Project of IT 214
User Experience Design
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King Saud University
College of Computer and Information Sciences
Information Technology Department

Phase 3 : Prototype

SmartFrost ❄

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1. Introduction:

 Nowadays Having a refrigerator became a necessity, not a luxury and we are sure that there is no home without refrigerators. Since the refrigerator has such great importance, we had the idea of inventing a smart refrigerator and designing the appropriate application for users to make their lives easier because we have seen that the majority of individuals have issues with their fridge, such as difficulty organizing it or occasionally having trouble figuring out what's inside. As a result, parts accumulate, and are purchased in large quantities that we do not need. That's why we came up with the idea of SMRTFROST ❄ .

SmartFrost ❄ is a smart refrigerator equipped with a sensor that recognize everything that put in or taken out of the refrigerator, with a touch screen on the outside that displays all the options and features that the smart refrigerator offers to its users.

The Smart Frost refrigerator has many features, including the capability to display every product inside the fridge on the screen and notifies you when it's about to expire, it's also notifying you when quantities are about to run out and adds the product that is completely sold out to the shopping cart list, from our app you have the option of sending your shopping list to one of the delivery apps in order to be delivered right to your door.

Also, the refrigerator provides information about the nutritional values of every food within, which is a great benefit for those who care about their health.

Depending on the level of cold, The Super Fridge also recommends the best location for each product to be stored inside the refrigerator.

Furthermore, it offers advice on the best way to store items so they last as long as possible.

Last but not least, our Smart Frost refrigerator suggests food recipes based on the ingredients inside it, focusing on food that will expire soon.

2.Methodology:

As we explained previously, our project provides solutions that make people's lives easier with the refrigerator. So, to learn more about the needs of our users, we conducted many interviews and created a questionnaire. We focused our sample on people who take care of organizing their refrigerators themselves.

In the interviews, we spoke with students who live alone, housekeepers, and housewives because we think that these groups are the ones who suffer most from regular refrigerator problems because of their busy lifestyles. We asked them 10 questions about issues they face with the typical fridge and about their ways of organizing the refrigerator, in addition to how can they keep food fresh for a long period…. etc.

However, in the questionnaire, we expanded the sample and paid attention to everyone who organizes his refrigerator himself or deals with it from time to time. So, we created a questionnaire consisting of 8 specific questions about methods of preparing shopping lists and number of shopping times per month and what they think about preserving food. Then we shared the link on social media platforms and asked random people to fill it out, regardless of their gender or identity.

3.Results:

Interviews results:

We conducted interviews with 8 people we noticed that most of them are not satisfied with their typical fridges due to its design. they told us that they are facing problems keeping their refrigerators organized which leads to not noticing what is inside the refrigerator so it expires before they consume it. We also discovered that everyone has his own ways in organizing the fridge and preserving fruits and vegetables as long as possible. After asking people, we learned that the majority have trouble remembering what is missing in their refrigerator while others find it easy to remember what they need.
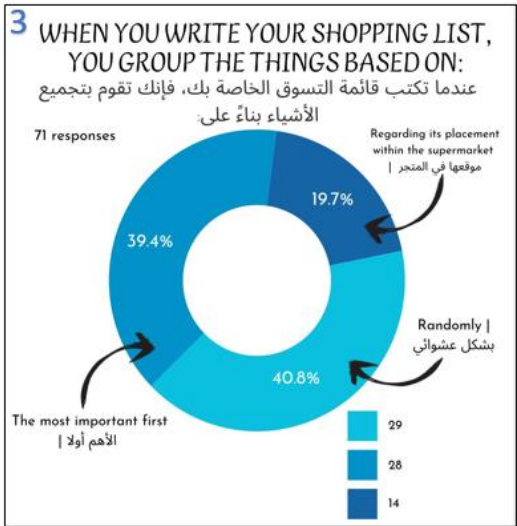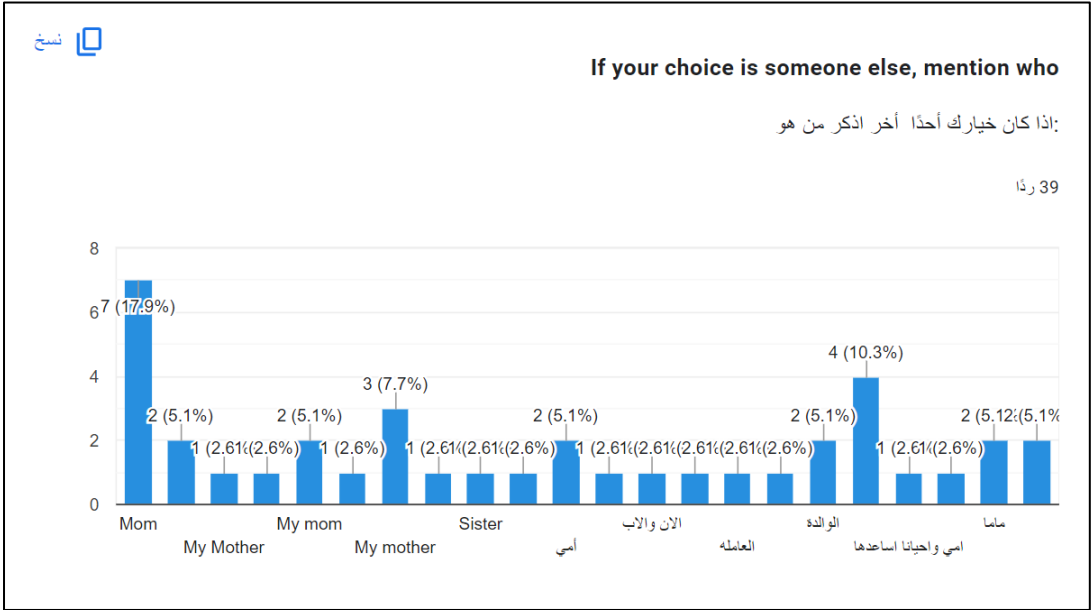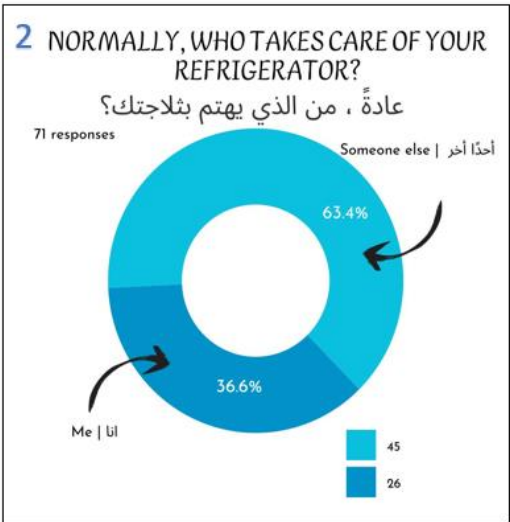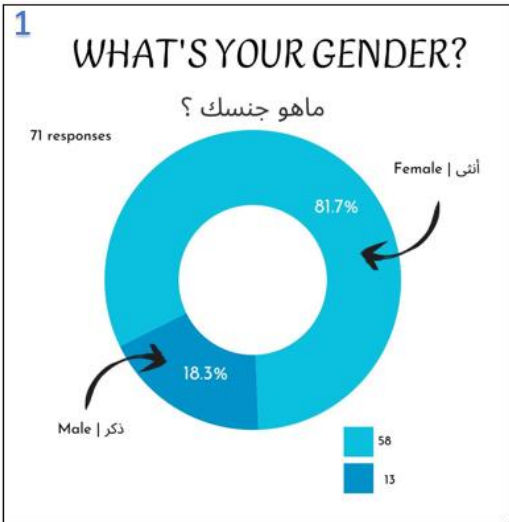
When we asked them about the features they want to provide in the smart refrigerator, they mentioned the following features: a reminder of what is inside the refrigerator and the purchases they need, suggests recipes, it remains tidy without any effort of them, in addition to the presence of a touch screen allows them control the entire fridge. Everyone agreed that if a refrigerator with these features were invented, they would buy it immediately.

Questionnaire results:

After publishing the questionnaire, we obtained 71 responses the majority of them were females. Also, we noticed 36.6% out of the 71 responses organize their refrigerators themselves, which are the ones who will benefit most from the SmartFrost refrigerator. Regarding how to write the shopping list, 39.4% start by writing the most important products first, 19.7% arrange them according to their location in the supermarket, and the rest just write it randomly. It also shown that 15.5% answered that they order from the delivery app while 46.5% of the responses which almost the half, go shopping 3 times or more per month but the rest go shopping less. The vast majority agreed that they need a way to help them organize their refrigerators. We noticed that 60.6% of people are aware about how quickly some areas inside the refrigerator cool food. Almost all of those who answered the survey agreed that storing food in certain ways makes it last longer. Since this is the era of reliance on social media, we asked people about what extent they rely on social media to search for food recipes, there were two responses saying they never rely on social media, while13 of the responses depend 25% on social media, 36 depend 75% and 20 depend 100%. People's response regarding interest in knowing nutritional values was shocking, whereas 12.7% do not care at all, 62% care sometimes and only 25.4 % are interested in knowing nutritional values. Finally, we wanted to know how interested people are in owning a smart refrigerator, the results were very satisfying for us as 80.3% confirmed that they want to get it.
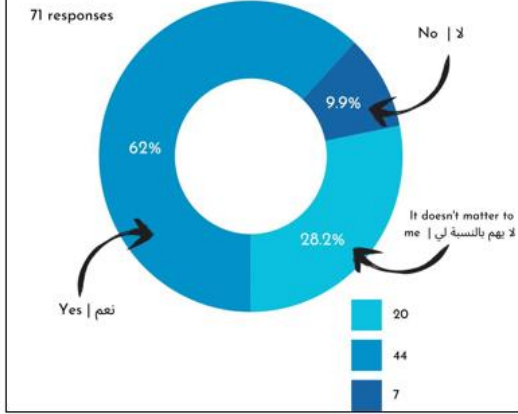
The statistics regarding the outcomes we obtained from the questionnaire are shown below.
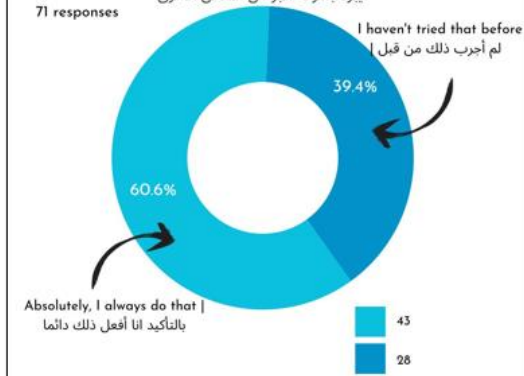
Questionnaire statistics:

1 WHAT'S YOUR GENDER?
ماهو جنسك ؟

71 responses

Female | أنثى
81.7%

Male | ذكر
18.3%

58
13

2 NORMALLY, WHO TAKES CARE OF YOUR REFRIGERATOR?
عادةً ، من الذي يهتم بثلاجتك؟

71 responses

Someone else | أحدًا أخر
63.4%

Me | انا
36.6%

45
26

نسخ

If your choice is someone else, mention who

:اذا كان خيارك أحدًا أخر اذكر من هو

39 ردًا

7 (17.9%) Mom
2 (5.1%)
1 (2.6%) (2.6%) My Mother
1 (2.6%) My mom
3 (7.7%) My mother
1 (2.6%) (2.6%) (2.6%) Sister
2 (5.1%) أمي
1 (2.6%) (2.6%) العامله
1 (2.6%) (2.6%) الان والاب
2 (5.1%) الوالده
1 (2.6%) (2.6%) امي واحيانا اساعدها
2 (5.12% (5.1% ماما

3 WHEN YOU WRITE YOUR SHOPPING LIST, YOU GROUP THE THINGS BASED ON:
عندما تكتب قائمة التسوق الخاصة بك، فإنك تقوم بتجميع الأشياء بناءً على:

71 responses

Regarding its placement within the supermarket موقعها في المتجر | 19.7%

39.4%

Randomly | بشكل عشوائي
40.8%

The most important first الأهم أولا |

29
28
14

4 HOW MANY TIMES DO YOU GO SHOPPING FOR YOUR REFRIGERATOR NEEDS PER MONTH?
كم مرة تذهب لشراء احتياجات ثلاجتك في الشهر؟

71 responses

two times | مرتين
29.6%

once | مرة واحدة
8.5%

15.5%

three times or more ثلاث مرات او اكثر |
46.5%

I place orders through delivery apps أقوم بتقديم الطلبات من خلال تطبيقات التوصيل |

6
11
21
33

5 DO YOU FEEL THAT YOU NEED A WAY TO HELP YOU ORGANIZE YOUR REFRIGERATOR?

هل تشعر أنك بحاجة إلى وسيلة تساعدك على تنظيم ثلاجتك؟

71 responses

No | لا
9.9%
62%
28.2%
It doesn't matter to me | لا يهم بالنسبة لي
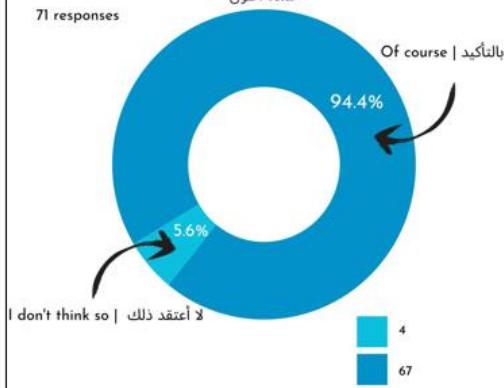Yes | نعم

20
44
7

6 SOMETIMES I ARRANGE THE FOOD IN A PARTICULAR AREA OF THE REFRIGERATOR BECAUSE I KNOW IT COOLS DOWN MORE QUICKLY THAN OTHER PLACES.

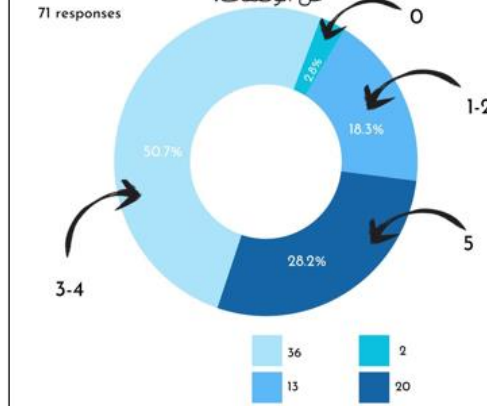أحيانًا أقوم بترتيب الطعام في منطقة معينة من الثلاجة لأني أعرف أنه يبرد بسرعة أكبر من الأماكن الأخرى

71 responses

I haven't tried that before | لم أجرب ذلك من قبل
39.4%
60.6%
Absolutely, I always do that | بالتأكيد انا أفعل ذلك دائما

43
28

7 I BELIEVE STORING FOOD A CERTAIN WAY HELPS IT LAST LONGER

أعتقد أن تخزين الطعام بطريقة معينة يساعد في الحفاظ على الطعام لمدة أطول

71 responses

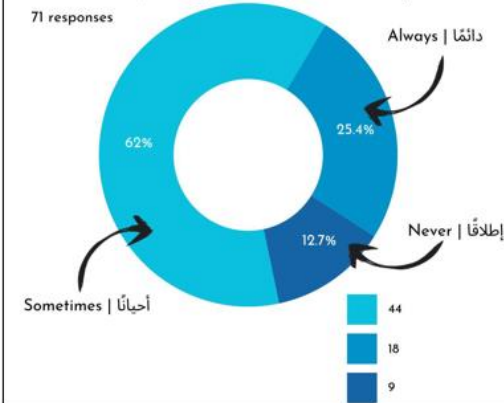Of course | بالتأكيد
94.4%
5.6%
I don't think so | لا أعتقد ذلك

4
67

8 OUT OF 5, HOW MUCH DO YOU RELY ON SOCIAL MEDIA TO SEARCH FOR RECIPES?

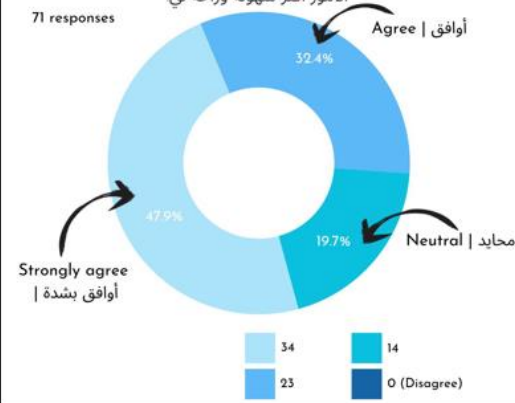من 5 ما مدى اعتمادك على وسائل التواصل الاجتماعي للبحث عن الوصفات؟

71 responses

0
2.8%
18.3%
1-2
50.7%
28.2%
5
3-4

36   2
13   20

9 I PAY ATTENTION TO THE NUTRITIONAL VALUES IN THE FOOD BEFORE I EAT IT

أنا أولي اهتمامًا للقيم الغذائية في الطعام قبل تناوله

71 responses

Always | دائمًا
25.4%
62%
12.7%
Never | إطلاقًا
Sometimes | أحيانًا

44
18
9

10 SOMETIMES, I WISH THERE WERE MORE FEATURES IN MY FRIDGE TO MAKE IT EASY FOR ME

في بعض الأحيان أتمنى لو كانت ثلاجتي تملك ميزات ذكية لجعل الأمور أكثر سهوله وراحة لي

71 responses

Agree | أوافق
32.4%
47.9%
19.7%
Neutral | محايد
Strongly agree | أوافق بشدة

34   14
23   0 (Disagree)

Interview's Questions:

1) Have there been any problems with your typical refrigerator? Describe the situation

2) You have probably discovered expired food in your refrigerator in the past. What causes this to occur?

3) Let's say you open the refrigerator and discover food that is about to expire. How are you going to deal with these foods?

4) Tell me about your method of making fruits and vegetables last as long as possible.

5) What is your method for arranging food inside the refrigerator?

6) In the unlikely scenario that you decide to stop at the grocery store on your way home, how do you determine which foods you are running out of in your fridge?

7) If you are confused about what to cook today? How are you going to decide?

8) Do you believe that it would be easier for you to achieve your daily vitamin requirements if you knew the nutritional values of the foods in your refrigerator? Why?

9) Have you ever imagined having an ultra-modern refrigerator? What features are you looking for?

10) If l we told you that there is a smart refrigerator with all the features you mentioned, would you buy it? and why?

Interview's Transcriptions: (interviewed with a mother **By Layan**)

A1: Being a mother and having kids makes it difficult for me to keep the refrigerator clean and organized. When the kids open food, they don't always finish it and put it back in the fridge, which causes the ingredients to pile up and makes it impossible for me to see them or count them.

A2: Mostly, they expire due to poor or wrong storage, and the refrigerator is large but does not contain organization, as it is possible to store the products incorrectly, causing them to spoil more quickly.

A3: I would inspect the food to see if it still appears fresh and safe to consume despite nearing its expiration date. If it shows signs of spoilage or has an unusual odor or appearance, I would discard it immediately.

A4: Cleaning produce before storing it can encourage the growth of mold and deterioration. Rather, don't wash them until you're ready to use them.

A5: Make use of the "first in, first out" strategy by putting newer objects in the back and older ones at the front of the arrangement. By doing this, perishable goods are made use of before they go bad.

A6: Mostly, As I cook, I know when I run out of ingredients, so for the most part, I can remember what I need. However, I always find that I forget some components.

A7: Look through the ingredients I have in my freezer and refrigerator to determine what I can use for inspiration, look through recipe apps, cookery websites, and cookbooks. Maybe I'll come with a dish that appeals to me and calls for items I already own.

A8: Because my child suffers from a vitamin deficiency, this makes it much easier for me to choose the right foods.

A9: It is amazing to find a modern refrigerator where I can know what its components are without opening it or being at home. A refrigerator that has a specific arrangement that my family can organize by following and has a lock that can be opened with a fingerprint or password.

A10: Of course, I will purchase it, as it represents an investment in my family's well-being, comfort, and time.

Interview's Transcriptions: (interviewed with a mother By Layan)

A1: Yes, I was suffering for two years when some areas of the refrigerator were colder or warmer than others and the lighting was so low and bad.

A2: When the refrigerator light was very low, I could not see the ingredients clearly and they spoiled without me noticing.

A3; I work mostly with groups who supply food for cattle, so I offer them the food and they determine if it's appropriate or not, at which point I discard it.

A4: To make the refrigerator sturdier, I put heavy products on the last shelf and large ingredients that require room on the first shelf.

A5: Put similar things in the same group: To make it simpler to find related items later, group them in storage. For instance, arrange fruits and vegetables in one area, dairy goods in another, and meats in a third.

A6: I buy things that I know I've run out of, and if I get home and discover that I forgot something, l just order it.

A7: I usually cook a recipe that I haven't cooked in a long time, and my family loves it.

A8: Indeed, without a doubt. Individuals can plan and prepare balanced meals that contain a variety of vitamins and nutrients by being aware of the nutritional values of various foods. This makes sure they receive all the vital vitamins they require during the day.

A9: A speech-activated refrigerator that could respond to voice commands would be fantastic for chores like shopping list creation, expiration date reminders, and temperature adjustments.

A10: I'll buy it since I think it will be interesting and help a lot of individuals in the community.

Interview's Transcriptions: (interviewed with a mother By Walaa)

A1: Yes, the refrigerator door magnet is bad because sometimes I think I close the door and when I come back, I find that the refrigerator door was open the whole time.

A2: This happens to me when there are sales in the supermarket, so I buy food in large quantities to take advantage of the discount, but unfortunately, most of it spoils before I consume it.

A3: I will look for recipes I can use it in, in sweets or something else.

A4: I chop the zucchini and then store it in the freezer I also buy large quantities of tomatoes and make sauce from them.

A5: I put drinks in the refrigerator door, medicines in the first shelf, then the second shelf for cheese fruits and vegetables, and the last shelf for homemade food.

A6: I try to imagine the refrigerator so I can remember what I need to buy.

A7: I make the decision based on the ingredients I have at home.

A8: Yes, definitely this will help me provide healthy and balanced meals for my children.

A9: I want a fridge that I can see everything inside very easily and it must be huge so I can store what I want.

A10: of course, I would buy it without thinking.

Interview's Transcriptions: (interviewed with a student By Walaa)

A1: Actually, I don't like not having a designated place for medicines in my refrigerator in addition to the fact that it freezes food, so it spoils quickly.

A2: I'm very busy because of the university, and I live in university housing, so I don't check the refrigerator or eat a lot of food on exam days so it expires.

A3: I will try to consume it as soon as possible and if not, I will throw it away.

A4: my mother tells me to wrap leafy vegetables in tissues after washing and then drying them well, then put them in a bag.

A5: Honestly, I don't care about organizing my refrigerator much; I just put the products that I consume a lot in the refrigerator door so I can reach them easily.

A6: I simply call my roommate.

A7: when I am exhausted and unsure about what to make for dinner, I order food from outside.

A8: Yes, this will undoubtedly make my life lot simpler maybe I won't need to use nutritional supplements to meet all of my daily requirements.

A9: I want a refrigerator that stays tidy all the time without putting in any effort, and if possible, it could remind me of the food in it because I often forget what I bought.

A10: if the price is affordable, why not?

Interview's Transcriptions: (interviewed with a working mother By Rama)

A1: The biggest problem with my refrigerator is that it gets messy very quickly, and it happens to me a lot. That's why every time I look for something in my refrigerator, I can't find it, so I have to go to the grocery store and buy it, then when I come back, my husband tells me that we have it, so I have a large amount of this product, and it is a waste of money, time and food.

A2: I think the reason is my refrigerator, because sometimes it does not give the best temperature that food needs, so it expires faster.

A3: I think the reason is my refrigerator, because sometimes it does not give the best temperature that food needs, so it expires faster.

A4: I don't do anything special. I just put the vegetables in a new, clean plastic bag, and as for the fruits, I put them as I got them from the supermarket.

A5: I simply place the sauces on the refrigerator door, so I can see them easily. I also store fruits and veggies in the drawer and organize the other ingredients randomly, each time different from the one before.

A6: I have to come back home, see what I need, and then go shopping, because I have no one at home that I can rely on to make a complete shopping list.

A7: I look through recipes on social media and see what ingredients I don't have ,then get those ingredients from the delivery application.

A8: Naturally, this will be of great assistance to me, as I have children and I always make sure to feed them foods high in vitamins and researching about this takes a lot of my time.

A9: Since I'm a mom and an employee at the same time, I'm looking for a smart fridge that will help me do all the things I need to do to have a healthy fridge for kids in the simplest way, that allows me to easily see the gaps I need to cover and have it all on my phone, so I don't have to go home and go shopping again.

A10: Of course, who doesn't want to make their life easier?

Interview's Transcriptions: (interviewed with a housekeeper By Rama)

A1: Approximately every two months, this issue occurs: the refrigerator unexpectedly stops working and remains that way for an hour or an hour and a half. While the possibility of food spoiling inside is an important issue, it is lucky that this does not often happen.

A2: The reason is that we are a large family, and everyone goes shopping for what they want without considering other stuff that is in the house. This results in an abundance of extra items that expire without us realizing it.

A3: I will inform the madam of the foods that are about to expire and set an alarm before their expiration date so that it reminds me to use all the food.

A4: Madam always tells me to store the onion and potatoes separately to preserve them as much as possible. I wash all fruits and vegetables before storing them in airtight containers to keep out air.

A5: Every time I try to learn a better way to organize the refrigerator, but until now I have not found it. For example, the last time I put the eggs on the first shelf, they became frozen the next day. However, I always put the bread on the second shelf and the veggies on the last shelf.

A6: I always keep a shopping list with me in case Madam asks me to buy it at any time.

A7: Usually, Madam makes the food; when she's busy, though, I make simple dishes like pasta because looking for something to cook is more difficult than cooking it.

A8: I don't care very much about what I eat and what nutritional elements it contains, but I think it will benefit those in the house because Madam cooks what suits her husband and does not cause him problems.

A9: Yes, I always imagine a refrigerator that keeps everything in its proper place and arranges it so that all the food is preserved. It seems to me that many issues can be resolved with a refrigerator such as this one.

A10: I don't mind if we have one at home; even so, I will persuade Madam to purchase one so that I may spend less time dealing with the refrigerator and more time relaxing.

Interview's Transcriptions: (interviewed with a mother By Rawan)

A1: Lately, I have been experiencing temperature issues like sometimes it's not cooling properly or it's cooling excessively which leads to ice and frost buildup.

A2: It happens all the time! I think mostly because I overbuy stuff, when you see the offers you really can't resist them, so you end up buying more than you need.

A3: When that happens, I always start googling some recipes that include ingredients that have been left in the fridge and are about to expire.

A4: I've heard that wrapping them in paper towels absorbs excess moisture and prevents mold growth. So, I often use this method, and let me tell you it does work!

A5: I actually use a common method I'm pretty sure you've heard about it before it's called FIFO which means "First in, first out" You do it by placing newer items at the back and older items at the front. This ensures that older items are used before they expire.

A6: Most of the time I try to call whoever is at home but if no one answers then I have no choice but to go back and see what I need to buy.

A7: For me, this is the hardest part, so I always end up making the same food or recipe just because I am too lazy to think of a new one.

A8: Of course! Understanding nutritional values helps me with meal planning. I can also create balanced meals that meet my specific dietary needs, which also makes me aware of the intake of essential vitamins required for my overall health.

A9: 100% yes, you can say that it was my childhood dream to have a super fridge. A touch screen or notification about my fridge status, all that stuff would be interesting.

A10: As I told you, it's my dream to have one. If there was one or it's going to be one I will be the first one to buy it.

Interview's Transcriptions: (interviewed with a father By Rawan)

A1: I changed my fridge not a long time ago because the previous one was making such weird noises when I opened or closed the fridge, I got it fixed multiple times, but it kept happening, so I ended up buying a new one.

A2: I think it is because they need to be stored at a certain temperature but because the fridge can't offer that they end up expiring faster than they are supposed to.

A3: If it's a lot of food, then I might give it to some neighbors or my relatives but if it's not much I would properly try to find a way to cook it or something.

A4: I don't have one, I just put them in the fridge. I heard that storing it differently will make it last longer, but I haven't tried it yet.

A5: I put the same food next to each other like the drinks together and the eggs on the fridge door, etc.

A6: I get back home to see what to buy and go back to the grocery store again. Sometimes when I get home, I get tired suddenly, so I don't go to the store and leave it for later.

A7: I always take a picture of the recipes I like and put them in my recipes folder on my phone so when I get hungry, I can just pick one.

A8: I do but not all the time because I get lazy to search for each one. Understanding the nutritional values of foods helps prevent lacking some of the certain nutrients, which can affect your health. Maintaining a balance is key to always being healthy.

A9: Yeah of course I think it's what everyone wishes at this point. For the features, I think of one that can control the temperature and tell me what I am running out of on my fridge.

A10: Wow! that's amazing if it has the features I mentioned before. I will buy it for sure, it is going to be so much help.

Questionnaire:

1)**What's your gender?**

ما هو جنسك؟

2)**Normally, who takes care of your refrigerator?**

عادةً، من الذي يهتم بثلاجتك؟

If your choice is someone else, mention who

3)**When you write your shopping list, you group the things based on:**

عندما تكتب قائمة التسوق الخاصة بك، فإنك تقوم بتجميع الأشياء بناءً على:

4)**How many times do you go shopping for your refrigerator needs per month?**

كم مرة تذهب لشراء احتياجات ثلاجتك في الشهر؟

5)**Do you feel that you need a way to help you organize your refrigerator?**

هل تشعر أنك بحاجة إلى وسيلة تساعدك على تنظيم ثلاجتك؟

6)**Sometimes I arrange the food in a particular area of the refrigerator because I know it cools down more quickly than other places.**

أحيانًا أقوم بترتيب الطعام في منطقة معينة من الثلاجة لأنني أعرف أنه يبرد بسرعة أكبر من الأماكن الأخرى

7)**I believe storing food a certain way helps it last longer**

أعتقد أن تخزين الطعام بطريقة معينة يساعد في الحفاظ على الطعام لمدة أطول

8)**Out of 5, how much do you rely on social media to search for recipes?**

من 5 ما مدى اعتمادك على وسائل التواصل الاجتماعي للبحث عن الوصفات؟

9)**I pay attention to the nutritional values in the food before I eat it**

أنا أولي اهتمامًا للقيم الغذائية في الطعام قبل تناوله

10)**Sometimes, I wish there were more features in my fridge to make it easy for me**

في بعض الأحيان اتمنى لو كانت ثلاجتي تملك ميزات ذكية لجعل الأمور أكثر سهوله وراحة لي.

Link of the questionnaire: https://forms.gle/hcv7RvCDGqH7uWf27

Google sheets Link (raw data):
https://docs.google.com/spreadsheets/d/1bFwX43sl9Z4fDXaslOVMyxiFQYdy2I93HMmoJ78CzeM/edit

4.Problem Definition:

After conducting interviews and collecting information from users, we were able to identify the problems people had with their typical refrigerators, regardless of whether these issues are the result of busyness or a lack of knowledge. The most important problems were: first, the inability to maintain a clean and organized refrigerator, food spoils because people don't know how to preserve it correctly, store the products in the refrigerator and forget about them until they expire, inability to remember the shopping list, difficulty of finding recipes with ingredients that are already on hand, inability to complete the daily needs of nutrients, and plenty of additional issues. And we were able to determine what the users needed based on what they informed us. They must first understand how to properly stock the refrigerator and preserve food, receive a reminder with the shopping list and food expiration dates, they also need suggestions for recipes that include all their daily nutritional needs. So, we created our SmartFrost application to satisfy every requirement. Our app instructs the user on how to correctly store food and arrange the refrigerator, remind the user of the ingredients that are finished by showing the shopping list, also shows the expiration dates, and provides recipe suggestions, it also informs the user of the nutritional values of everything inside the refrigerator to help him complete his daily needs, and many other features.

User's needs:

- Know the correct way to organize the refrigerator and store food.

-Shopping list and expiration dates reminders.

-Recipe suggestions with available ingredients.

-information regarding the nutritional values of the consumed food.

Project objectives:

-The smart refrigerator application teaches the user the correct way to arrange the refrigerator and the appropriate way to preserve food.

- The refrigerator screen displays the foods inside with their expiration dates. It also displays the shopping list in addition to the notifications feature.

-To avoid confusion in choosing a recipe, the refrigerator suggests recipes using the ingredients you have in home.

- The refrigerator displays the nutritional values of everything inside it.

5.Persona:

We choose our persona based on interviews and questionnaire results. We identified our first persona "Felvei" as a 34-year-old housekeeper, who struggles with arranging the refrigerator and preserving fruits and vegetables in the most appropriate way, also she has difficulty determining a recipe to cook. We identified Felvei based on interview 6 [A5, A7] + interview 7 [A7] + interview 8 [A4] and questionnaire results.

The second persona is " Sara " a 21-year-old student, who has difficulty storing food properly and she is facing some health problems due to the type of food she eats. we identified Sara based on Interview 2 [A2, A9] +Interview 4 [A1, A8, A9] + Interview 7 [A9] and questionnaire results.

Felvei

"Hard work and dedication know no boundaries "

Age: **34**
Work: **House keeper**
Location: **Saudi arabia, Riyadh**

Goals
- Learn the best ways to arrange the refrigerator.
- Know how to preserve food for a longer period.
- Recommendations for daily recipes.

Frustrations
- After arranging the food in the refrigerator, when she came back, she found it frozen.
- Madam always gets angry with Felvei because she doesn't know how to store vegetables and fruits correctly, so they spoil faster.
- She doesn't know what to cook.

Motivation
Incentive
Fear
Growth
Power

Bio
Felvei is a 34-year-old housekeeper, and as always, Felvei wakes up at 8 a.m. She starts cleaning the house and finishes all her work easily, but when she comes to the kitchen, she has some trouble with the refrigerator. She always spends more than 4 hours trying to organize the refrigerator correctly. However, the food either spoils quickly or gets frozen. Also, she doesn't know how to store veggies and fruits in the right way, so it ruins, and madam has to thraw it. That's why her madam is constantly frustrated with her because there is a lot of wasted food. Sometimes the madam goes out and Felvei must cook, so she gets confused about what recipe she can cook with the ingredients that are available in the refrigerator because she usually cooks simple dishes only.

Sara

"you get what you give ,so always work hard ! "

Age: **21**
Work: **Student**
martial Status :**Single**
Location: **Riyadh**

Goals
- Remind her to not forget the stored food in her fridge.
- a customized shopping list based on what she needs to buy.
- Keep her aware of the nutritional values of the food she consumes.

Frustrations
- food gets expired without her knowing which gets her upset.
- The food she usually eats cause her stomachache and vitamins deficiency.
- due to her studies, she does not have the time to go shopping multiple times.

Motivation
Incentive
Fear
Growth
Power

Bio
Sara is a student majoring in IT she lives alone in the university dorms which puts her with more responsibilities to take care of, she has to buy and cook the food herself she also has to look up recipes and make a shopping list, etc. that sometimes makes her anxious and stressed. sometimes when she notices the amount of food that has expired she gets really upset. due to her busy schedule, she would rather order food to save her time. but now she suffers some health problems because ordered food isn't as healthy as homemade food.

6.User story:

As with the information we have in the interviews and questionnaire, we have identified two specific groups of individuals: the first group includes people who do not have sufficient knowledge of the proper use of the refrigerator, and the second group consists of busy individuals who struggle to make time to manage their refrigerator needs. As We aspire to solve many of the problems they face through our project.

| Summary	Details	Priority
1-As a student, I want a prepared shopping list that includes the food I'm running out of, so that I just have to go and buy it which saves my time.	• Click on the basket icon on the home page. • A list of your purchases will appear. Click on Add Items if you want. • You type the name of the item you want, then click Add, added successfully. • You can also order products and receive them at your location.	Medium
2-As a student, I want my fridge to notify me when my food is about to expire so that I can consume it or take care of it.	• Click on the notification's icon on the home page. • You will see two options: Choose expiration dates. • A list of expiration dates for products that will expire soon will appear. • If you are interested, you can view the rest of the expiration dates.	High
3-As a student I want my fridge to notify me when quantities are about to run out so I can basically add it to the shopping list.	• Click on the notification's icon on the home page. • You will see two options: Choose items quantity. • A list of products that are sold out and will be sold out soon will appear. • You can add these products to the cart.	High
4-As a student, I want to be able to see everything inside my fridge so I don't forget about it.	• Click on the What's Inside option from the home page. • You will be able to see all the products inside your refrigerator.	High
5- As a student, I want to know the nutritional values of all the food inside the refrigerator so that I can meet my daily requirements.	• Click on the Nutritional Values option from the home page. • Choose the item you want to know its nutritional value. • You will be shown a comprehensive summary of the nutritional values of the item you have chosen.	Medium
6-As a housekeeper, I want to learn the correct methods of preserving vegetables and fruits, so it last as long as possible.	• Click on the storing food option from the home page. • Enter the name of the item you want in the search box. • You will be shown the appropriate storage location for this item based on the appropriate level of cooling for it. • If you are interested, you can also get advice on the appropriate storage method that will make the item last as long as possible.	High
7-As a housekeeper, I want to see recipes recommendations, so I know what to cook for Madam's family.	• Click on the Recipes option from the home page. • You will see the following options: breakfast, lunch, dinner or dessert. • After choosing the desired meal, you will be shown the ingredients available to make the meal. • You will be shown a recipe for the chosen meal based on the ingredients in your refrigerator.	Low

7.Scetch:

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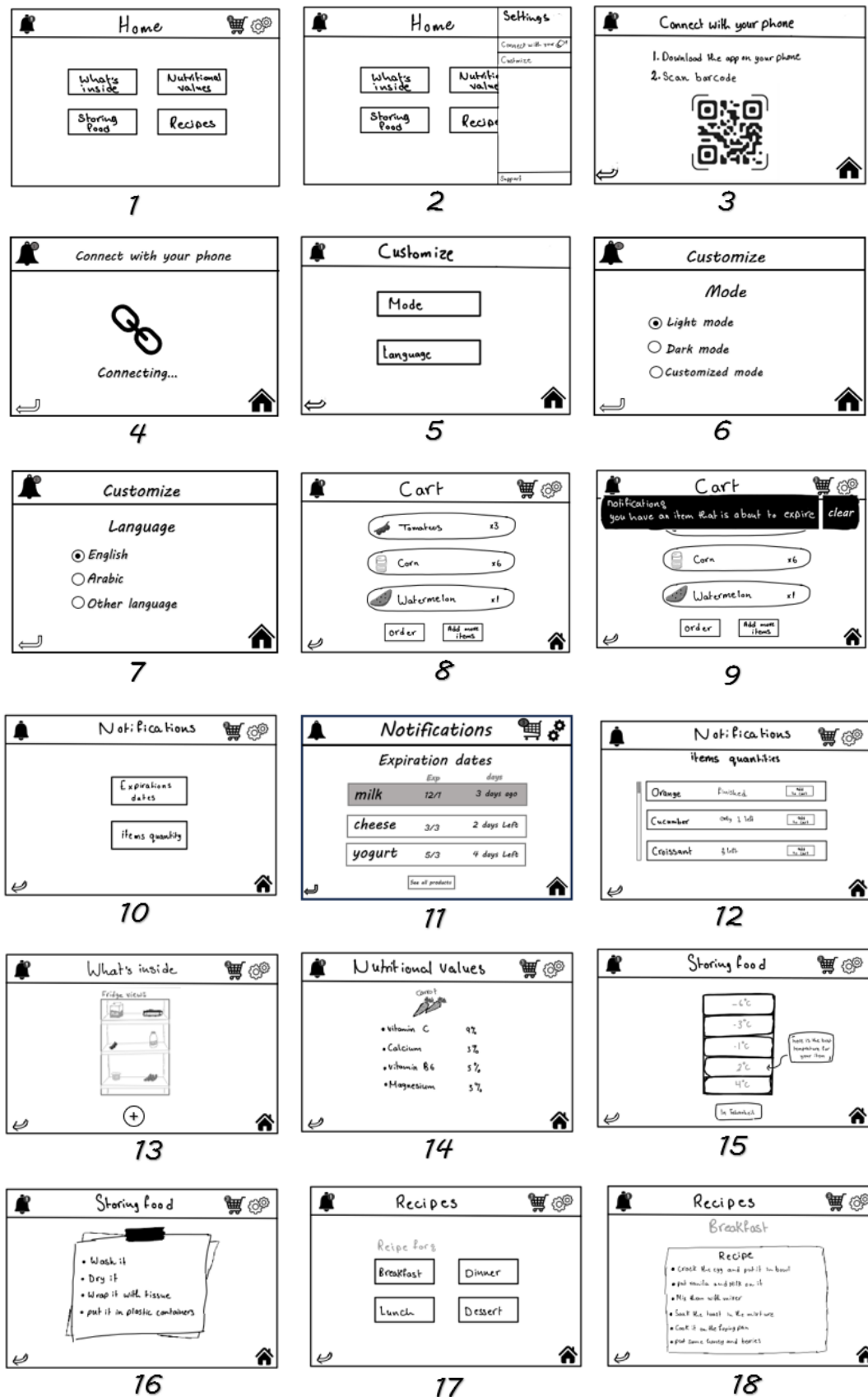
*We have modified the appearance of the notifications in the photo 9 because this design is more familiar to the user.
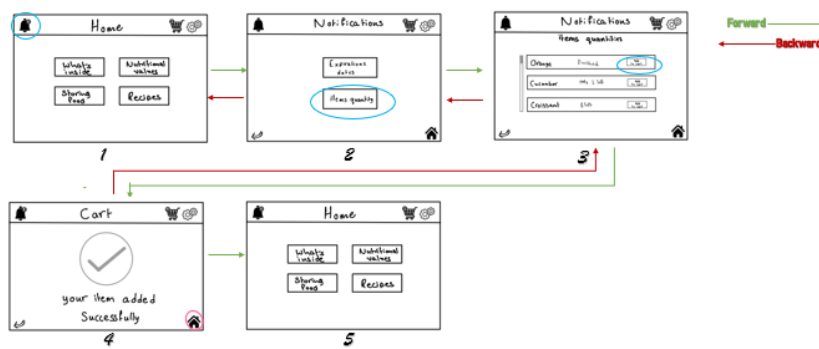
8.User Flow:

1-As a student, I want a prepared shopping list that includes the food I'm running out of, so that I just have to go and buy it which saves my time.
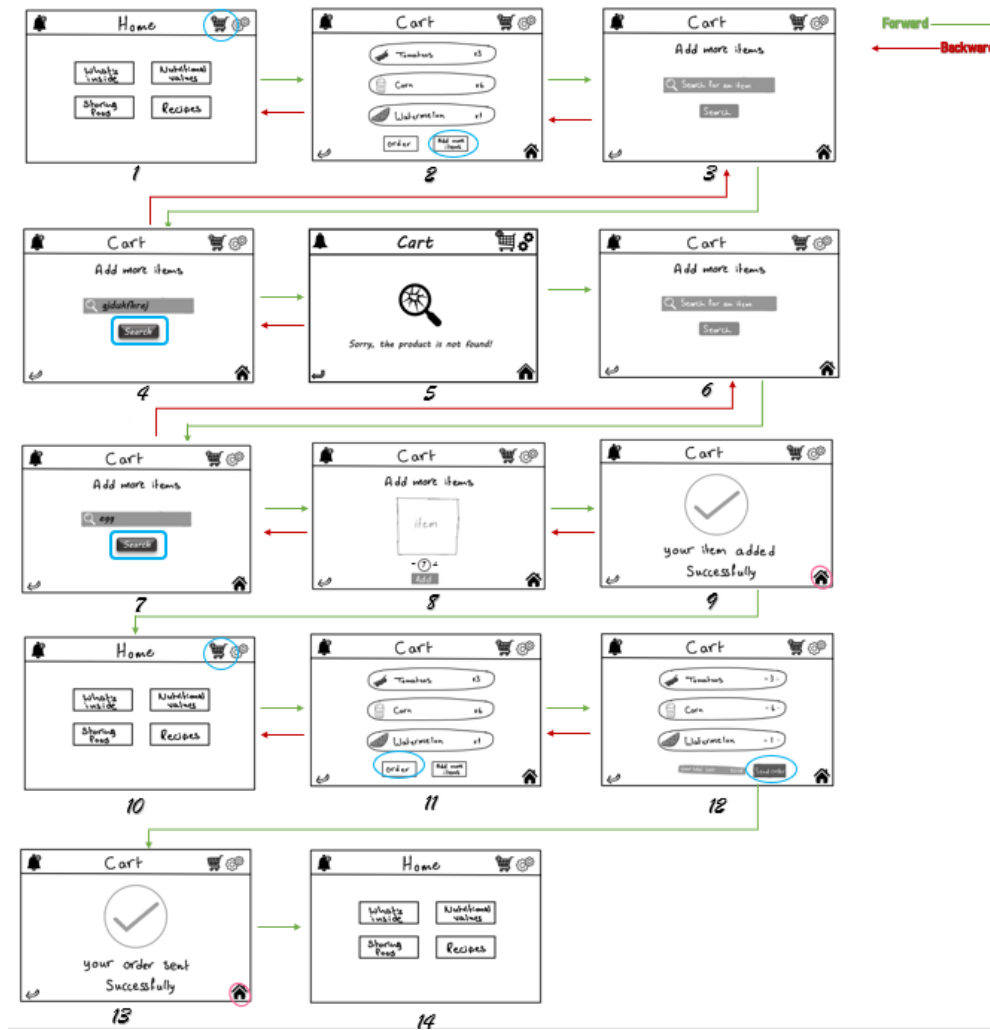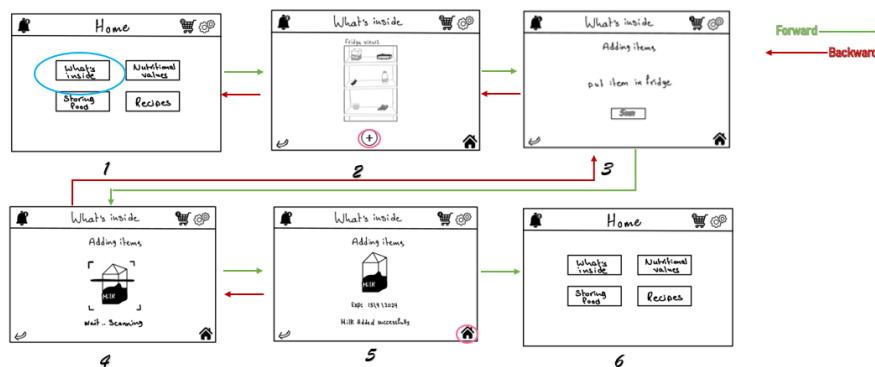

2-As a student, I want my fridge to notify me when my food is about to expire so that I can consume it or take care of it.
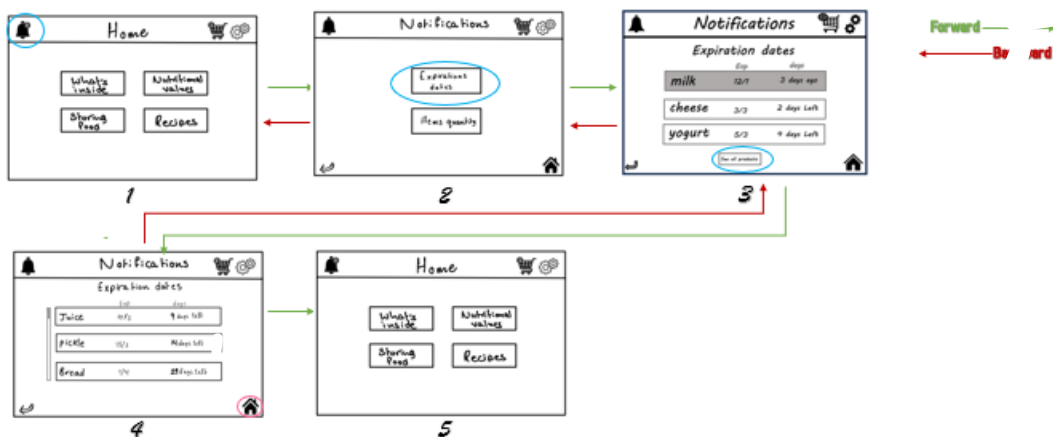
3-As a student I want my fridge to notify me when quantities are about to run out so I can basically add it to the shopping list.

4-As a student, I want to be able to see everything inside my fridge so I don't forget about it.

 *We have modified this user flow because we did not explain the method of adding products inside the refrigerator previously and to make the process of adding items into the fridge more clear for the user we decide to add this part.

5- As a student, I want to know the nutritional values of all the food inside the refrigerator so that I can meet my daily requirements.
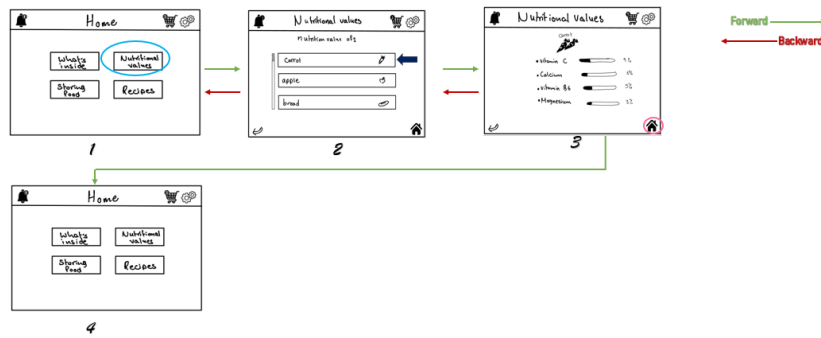

   *We have modified this user flow photo no 2 because the scroll bar shows the products in a neater and it's easier for the user to deal with, photo no 3 because this method shows the information using shapes, so it is clearer to the user and will sticks in his mind

6-As a housekeeper, I want to learn the correct methods of preserving vegetables and fruits, so it last as long as possible.
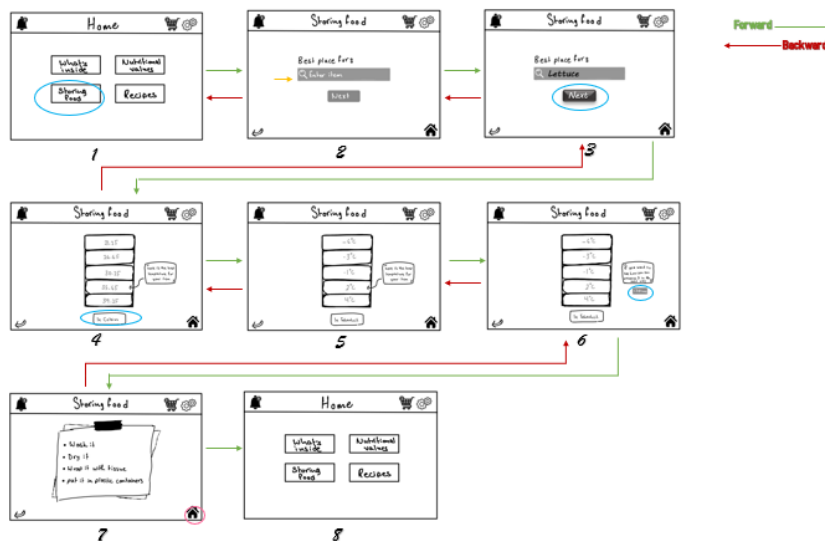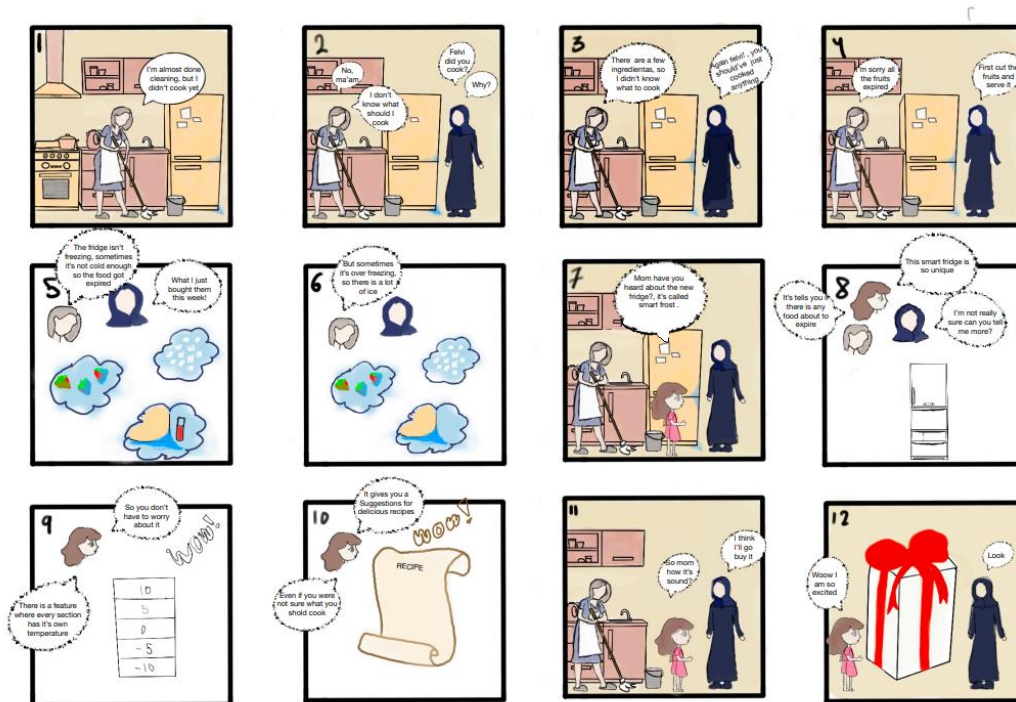
7-As a housekeeper, I want to see recipes recommendations, so I know what to cook for Madam's family.
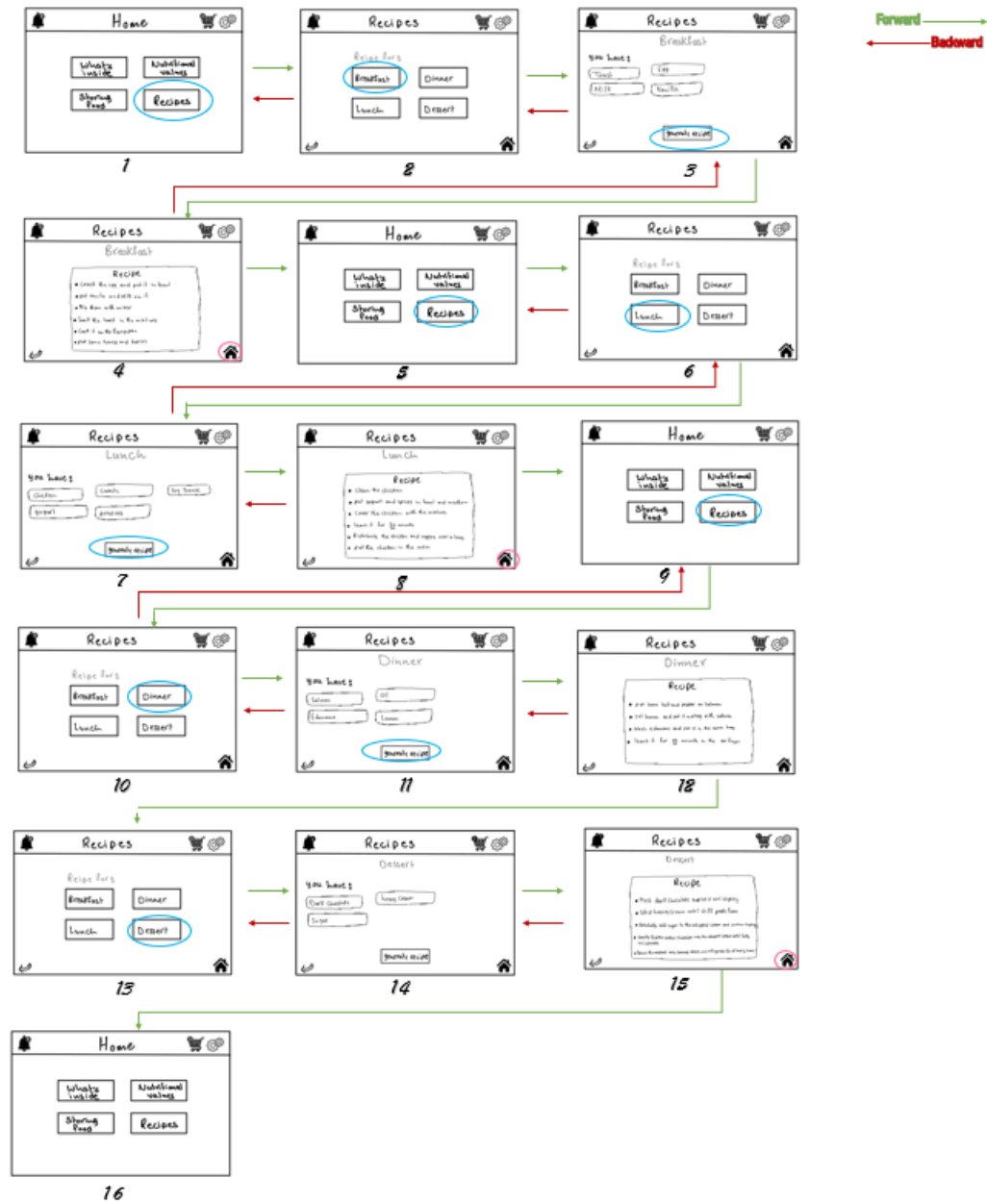
9. Story Board:

Story board 1:

Story board 2:

10. Design Rules:

Learnability Principles

Rule	The principle	Sketch No/User Flow No	Application (or not) of rule with explanation
1	Predictability	Sketch 17,18 UF7 Sketch 8 UF1 Sketch 10,11,12 UF2	• When the user wants a recommendation for a recipe, he predict that all the ingredients of the recipe are in his fridge. • The user predicts when he clicks on the "cart icon" will go to the list of what he needs to purchase. • the user can predict that when he "clicks on the "bell icon " the notification will appear.
2	Operation visibility	UF1	• the user can't click on the "search icon "until he searches on something.
3	Synthesizability	UF1 Sketch 2,5,6	• When the user successfully adds an item to the shopping cart, a confirmation message will appear immediately. • The user can change the "mode" and see the change on the interface immediately.
4	Familiarity	All Sketch All UF	• The shopping cart icon, home page icon, and arrow icon to go back are familiar to the user.
5	Generalizability	All Sketch All UF	• By using the "left arrow "to go back and the "Home icon" to go to the home page like other applications.
6	Consistency	All Sketch All UF	• There is consistency in icon layout as having "cart", "bell ", and" Settings" as other applications.

Flexibility Principles

Rule	The principle	Sketch No/User Flow No	Application (or not) of rule with explanation
7	Dialog initiative	Sketch 8,9,10,14,15,16,17,18 UF 1,2,3	• We applied "user per-emptive" by allowing the user to do any task that is available as "adding product to cart or seeing the nutritional values of an item.
8	Multi-threading	Sketch 9	• For example, while the user adds items to the cart, he reserves notification from the application.
9	Task Migratability	Sketch 17,18 UF7	• When the user wants a recipe recommendation the system takes over the lead and suggests some recipes based on the ingredients in the refrigerator and he can choose what recipes he wants.
10	Substitutivity	Sketch 15 UF6	• The user can represent the Temperature in the fridge as " Fahrenheit" or " Celsius".
11	Customizability	Sketch 2,5,6,7	• The user can customize the interface mode and language.

Rule	The principle		Sketch No/User Flow No	Application (or not) of rule with explanation
12	Observability	Browsability	All Sketch All UF	• The user can see the number of notifications on the interface.
		Defaults	Sketch 10,11 UF 2 Sketch 2,5,6 Sketch 2,5,7	• by default, the system shows how many days remain before the expiration day of the product. • application is in light mode by default. • The application is by default in the English Language.
		Reachability	All Sketch All UF	• Users can go back and forth between pages by arrows or go to the home page with the "home icon".
		Persistence	All Sketch UF2	• We use Visual communication as when a product expires, a notification comes to the user, and a red bubble is placed on top the "bell icon".
13	Recoverability		UF 1	• if the user enters something wrong, an appropriate message will appear to him.
14	Responsiveness		Sketch 14 UF5 Sketch 8 UF1	• When the user clicks on the "nutritional values " and then picks an item the nutritional values of that item will appear. • When you add an item to the cart the item will appear immediately with the cart list.
15	Task conformance		All sketch All UF	• The user can understand and reach his goals, so the application supports user needs.

11. Prototype:

We have implemented these features in our UX design:

1) **Connect your phone:** Through this feature, the user can connect his mobile phone to the refrigerator and download the Smart Frost application on his mobile phone so that he can benefit from our features from anywhere.
2) **Customization:** A feature that allows the user to change the language between Arabic and English and the application mode between light and dark.
3) **Support:** If the user encounters any problems or has a question, he can contact support via email or phone.
4) **Shopping list:** By adding items to the cart the user can create a shopping list that he can refer to at any time and help him remember what he needs when he goes shopping.
5) **Make order:** If the user does not want to go shopping for any reason, he can place an order through our application.
6) **Expiration date notifications:** A feature that sends notifications to the user when the expiration date of products approaches, and he can also check the expiration dates of all products in the fridge.
7) **Items quantity notifications:** A feature that sends notifications to the user when a product is about to run out, and he can add it immediately to the cart.
8) **What's inside:** Through this feature, the user can view everything inside his refrigerator, and when he wants to add products, the refrigerator scans the product and then adds it to the What's inside section.
9) **Nutritional values:** This feature enables the user to complete his daily needs easily, as it displays the nutritional values of all products inside the refrigerator.
10) **Storing food:** With this feature, the user's fruits and vegetables will not spoil quickly, as it tells the user the appropriate temperature to store the fruits and vegetables he wants and accordingly determines the appropriate place to store it inside the refrigerator. It also provides the user with the correct way to preserve it for the longest period.
11) **Recipes:** The user will no longer wonder what to cook, this feature provides the user with recipes for the three meals and dessert based on the ingredients available in the refrigerator.

We used **Figma** to build the prototype.

YouTube Video: https://youtu.be/KTq1Hl-8vZY?si=QyH3CYRzMJD1mH5B

Prototype Design: https://www.figma.com/proto/JhFdEEXJz3aXXTGMH0PjPb/SmartFrost-(phone)?type=design&node-id=1-2&t=tlN4lhtl9r34HLam-0&scaling=scale-down&page-id=0%3A1&starting-point-node-id=1%3A2