

SWE3002-42
Introduction to SW Engineering

Smart Refrigerator System

Proposal

TEAM 10



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01

Introduction

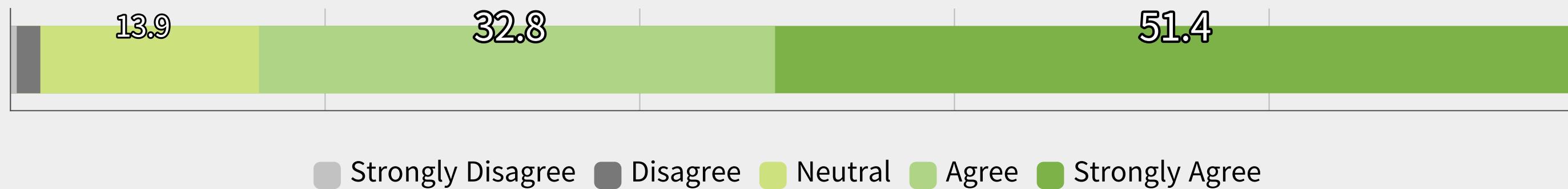
Cooking at Home



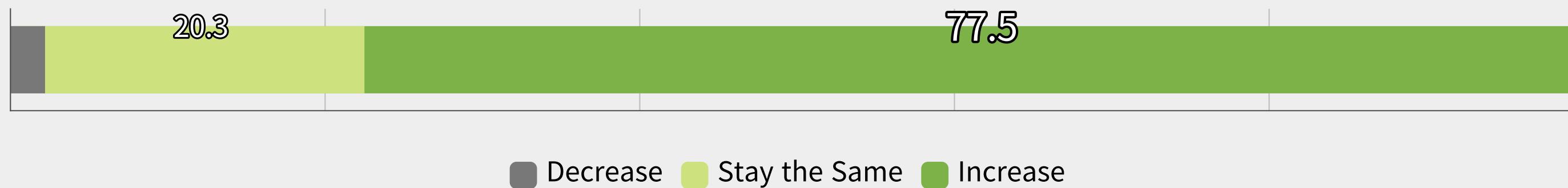
01 Introduction

After COVID-19,

Cooking at home for meals has increased.

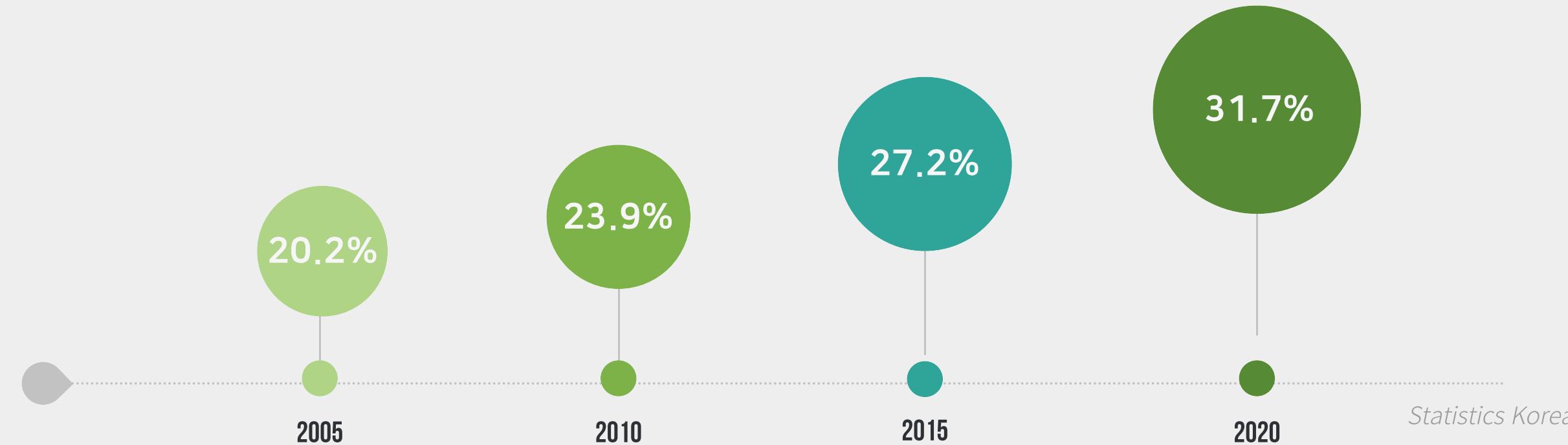


In the upcoming era, cooking at home will ...



01 Introduction

Rise in Single Households



Single Households

The statistic above shows the increase in the proportion of single-person households in Korea. Living alone means that people have to take care of their own meals. Not a simple matter. Since the COVID-19 turned eating-outs into risk, the food delivery market has grown significantly. However, due to some issues like increasing disposable use and high delivery fees, people looked for another way to enjoy a satisfying meal. Which was cooking at home.

01 Introduction

Increased Demand for Cooking at Home

Top motivators of Home-Cooking are:

Economical
58%

Healthy
52%

*as an
Experience*
50%

*Comforting
Hobby*
50%



01

Introduction

Difficulties Amateur Cooks Face



Unfamiliar Recipes

This can be seen from the number of subscribers to cooking Youtubers. Many Youtube cooking channels have millions of subscribers, which also means cooking is not easy for that amount of people.

Time Management

Suppose an office worker comes home at 7 o'clock. This man wants to cook salmon steak. Before cooking, he needs to thaw salmon stored in the freezer. It's 7:40 after thawing, and he grills salmon, adds some toppings around, makes some sauce.

Now the time is 8:00 o'clock. It is quite late to eat dinner.

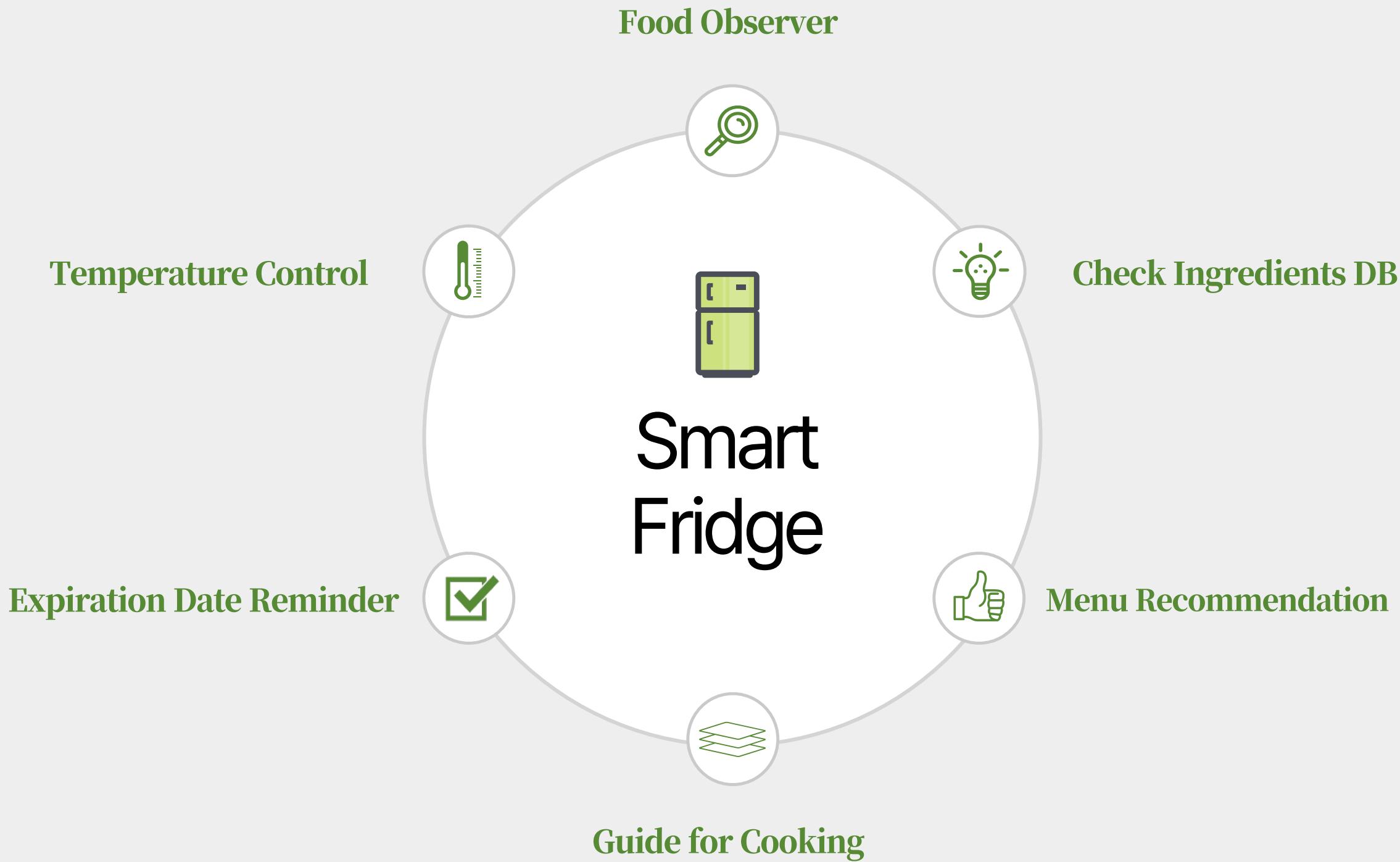
01 Introduction

*Our system aims to help people
cook with ease, and
not fall into the unexpected situations.*



To **motivate** people to keep cooking at home,
provide more **convenience and experience**,
and support their healthy lifestyle

02 System Overview



02 System Overview

Devices

Camera Device

A camera inside the refrigerator scans and the CV system categorizes the food ingredients, and updates the DB each time the door is closed.

Temperature Manager

Measures the temperature of each sections:

Refrigerator, Freezer, Thaw-able Container
and adjusts the cooling system according to the user's setting.

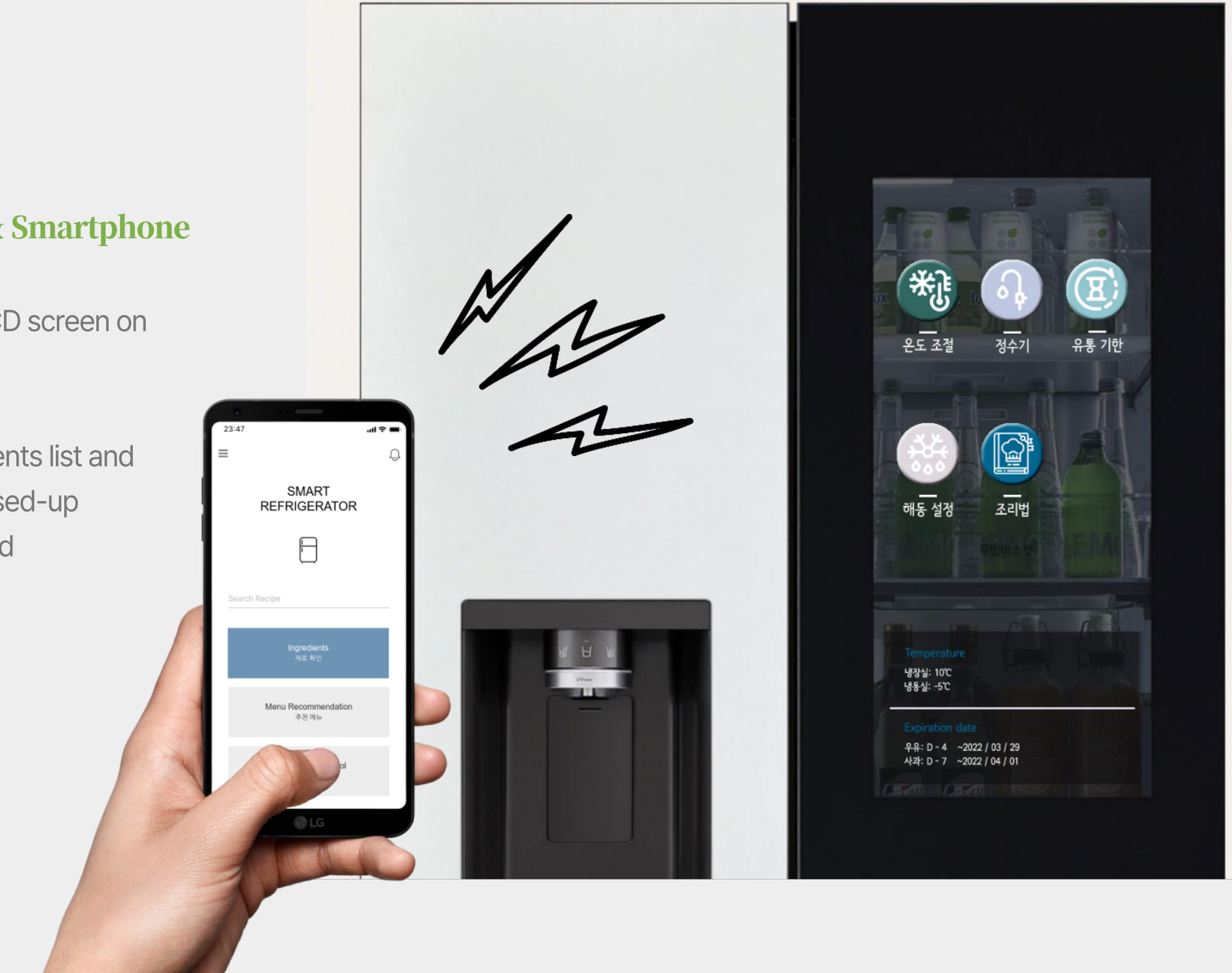


02 System Overview

User Interface Refridgerator LCD & Smartphone

On the frontend side of the system, there are an LCD screen on the refrigerator and smartphone application.

Users can access the system—check food ingredients list and the recent image of the fridge, make an order for used-up ingredients, control the equipment, temperature and thaw-mode—remote-home with the application.



02 System Overview

Food Observer

What's inside the fridge

When the user puts food in the refrigerator, the system scans it, detects the category and expiration date if written, and automatically updates information on the database.

DB Table consists of name label, quantity, expiration date, refrigerated/frozen.

Expiration Date Reminder

Users can check the expiration date of each food from our database.

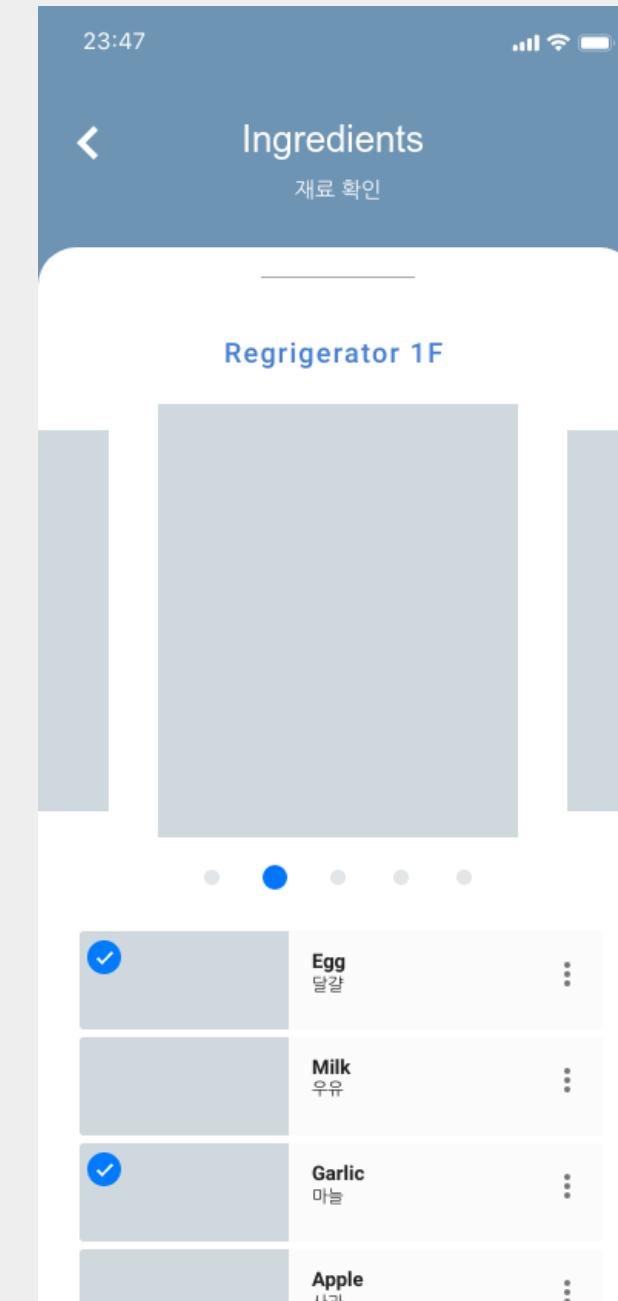
The system sends notifications when the expiration date is approaching.

Get expiration date information from the server and display it on the Lcd screen and application

Insufficient Ingredients Notification

If user don't have enough ingredients to cook, send information about scarce ingredients to users.

Users can set up the list of ingredients to receive this notification.



02 System

Overview

Menu Recommendation

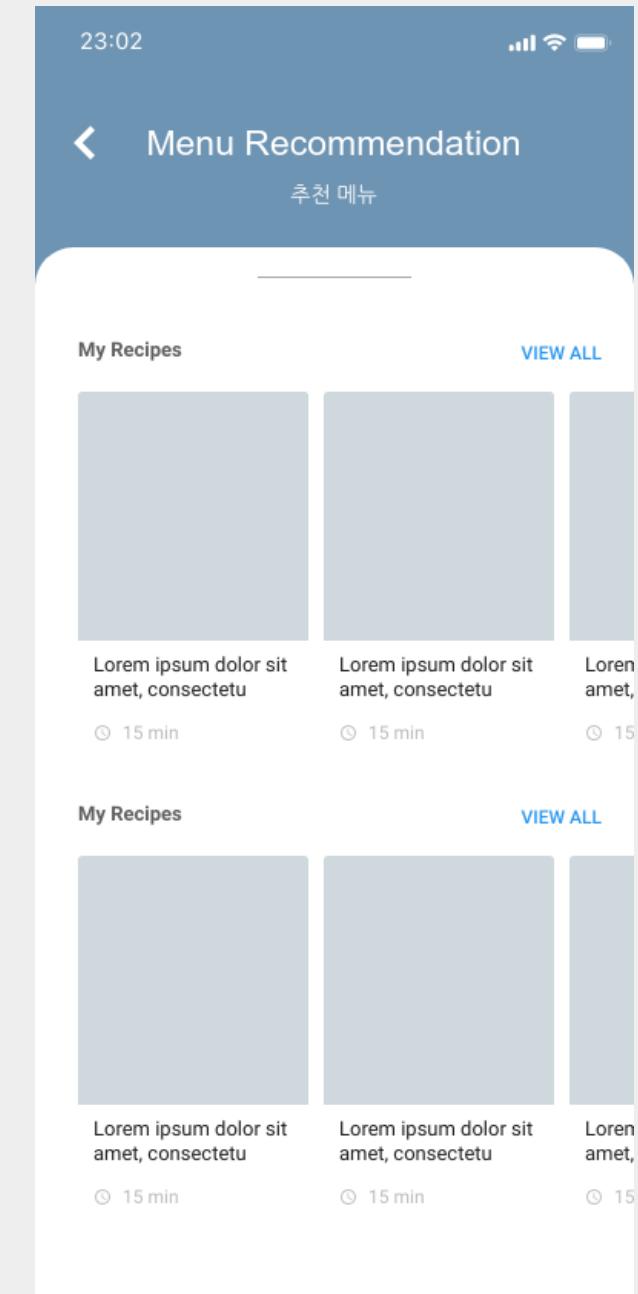
Recsys choice of menu

Considering User Preference and Smart Usage of Ingredients

Agonizing about what to eat is a daily task for many people.

This system will show you a list of cooking recommendations based on the ingredients in the refrigerator, expiration date, and search records.

Guide for Cooking
For each menu, a recipe with a video guide is provided.
By touching food picture, display recipe or video
on the lcd screen or application.



O2 System

Overview

Temperature Control

Make your cooking easier

If the user chooses one of the dishes recommended and the ingredients needed for the dish need to be thawed, defrost the ingredients automatically. Users can also choose the ingredients to defrost themselves.

Frozen-thaw Reservation

There are separate thawable compartments to store frozen ingredients.

The system has information about time taken to thaw each food.

It turns on the thaw mode if the user sets it on or thawing is needed for the chosen recipe.

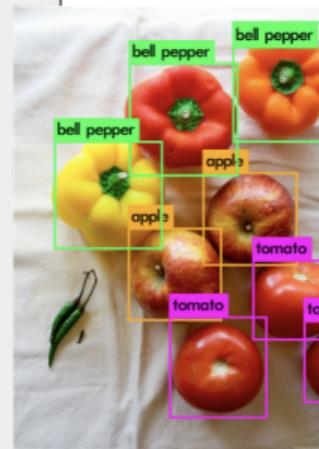


03 Implementation Details



Recsys

CV



Tesseract OCR



Dart
Flutter



User Devices

03 Implementation Details



Platform for
the Flutter Framework



Cross-Platform
GUI Application Framework

Building Android and iOS,
Smart Device Apps with One Codebase
Native Performance
Customizable UI widgets

Suitable for IoT device Applications

03 Implementation Details



Real-time Object Detection System
to Categorize the Ingredients



Tesseract OCR

Optical Character Recognition
to Detect Expiration Date

03 Implementation Details



Cloud Server Management

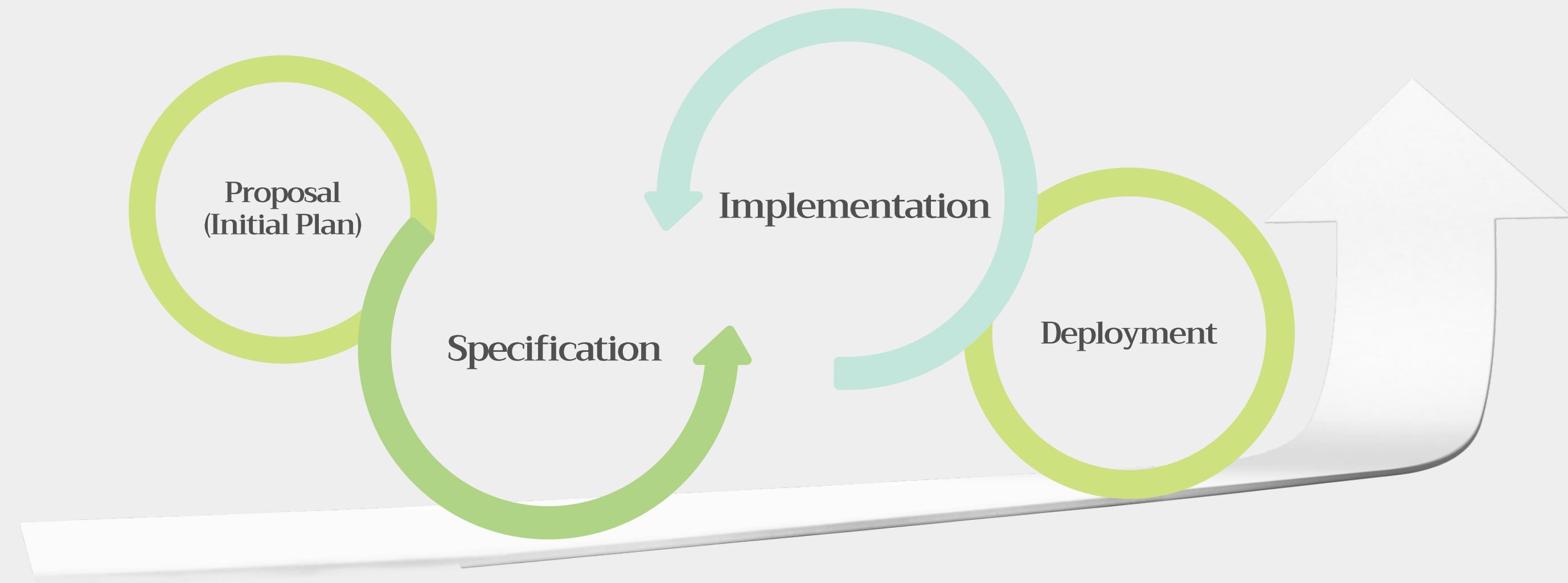


Database CRUD,
Web Server Establishment
using MVC

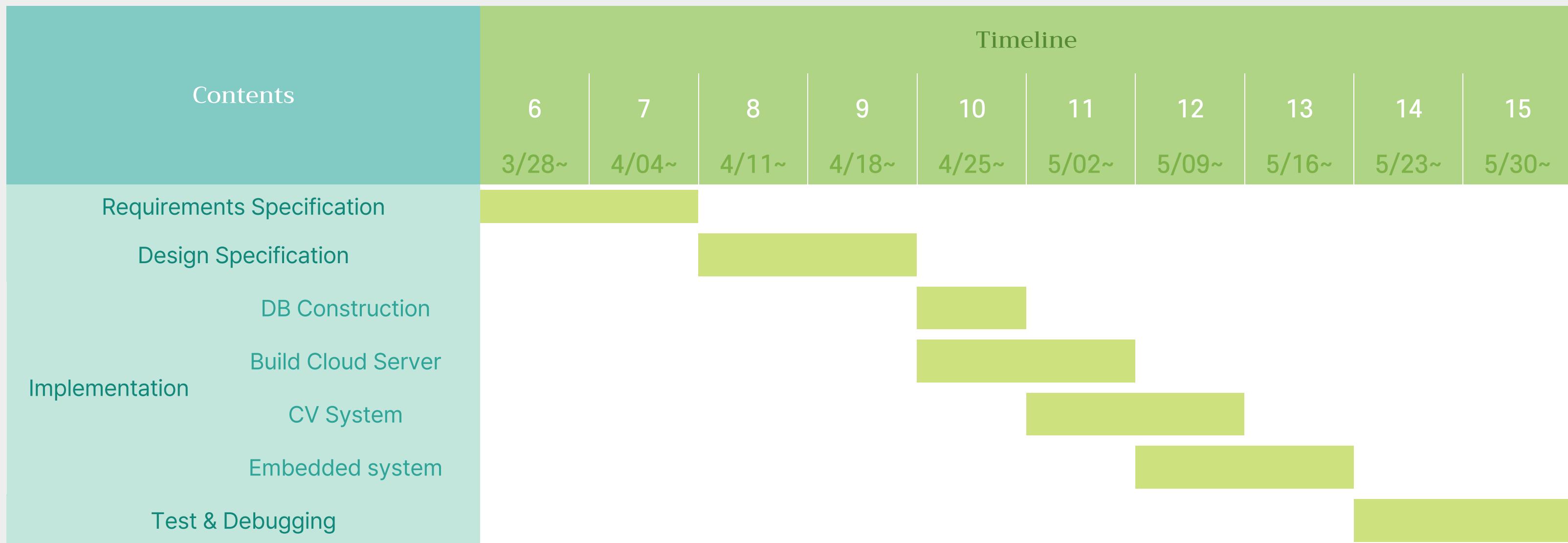


Relational Database
Management
and Creation

04 Development Plans



04 Development Plans



04 Development Plans



Backend

Junyeong Park
Amirah

Recsys

Junyeong Kwak



Frontend

Seyoung Kim
Suyeon Park

Embedded

Seongjun Kim

CV

Woohyeon Park

05 Expectations



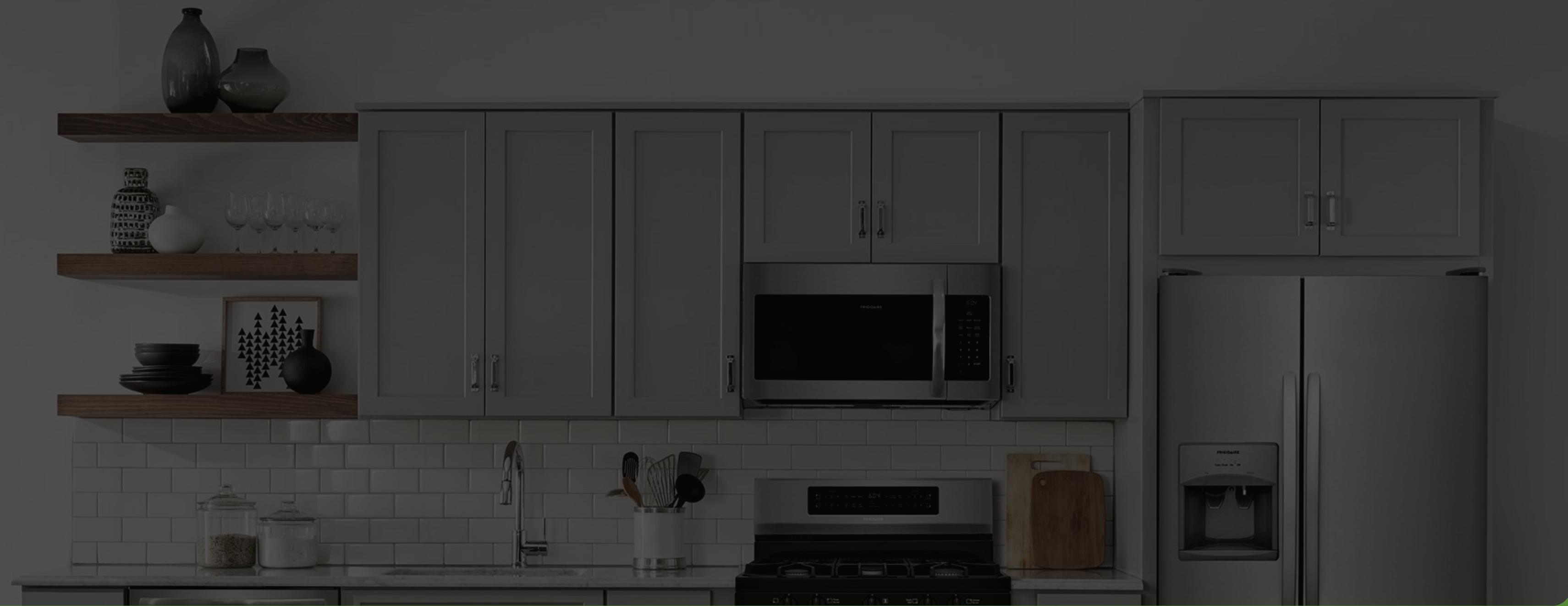
Convenience

Features such as defrosting food ingredients prepare the best cooking environment on their own. Also, the recipe recommendation system and the cooking guide videos help users who are not good at cooking get started more easily.



Sustainability

Users would be able to reduce the use of delivery food. Nowadays, the frequent delivery food intake is a rising problem, causing unhealthy eating habits and tons of disposables which lead to an environmental pollution. In this vein, we expect system users to promote personal and environmental sustainability by starting self-cooking easily.



Thank you!

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