CSC 300 - Week 1 Project Deliverable
Smart Refrigerator Display System

Team Member 1: John Dusenbery
Student ID: 901070707
Electrical & Computer Engineering

Project Domain: Smart Refrigerator Display System

Background and Problem Statement

Modern households struggle with food waste and poor inventory management. Studies show that families waste approximately 30% of their food purchases annually, primarily due to forgotten items and expired products. Additionally, meal planning remains a daily challenge for busy families who often discover missing ingredients mid-recipe or buy duplicate items at the grocery store.

While smart refrigerators exist in the market (Samsung Family Hub, LG InstaView), they are often overcomplicated and expensive ($3,000+). Our Smart Refrigerator Display System aims to provide essential smart features through a simplified, cost-effective touchscreen interface that focuses on the core problems of inventory tracking, temperature monitoring, and basic meal planning.

System Overview

Our system consists of a touchscreen display panel mounted on the refrigerator door that runs a C++ application. The display provides users with a simple menu system to access three main features: Inventory Management, Temperature Control, and Meal Planning. The system operates as a standalone unit with WiFi connectivity for recipe database access and optional smartphone integration.

The touchscreen activates when touched, displaying a home screen with the current date, time, and quick access to the main menu. Users can navigate through simple, intuitive screens to manage their refrigerator contents, monitor temperatures, and get meal suggestions based on their current inventory.

Core Features

Inventory Management: Users can manually add food items to the inventory by entering the item name, quantity, and expiration date through an on-screen keyboard. For items with barcodes, users can enter the barcode number to retrieve product information from a database. The system displays the current inventory list and highlights items approaching expiration (within 3 days). Users can update quantities as items are consumed and remove items from the list.

Temperature Control: The system displays current temperature readings for the main refrigerator compartment and freezer section. Users can adjust temperature settings for each zone through simple up/down controls on the touchscreen. The system shows temperature in both Celsius and Fahrenheit based on user preference. If a door is left open too long, the display shows an alert.

Meal Planning: Based on the current inventory, the system can suggest simple recipes from its database. Users can browse through recipe suggestions that use available ingredients. When a recipe is selected, the system can send the recipe instructions to the user's email address (stored in user settings). The system highlights any missing ingredients needed for selected recipes.

Typical User Interaction

A user approaches the refrigerator and taps the touchscreen to wake it. The home screen displays the current temperature (37°F refrigerator, 0°F freezer) and shows a notification that the milk expires tomorrow. The user taps "Inventory" and manually adds the groceries they just purchased: entering "Chicken Breast, 2 lbs, expires Nov 5" and "Lettuce, 1 head, expires Nov 2". They then navigate to "Meal Planning" where the system suggests "Chicken Caesar Salad" based on available ingredients. The user selects the recipe and chooses to email it to themselves for cooking reference.

Technical Implementation Scope

The system will be implemented as a C++ application running on a simulated touchscreen interface. For the class project, we will create a desktop application that simulates the touchscreen display using a graphical user interface. The application will use local file storage for inventory data and temperature settings. The recipe database will be a simple text file with pre-loaded recipes. Email functionality will be simulated by writing recipe text to an output file.

This approach allows us to demonstrate all core functionality without requiring actual hardware integration, making it feasible to complete within the course timeline while still showcasing object-oriented design principles and software engineering practices.

Value Proposition

The Smart Refrigerator Display System provides practical benefits including: reduced food waste through expiration tracking (saving families $300-500 annually), simplified meal planning (saving 20 minutes daily), and energy savings through temperature optimization. The simplified design makes it affordable to manufacture (estimated $200 component cost) compared to existing smart refrigerators, opening the market to middle-income households.

Target Users

Primary users are busy families and young professionals who want basic smart features without the complexity and cost of high-end smart appliances. The simple interface makes it accessible to users of all ages, including seniors who may struggle with smartphone apps but can use a touchscreen with large, clear buttons.