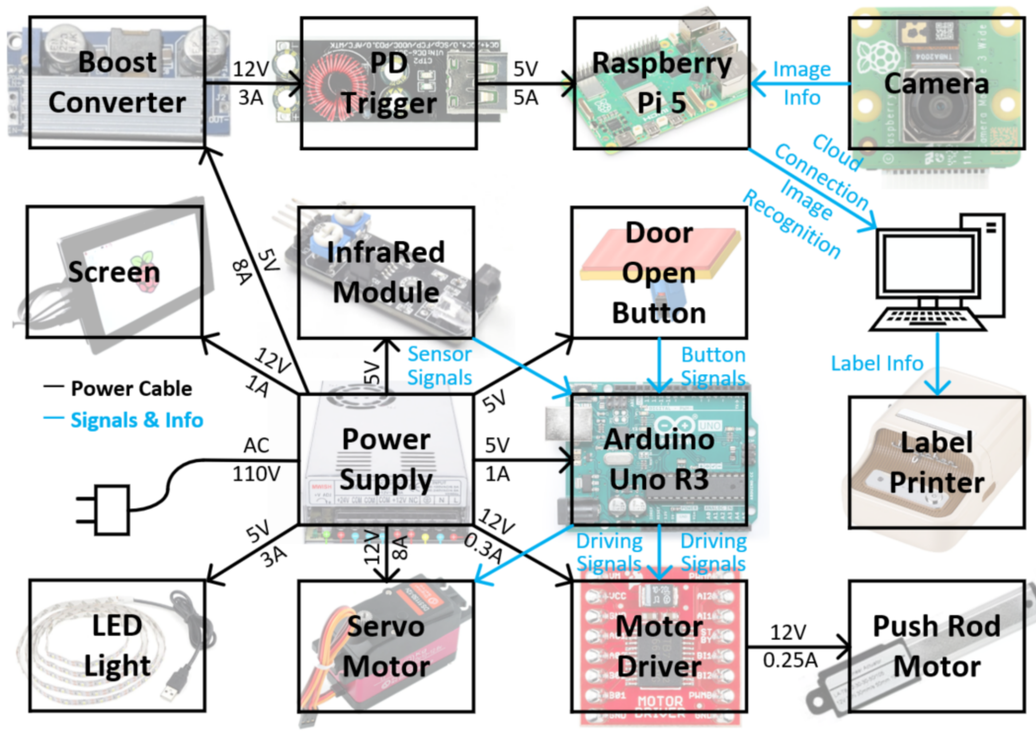
Problem Statement & Solutions

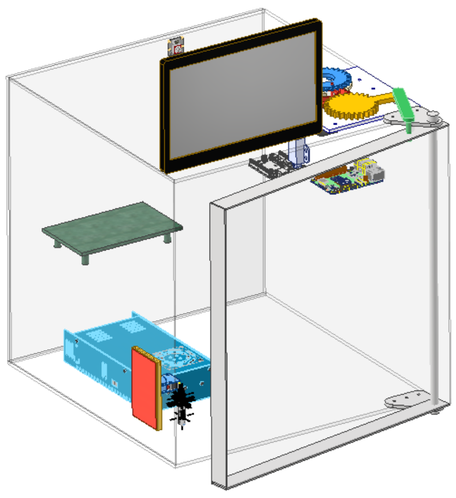
With the fast pace of modern life, users often forget about the food stored in their refrigerators, leading to spoilage and waste. Additionally, forgetting to close the refrigerator door properly causes unnecessary energy loss. Our smart refrigerator addresses these challenges by helping users efficiently manage their food and energy consumption.

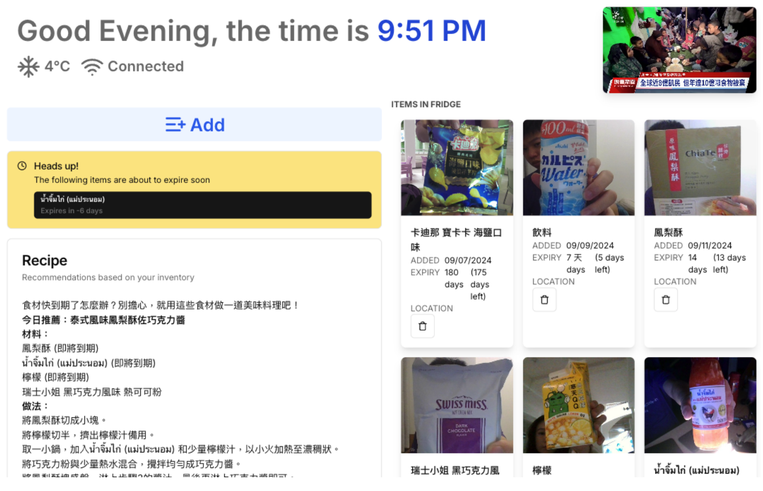
Before storing food, the smart fridge captures an image, records the expiration date, or estimates shelf life. This data is printed via a label printer and stored in the cloud for easy management. Users can also access a Food Management Control Panel on various devices, providing a clear overview of food names, expiration dates, and remaining storage time. The system also sends timely reminders when items are nearing expiration. Furthermore, the refrigerator is equipped with an automatic door-closing function to prevent power wastage. Finally, the system suggests recipes based on ingredients approaching expiration, helping users prepare meals effortlessly while minimizing food waste.

Architect

Hardware Archit. & Food Management Control Panel Overview







Software Development

1. Food Recognition
   - We select Google **Gemini 1.5 Pro** model to complete the task of food recognition.
   - The Gemini model can be accessed through the API provided by **Google Cloud**.
   - The prompt is well-designed to generate precise and informative output.

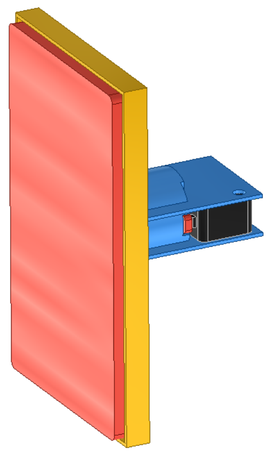

```
{
  "object": [
    {
      "text": "西瓜牛乳",
      "quantity": "1",
      "confidence": "90%"
    }
  ],
  "expiry": [
    {
      "text": "08/04/2024",
      "type": "date",
      "confidence": "90%"
    }
  ],
  "location": []
}
```

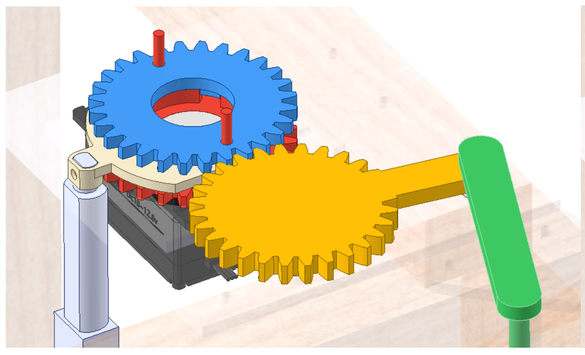
2. Food Management Control Panel
   - React/Next.JS are utilized to build responsive and dynamic web-based user interfaces, ensuring an intuitive and seamless user experience for interacting with the application.
   - Utilized as a backend-as-a-service (BaaS), Firebase integrates Firestore to store food inventory and printing labels, along with functions to run AI code for recognition tasks.
   - Vercel serves as the hosting platform for both the backend and the user interface, ensuring reliable and scalable deployment of the web application.

Hardware Mechanism

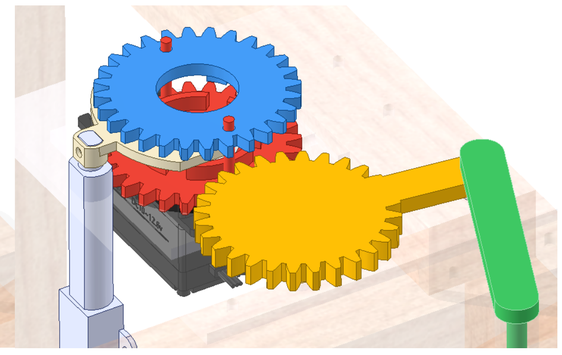
1. Fridge door open button
   - The button is mounted at the bottom of the fridge.
   - The users can open the door by kicking the button.

2. Fridge door opening mechanism
   - The main structure consists of a four-bar linkage mechanism, where the drive arm rotates to a specified angle to open the door.
   - To allow users to open the door both electrically and manually, a clutch-like mechanism is adopted, utilizing a push rod motor for shifting.





Electric Mode



Manual Mode

Values Proposition

Eco-Friendly

Food-Saving

Energy-Efficient

Conclusion

Our smart fridge is designed to be **Sustainable**, **Manageable**, **Automated**, **Responsive**, and **Teaching**. It reduces food and energy waste, promoting environmental sustainability. Users can easily manage food inventory and adjust settings through real-time monitoring and app-controlled features. Automated functionalities, such as door operation and expiration notifications, enhance convenience, while the fridge's responsive design leverages infrared sensors to provide up-to-date data and dynamic recipe suggestions. Finally, the fridge also educates users by promoting efficient energy use and minimizing food waste, fostering more sustainable habits.