SmartFridgeX - SFXfridge Software

EasyLiving
London

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Summary

This is a Software Requirements Document, a proposal to the marketing team of EasyLiving by Dr Georgios Karanasios, from the software development team.

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Distribution

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Residential, Commercial & Yacht Solutions

Contents

1 Preface

1.1 Purpose and scope of the document (what it is and what is NOT)

This is a software requirements document for the SmartFridgeX software. This SRD mentions numerous implementation constraints to analyze the functional and non-functional necessities described within the initial statement of requirements by the marketing department of EasyLiving client.

The document does not define the implementation of the functionality but what the system shall do.
The behavior of the system is based on various models that give more accurate and trusted details to system developers.

1.2 Intended audience and Reading Suggestions

The intended audience is the manager marketing team, the Managing director of EasyLiving, the system analysts and architects from the Development Team.

Not all of the sections are intended to the development team. This is clearly stated in the document.

1.3 History of the document

This is a new document, v. 1.0.

2 Introduction

EasyLiving introduced the SmartFridgeX software, a pilot project created to protect and improve the costumers' health by developing a software to control better the condition of their fridge and to suggest cheaper and more quality foods. All the reports will be used to inform a future software development based on costumer's food inventory and internet shopping.

This prototype does not intend to promote specific supermarkets, but rather as a proof of concept to make the life of the costumer easier using our technology.

The system shall allow keeping track of foods and their maximum storage times by using a barcode tagging system which is connected with the deployed system of the fridge (SFXfridge) or the mobile app (SFXapp). All sorts of reports can be generated via SFXfridge or SFXapp. The synchronization of the data will be through the EasyLiving's cloud.

3 Glossary

Actor	A human or an external system interacting with SmartFridgeX, e.g. the user of the barcode scanner.
SmartFridgeX	The SmartFridgeX Software System
Barcode scanner	A tagging system device which helps the users to add, remove and track their foods combined with SFXapp or SFXfridge.
SFX app	A subsystem for mobiles which controls temperature details, tracks stock items and low stock threshold details as they are stored on the database.
SFXfridge	A subsystem for status messages, shopping lists, statistics and reports which display on an interactive LCD touch screen and inspected via the LCD panel.
Use case	A basic interaction of a system with an actor. (see above)

4 User requirements

4.1 System architecture - subsystems and their interfaces

SmartFridgeX includes two explicit subsystems which are already identified. The first one runs on the mobile phone and collects data (SFX app). The second runs on the fridge and generates reports (SFXfridge).

As our initial proposal, for the storage and synchronization of all information with these devices, we have created an interaction between our system and an external server, the EasyLiving cloud. Thanks to this interaction, the data from the cloud are connected directly with the SFX app's and SFXfridge's panel.

4.2 User requirements using Volere templates

Requirement ID: 1	**Requirement Type:** FR	**Event/Use Case #1**
Description: The system **shall** allow the user to scan the product's barcode.		
Rationale: To allow users to add their items to the fridge.		
Source: The initial statement of requirements.		
Fit Criteria: The fridge has an embedded barcode scanner inside from the door opening. When the user scans a product using the barcode tagging system, the fridge must keep the track and the maximum storage time of this product.		
Customer Satisfaction: 5	**Customer Dissatisfaction:** 5	
Priority: An essential requirement.	**Conflicts:** None	
Supporting Material: None	Volere Source: Atlantic Systems Guild	
History: A new requirement.		

Requirement ID: 2	**Requirement Type:** NFR (privacy)	**Event/Use Case #2**
Description: The SFXfridge system **should** only allow an authorized family member to have access to the fridge.		
Rationale: If the fridge is accessible to others there will be a great risk of abuse of the family's personal data. Note that this version of SFXfridge is just a prototype.		
Source: The initial statement of requirements.		
Fit Criteria: Testing the SFXfridge system on the LCD screen such that a family member successfully log into the smart fridge family app group (only up to 8 members can be added). We need to be sure that all members of the family have access to each other. Additionally, we have to test if the account, that has been deleted from the system, still has access to the group's contents. We must also try to access the data directly from the mobile's system (SmartFridgeX app), bypassing the SFXfridge. Note, all the above must be done with all 8 accounts (assuming that the family consists of 8 members max).		
Customer Satisfaction: 4	**Customer Dissatisfaction:** 3	
Priority: A non-essential requirement.	**Conflicts:** None	
Supporting Material: None	Volere Source: Atlantic Systems Guild	
History: A new requirement.		

5 System requirements

5.1 Purpose and scope of the system

This section refers more how the system works than in section 4 and the implementation of the SFXfridge system is the responsibility of the members of the intended audience. This section cannot be characterized useful for the marketing group because we use UML, which requires a specific knowledge and experience. However, our aim is to inspire them to review and comment, if it is possible.

5.2 System models

5.2.1 UML use-case models

5.2.1.1 Use case diagram

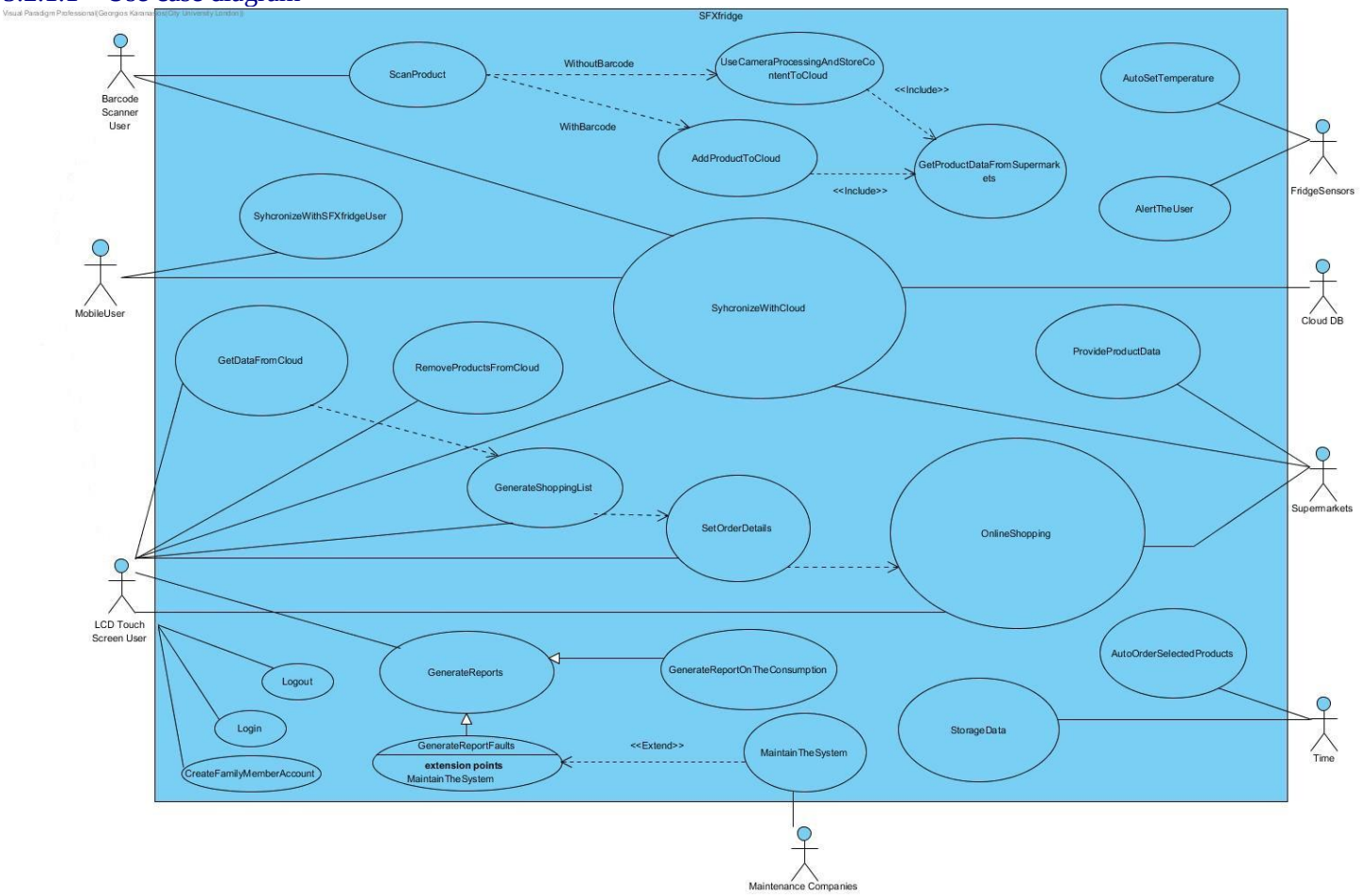

Table 1. Mapping between use case names and use case Ids.

Use case name	Use case ID	Specification provided
ScanProduct	1	No
UseCameraProcessingAndStoreContentToCloud	2	No
AddProductToCloud	3	No
GetProductDataFromSupermarkets	4	No
AutoSetTemperature	5	No
AlertTheUser	6	No
SyhcronizeWithSFXfridgeUser	7	No
SynchroniseWithCloud	8	No
GetDataFromCloud	9	No
RemoveDataFromCloud	10	No
GenerateShoppingList	11	No
SetOrderDetails	12	No
OnlineShopping	13	No
ProvideProductData	14	No
GenerateReports	15	No
GenerateReportFaults	16	No
MaintainTheSystem	17	No
GenerateReportOnTheConsumption	18	No
StoreData	19	No
AutoOrderSelectedProducts	20	No
Login	21	No
Logout	22	No
CreateFamilyMemberAccount	23	No

5.2.1.2 Use cases descriptions

This section is provided to give an overview of what each use case represents. This is to be kept in the document until the use cases specifications are provided.

1. ScanProduct: User scans the barcode of the product using a barcode scanner.
2. UseCameraProcessingAndStoreContentToCloud: If the product does not have a barcode, user can use the camera which is inside the fridge in order to add its content to the cloud server.
3. AddProductToCloud: When the user scans the product, the data of this product added to the cloud server.
4. GetProductDataFromSupermarkets: The product's data is given by the Supermarkets (food companies).
5. AutoSetTemperature: Fridge sensor and specifically the fridge monitors maintain the correct fridge temperature automatically.
6. AlertTheUser: Fridge sensor and specifically the alarm of the fridge, notify the user if the door is open for a long time, or if there is a fault on the system, or if a product is outdated.
7. SyhcronizeWithSFXfridgeUser: the mobile user can always contact the SFXfridge user's system when requested.
8. SynchroniseWithCloud: provides means for an actor to synchronize the data of a specific account with the EasyLivig cloud server.
9. GetDataFromCloud: LCD touch screen user can have access to every data of his stored products which are saved on the cloud server.
10. RemoveDataFromCloud: The users can manually remove products from the database via the LCD panel, stating how much will be left.
11. GenerateShoppingList: The user can organize his shopping list via the LCD touch screen.
12. SetOrderDetails: LCD touch screen user can order products online by setting up his order details.
13. OnlineShopping: Based on the order details the LCD touch screen user can shop from the supermarket online.
14. ProvideProductData: Supermarkets provides the data of the product to the cloud.
15. GenerateReports: triggered by a LCD touch screen user, supports the generation of reports according to the user choice.
16. GenerateReportFaults: In case of any fault, the user is informed via the LCD screen and has the option to generate a report in order to call-in a maintenance engineer.
17. MaintainTheSystem: When the LCD touch screen user calls the maintenance, the maintenance companies fix the issue.
18. GenerateReportOnTheConsumption: LCD touch screen user can produce statistics and reports on the consumption of various items.
19. StoreData: every minute data of the current type of product is stored on the SFXfridge system.
20. AutoOrderSelectedProdcuts: The SmartFridgeX has the option to set the automatic reordering of selected items via the SFXfridge system.
21. Login: allows the LCD touch screen user to log in securely.
22. Logout: allows the LCD touch screen user to log out.
23. CreateFamilyMeberAccount: allows LCD touch screen user to create a member account linked to the fridge family app group.

5.2.1.3 Use cases specifications

To be provided in the near future.

6 System evolution

In the future, a similar product will be built based on the SFXfridge. But in this case, we will emphasize to improve even more the organization and management of the stored food.
It is important to note that various parts of the system will not have such big changes that will affect their functionality as summarized below, in 6.1 and 6.2.

Further expected evolutions are also listed below.

6.1 Voice users' interfaces (VUIs)

The user will have the opportunity to interact with the system through voice or speech commands.

6.2 Data Stored

The data storage will have a semantic data replication.

6.3 Web browser

In the near future, SFXfridge software will have its own Web browser and the user will surf on the Internet via the LCD in order to find food recipes and video with cooking classes.

6.4 Synchronization Options

In the future versions, the synchronization policy will be part of the SFXfridge software. That means, there will be a new hosting items tracking device for the client's shopping data list, so with this aspect will not need to be dealt with by the SFXfridge software itself.

6.5 Power Freeze

Sometimes, it can take a long time for the food to cool properly. The SFXfridge software will offer a special mode that speeds the chilling process. These models ramp up the fridge temporarily, sharply reducing the time it takes to bring your food down to a food-safe temperature.

6.5 Body Weight analyzer

A digital hologram of the user will be presented on the LCD screen which will be fat based on the calories of the foods which are in the smart fridge. At the same time, SFXfridge will warn the user and it will suggest fitness exercises and tips for a proper and healthier diet.

7 Appendices

7.1 Initial Statement of requirements by the client

SFXfridge

Nowadays, smart fridges are getting more and more as the first choice for the costumer's kitchen, replacing the simple fridges. Many stores sell this type of fridges all over the world with some small factional changes.

Your company, EasyLiving, has the specialty to create new better prototypes and promote them in areas that are explored, and there are companies that want to buy them according to some very profitable terms.

EasyLving started this new project in order to explore the consumer's preferences for food while helping him to have a better management over what is inside in his fridge. EasyLiving recognizes that many people do not have the right information about the foods stored in their fridge, so most of their foods get spoiled before they are consumed. EasyLving believes that they can develop a specialized product that will prevent this kind of problems. They are calling it SFXfridge. The intention for this software idea is to be sold to companies that already manufacture high-tech fridges, so that it can be added to their pre-existing packages.

EasyLiving will have two teams working on this new endeavor. One team will develop a variant of the LCD screens, smart phones and controllers with a touch screen (the hardware). The other team will be developing the software for these devices. You are one of the members of the EasyLiving team that will be developing the software for SFXfridge. As a first aspect, EasyLiving have decided to change the review and adjust the shopping list, as a proof-of-concept. The only necessary change is to setup the voice commands in the user interface.

After an interview with the marketing team, the vision relating to the SFXfridge system is summarized as follows:

- The EasyLiving development team is required to produce a working prototype within 90 days.
- The fridge monitors the outside temperature and adjusts the air flow to maintain the correct fridge temperature.
- An interactive LCD touch screen is provided on the front of the fridge for status messages and shopping lists.
- The fridge has an embedded barcode scanner on the main body, mid-height, just inside from the door opening.
- The fridge will be connected to the internet and mobile app (up to 8 members can be added to the smart fridge family app group).
- If the door has been open for more than 90 seconds, an alarm triggers to alert users.
- Users also scan the barcodes when removing items. The default is to assume that the whole package will be used. The users can manually override that via the LCD panel, stating how much will be left.
- Using a barcode tagging system, the fridge keeps track of foods and their maximum storage times, and informs the user via the LCD touch screen and the mobile app of any food that has been stored for too long.
- All information is stored on a dedicated database hosted on EasyLiving's cloud servers.
- As users are adding new items to the fridge, they scan their barcodes.
- EasyLiving's database is populated with barcodes, with respective food item description and recommended maximum storage times. This information is provided by the food companies.
- There is a wide-angle camera fixed inside the fridge to share live images of the contents inside the fridge on demand with members of the fridge family app group. Then users can cross check the actual contents with their shopping list.
- Sensors and fridge seals are monitored and in case of any fault, the user is informed via the LCD screen and via the mobile app, with an option to call in a maintenance engineer.
- The SFXfridge can use the inventory to determine when stocks of some items are getting low, and produce a shopping list to be sent to the user's favorite internet supermarket. The user can review and adjust the shopping list (using the LCD screen or the mobile app). The user can also decide whether (and when) to send the shopping list to the supermarket.
- The SmartFridgeX has the option to set the automatic reordering of selected items (via either subsystem)

- Online shopping only takes place if the users have set their supermarket preference, days and times preference for delivery slots, delivery address, client name and payment method. These actions need to be done via either the LCD screen or the SFXapp.

- Temperature control details, stock items to track and low stock threshold details are stored on the database and set via the mobile app (SFXapp).

- Users can produce statistics and reports on the consumption of various items in the stock. These reports can be requested/inspected via the LCD panel and the SFXapp.
  They include:
  o List of items in the fridge at any given time
  o Average frequency with which certain items are bought.
  o Amounts of a given item consumed in a week/month/year
  o All items and their corresponding amounts consumed in a week/month/year

- As the system can expose data via the internet, adequate security measures must be implemented to comply with UK and European Union laws, such as the upcoming EU General Data Protection Regulation (GDPR), see https://www.eugdpr.org/

- In the future full versions of the system, users will be able to sync their smart devices with more than one app installation, including smart tablets and watches. Yet, the biggest change will be that of the SmartFridgeX being just another part of the Smart-Fridges' systems.

[1] In the fully developed product there will also be apps for other smart devices, such as for smart tables and smart watches.
[2] In the future, syncing will be done according to the set up in which the SFXfridge and SFXapp have.
[3] This is an assumption made for the prototype. Real products will handle releasing memory storage the same way they do with their corresponding food consumption data.

8 Index

Not provided in this version of the document.