

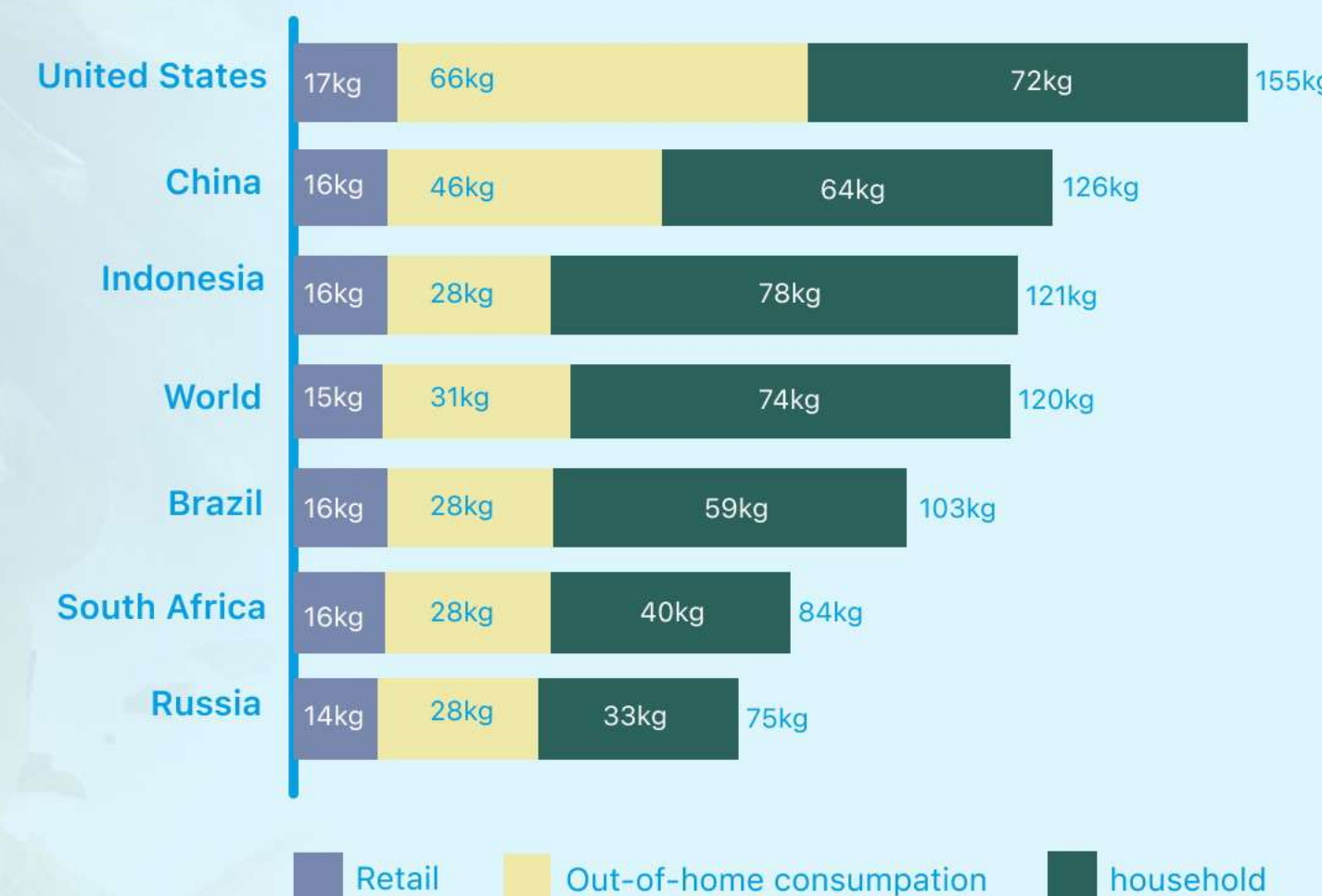
Eatopia

PRODUCT DESIGN
UI/UX DESIGN
Personal Work
2024.08-2024.11

Food waste occurs along the entire spectrum of production, from the farm to distribution to retailers to the consumer. Reasons include losses from mold, pests, or inadequate climate control; losses from cooking; and intentional food waste.



Wasted food has far-reaching effects, both nationally and globally. In the U.S., up to 40% of all food produced goes uneaten, and about 95% of discarded food ends up in landfills. It is the largest component of municipal solid waste at 21%. In 2014, more than 38 million tons of food waste was generated, with only 5% diverted from landfills and incinerators for composting. Decomposing food waste produces methane, a strong greenhouse gas that contributes to global warming. Worldwide, one-third of food produced is thrown away uneaten, causing an increased burden on the environment. It is estimated that reducing food waste by 15% could feed more than 25 million Americans every year.

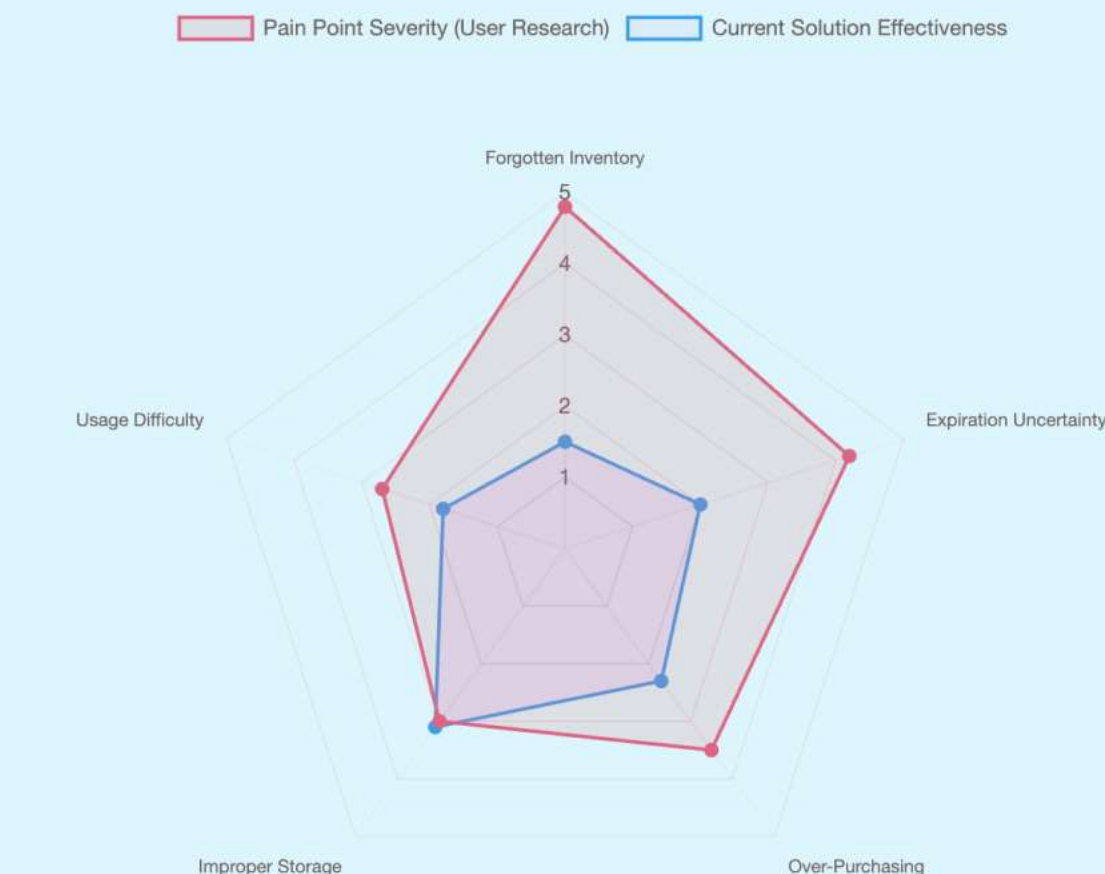


- ### Benefits of Less Food Waste
- Cost savings on labor through more efficient handling, preparation, and storage of food that will be used.
 - Cost savings when purchasing only as much food as needed, and avoiding additional costs of disposal.
 - Reduced methane emissions from landfills and a lower carbon footprint.
 - Better management of energy and resources, preventing pollution involved in the growing, manufacturing, transporting, and selling of food.
 - Community benefits by providing donated, untouched, and safe food that would otherwise be thrown out.

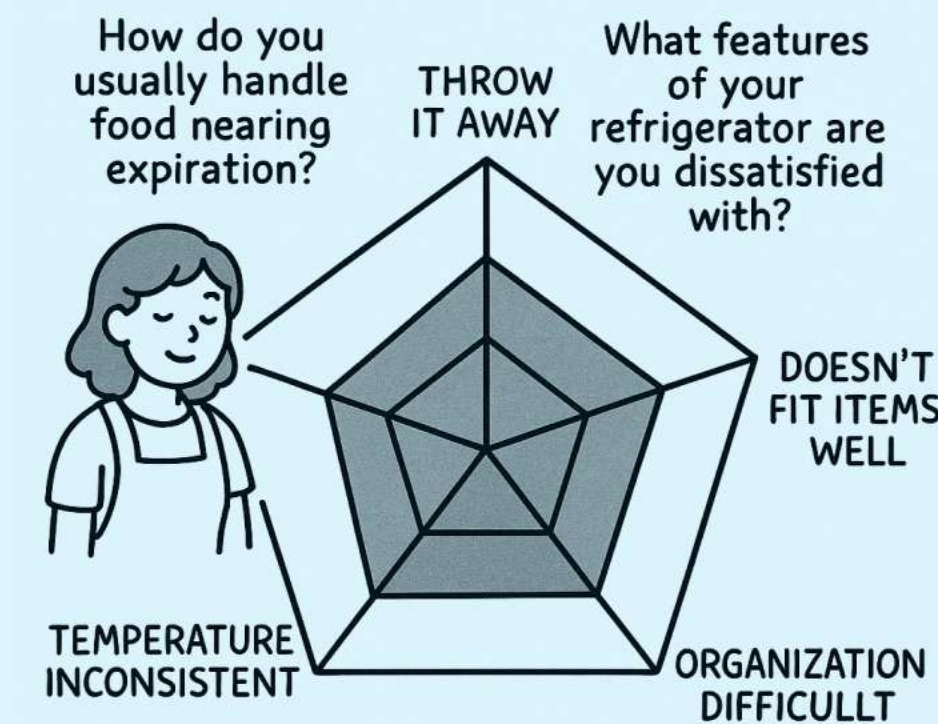
Where Our Waste Comes From



Core Food Waste Pain Points (Scale: 1-5)



USER PAIN POINTS



Interview

Interviewer: Thank you for taking the time to speak with me today. I'd like to ask you a couple of questions about your experience with food storage at home.

Interviewee: Sure, happy to help.

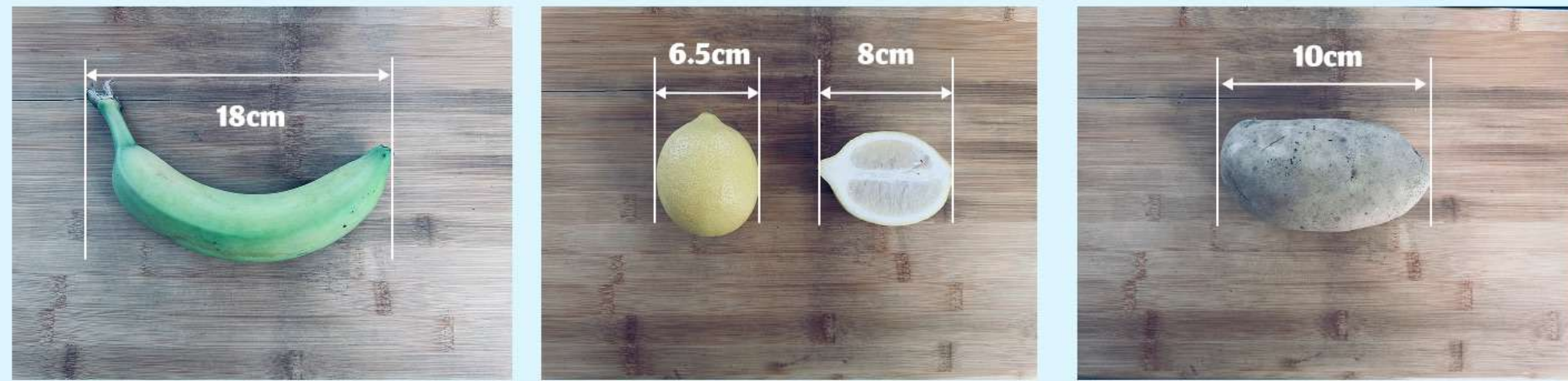
Interviewer: First, how do you usually deal with food that's close to its expiration date?

Interviewee: Well, I try to check my fridge regularly, but sometimes things slip through the cracks. If I notice something is about to expire, I'll try to cook it that same day or freeze it if possible. But honestly, there are times when I end up throwing things away because I just forget they were in there.

Interviewer: I see. What are some features of your current refrigerator that you're not satisfied with?

Interviewee: Hmm... I'd say the organization could be better. Sometimes food gets pushed to the back and I don't notice it until it's too late. Also, there's no reminder or tracking system—it would be really helpful if the fridge could somehow alert me when something is about to expire. And the temperature isn't always consistent, which makes me worry about how well things are being preserved.

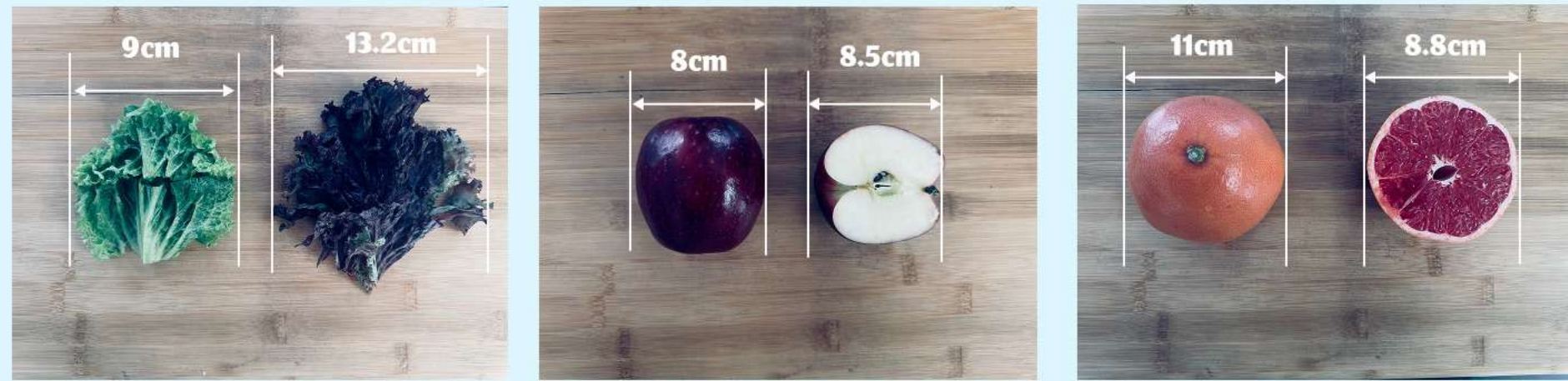
Visual Recognition Mechanism



Banana
20cm x 4.5cm

Lemon
6.5cm x 8cm

Potato
20cm x 5cm



Lettuce & Cabbage
9cm x 11cm 13.2cm x 13cm

Apple
8cm x 8.5cm

Orange
11cm x 8.8cm



Onion
5cm x 4cm

Arugula & Cabbage
6cm x 13cm 15cm x 15cm

Key Tech Behind It:

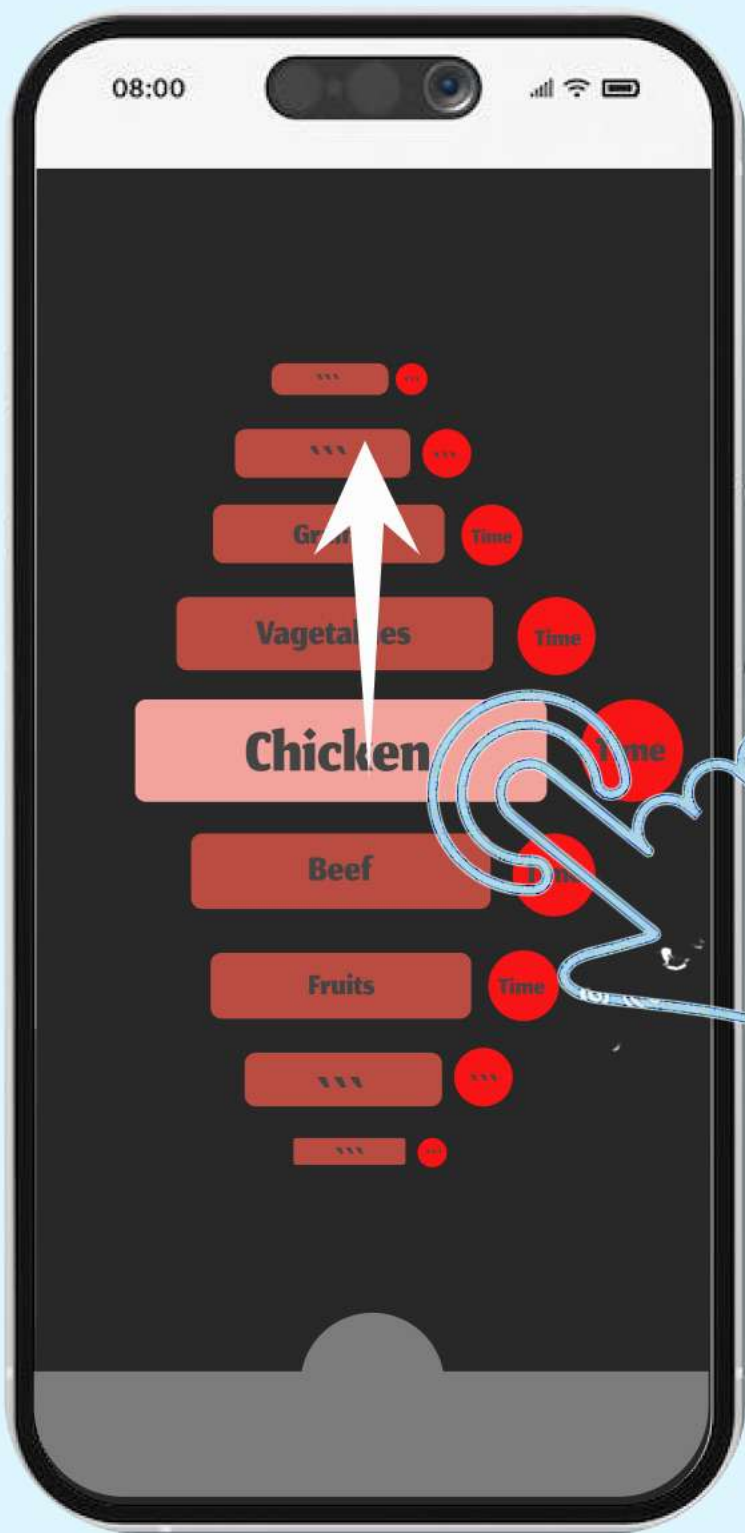
- **Deep Learning:** CNNs excel at hierarchical feature learning (e.g., ResNet/MobileNet for mobile devices).
- **On-Device AI:** Modern phones use NPUs to run lightweight models (like TensorFlow Lite) without cloud dependency.

具体功能运行原理



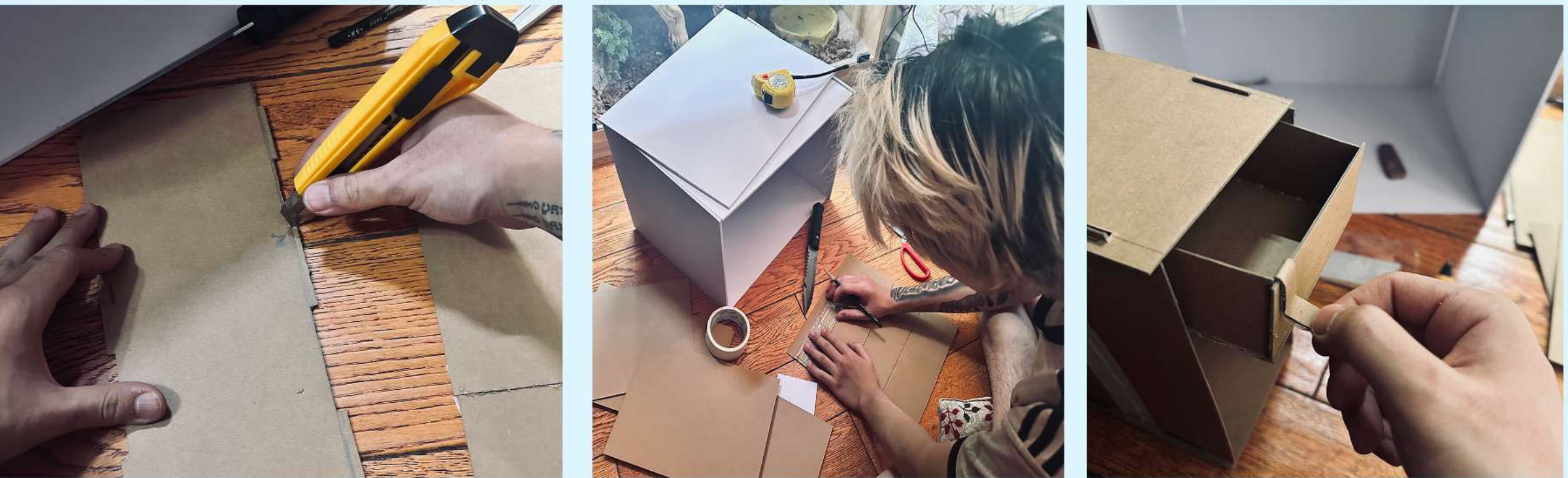
- 1. Image Capture**
 - The camera captures light reflected off the broccoli as pixel data (RGB/grayscale values).
- 2. Preprocessing**
 - Adjusts brightness/contrast, removes noise, and may segment the image to isolate the object from background.
- 3. Feature Extraction**
 - Identifies key visual features:
 - Color: Green hues (HSV color space analysis)
 - Texture: Floret patterns (edge detection/ Gabor filters)
 - Shape: Tree-like fractal structure (contour analysis)
- 4. Model Matching**
 - A pre-trained machine learning model (like CNN) compares extracted features to learned broccoli "fingerprints" from its dataset.
 - For simpler systems: Rule-based checks (e.g., "Is the object green + bumpy surface + rounded shape?")
- 5. Confidence Scoring**
 - Outputs probability (e.g., "87% broccoli") and draws bounding boxes if confidence exceeds a threshold (e.g., >70%).

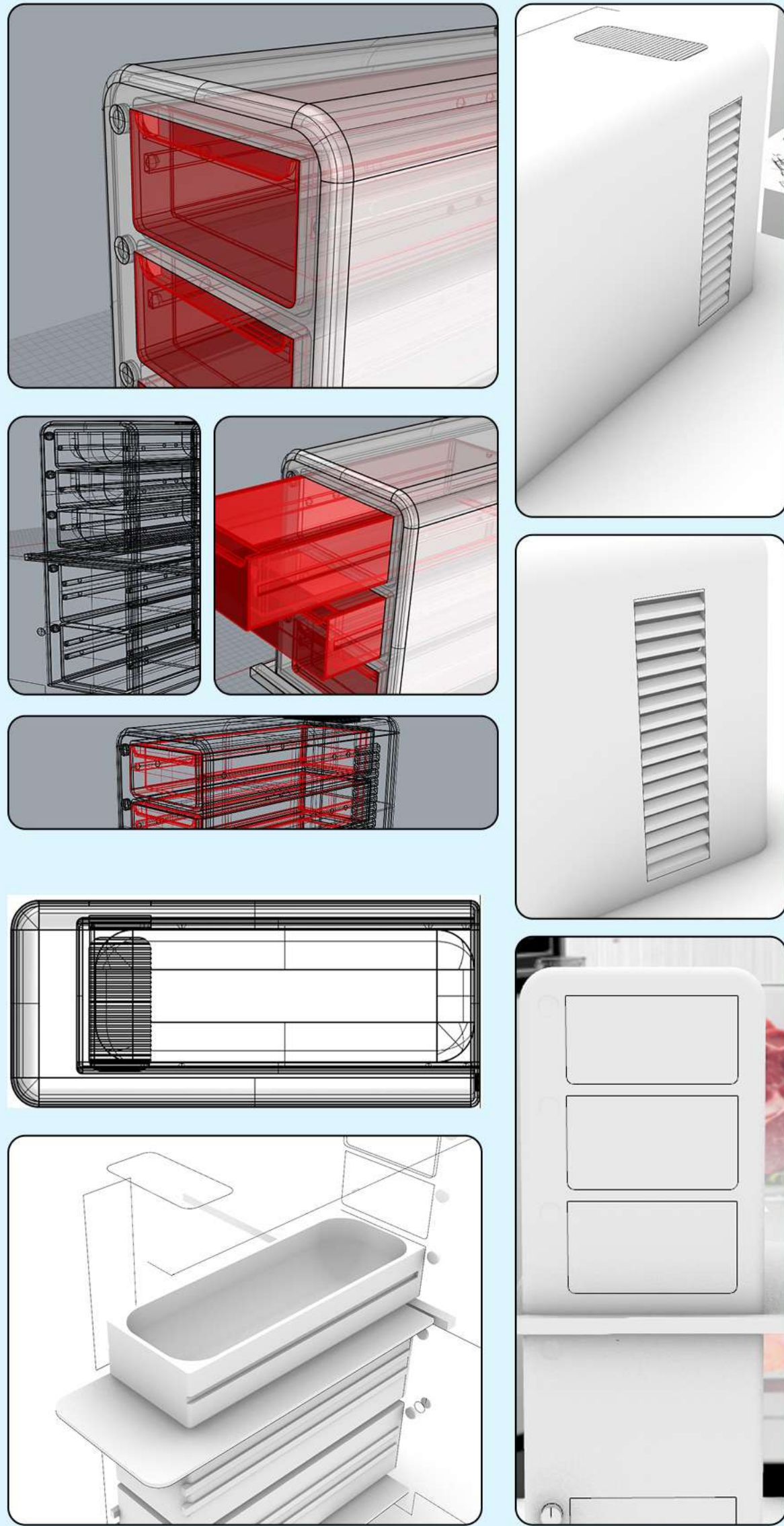
The storage **methods** and **times** of different ingredients will be displayed on the screen



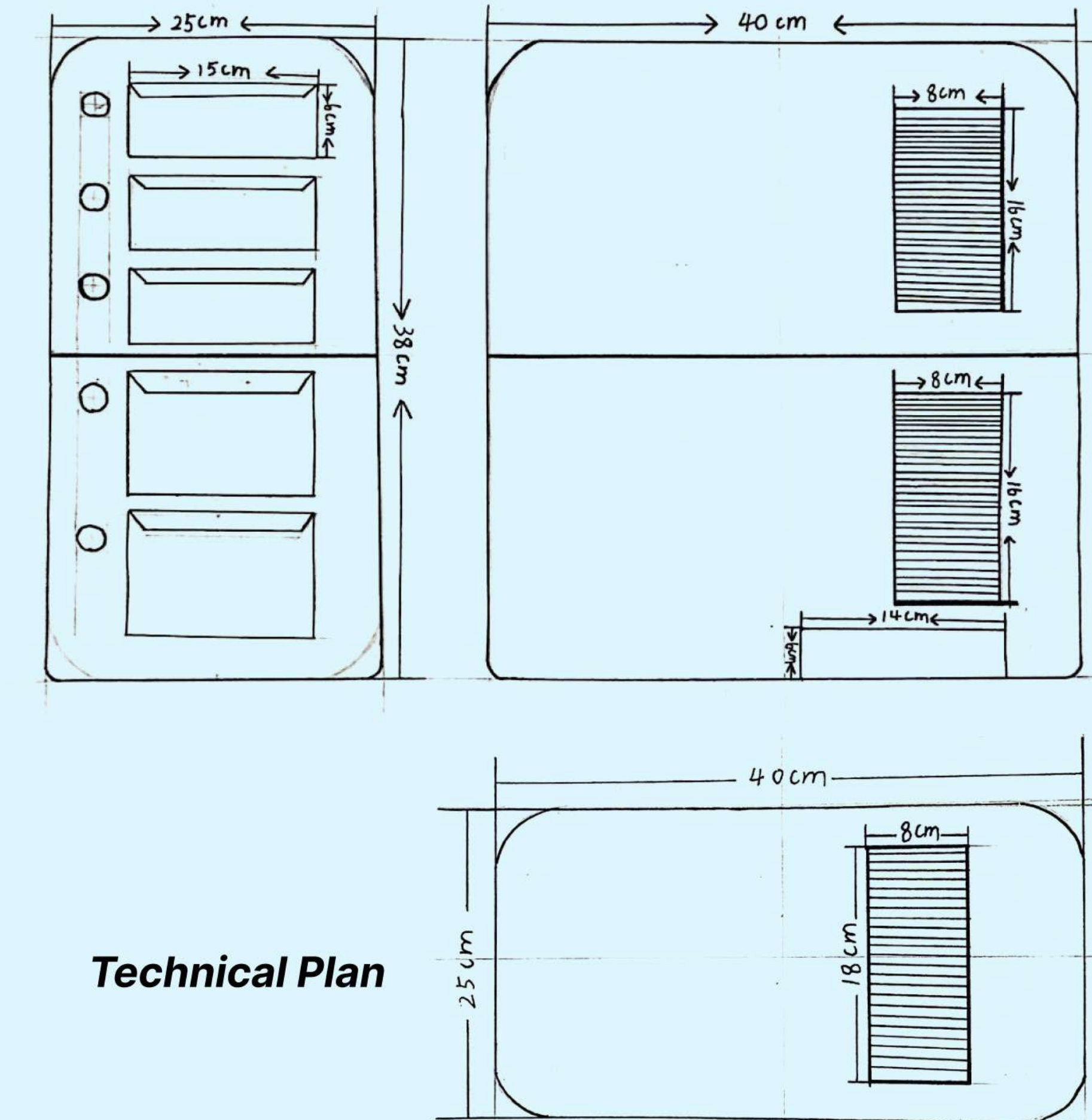
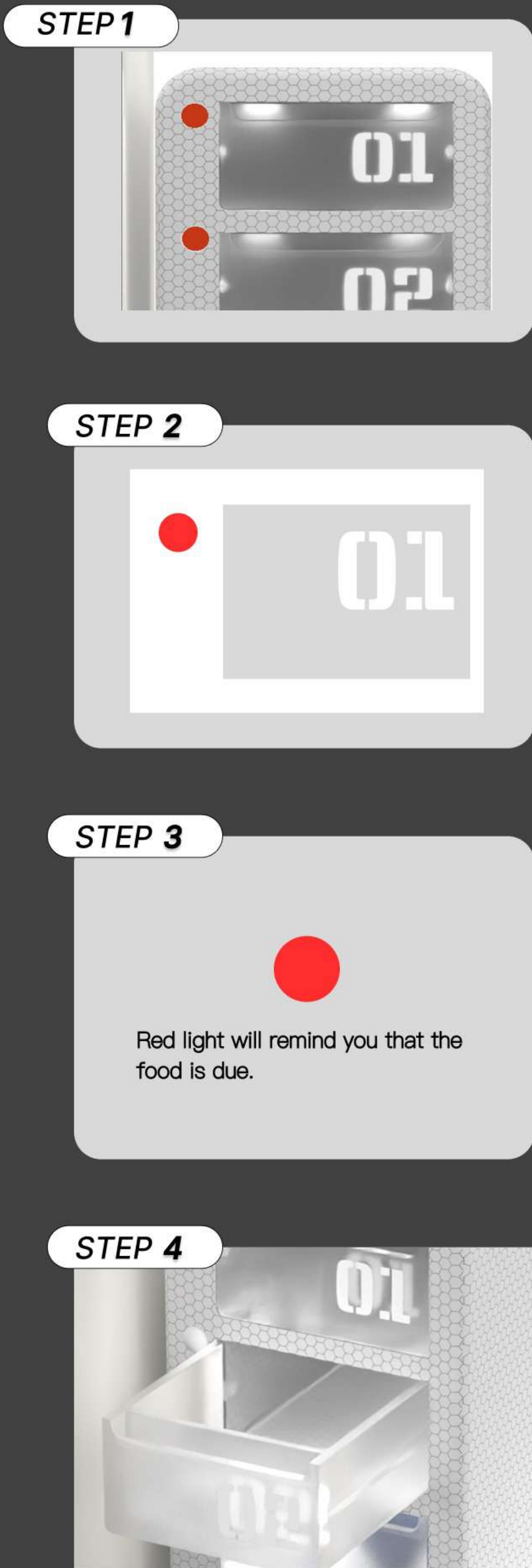
- Push notifications: Sends warnings to your phone 3 days before food goes bad, with fun ideas like, "Make banana bread with those old bananas!"
- No-waste recipes: Suggests easy meals based on what's about to expire.
- Family sharing: Lets roommates or grandparents sync grocery lists so no one buys the same thing twice.

Model





3D modeling & Render
By Rhino 8 / Keyshot 12



Technical Plan

1. The Smart Fridge
- Uses sensors to check if your food is still fresh (like scanning fruits for mold or meat for weird smells).
 - Auto-expiry alerts: Scan barcodes or type in food names, and the fridge's screen will flash and say out loud: "Hey, your milk expires tomorrow!"