System Requirements Specification
for
Food Magic

Jiangpei Chen, Zhixin Huang, Nontawat Janpongsri, Sandy Wu

April 18th, 2021

1. Introduction

1.1 System purpose

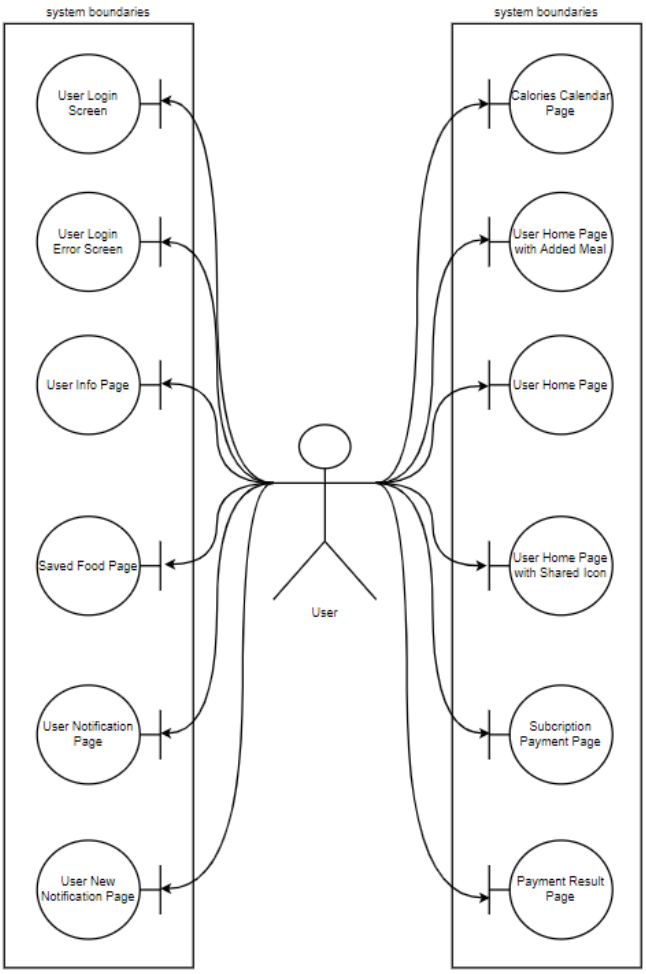
Digital Health Inc is a leading health care company providing personal health monitor devices and service. We had already had a significant share of the market for calculating daily energy expenditure, but we have seen a potential gap in the market, which is energy intake functionality. So that we want to develop a system (app) to help tracking users' energy intake level with AI assistant techniques in order to increase accuracy and decrease complexity. Then combining with our daily energy expenditure service, we will have a full set of functionality of personal energy health monitoring.

1.2 System scope

The healthcare system under our development is called Food Magic. For our surveys in the market, there are many great systems (apps) that are well-designed for energy expenditure, which tracks the users' energy consumption accurately. But we did not see a well-designed system (app) that is easy to operate and tracks the users' energy intake. So we decided to develop an app that tracks the users' energy intake with the assistant from AI, to increase the accuracy of energy measurement and decrease the complexity of the operation. Our system is aiming to help the users to track their daily energy intake with the AI assistant. We are focusing to develop an easy-use, accurate application that can potentially have a 50% or more market share in health care applications.

1.3 System overview

1.3.1 System context



1.3.2 System functions

- The system shall run on IOS devices with versions higher than iOS 9.
- The system shall run on Android Device with versions higher than Android 5.
- The system shall store data within Amazon Web Service.
- The system shall run on a device that equip with object capture devices.
- The system shall run on a device that connects with the internet.
- The system shall run on a device that screen size is bigger than 5 inches.

1.3.3 User characteristics

Users	User Group Number	Nature of Using	Characteristics
Developers	~15	Developing the app	The developers, under the direction of the project manager, will manage the development and testing of the product. Education level: High
Project Owner	1	Manage the development progress	The project owner will be responsible for overseeing that the project is on track and meeting milestones on time. The program manager will represent the users and manage the product backlog items. Education level: High
Product designers	~3	Manage UI and UX design	The designers will design the product to be as simple and user-friendly as possible to encourage users to invest into their diet log. Education level: High
Marketing Promoter	~2	Public Relation and Market Promotion	Marketing Promoter promotes our product, service, venue, to potential consumers or clients. Education level: Moderate
Dieticians	Undefine	Using the App to provide useful advice to patients	Dieticians will provide feedback and suggestions on how to improve our dietary suggestions. They will help us gather calorie counts for individual ingredients. Education level: High
Healthcare providers in diet and health clinics	Undefine	Using the app to provide useful advice to their customers	Employees in healthcare, a customer, will be using our app to provide reports to their patients and help them get on a diet plan easier. Education level: varies
Regular Individual Users	Undefine	Using app to monitor energy intake, energy	Users will interact with the system and use our service for dietary advice. Regular users might not be interested in energy

		consume and personal health status	intake details. They will use our system only for daily meals and calories records. Education level: varies
Pro Individual Users	Undefine	Using app to monitor energy intake, energy consume and personal health status	Users will interact with the system and use our service for dietary advice. Pro users might be more interested in energy intake details such as sugar, minerals, vitamins consuming amount. Education level: varies

2. Reference

[1] "Core System Requirements Specification (SyRS)" us department of transportation, [Online]. Available: https://www.its.dot.gov/meetings/pdf/CoreSystem_SE_SyRS_RevA%20(2011-06-13).pdf [Accessed 18 April 2021].

3. System Requirements

3.1 Functional requirements

3.1.1 User Registration and Log-in

No.	Function requirements
1	The system shall send user entered sign-up information to AWS database.
2	The system shall fetch the log-in verification result from AWS database.
3	The system shall display the error page when the user entered information does not match with user pre-stored information

3.1.2 User Personal Information

No.	Function requirements
1	The system shall update the new user information in the AWS database.
2	The system shall delete the deleted user information in AWS database.

3.1.3 User Saved Food

No.	Function requirements
1	The system shall send the user added food (user would like this food to be saved) information to AWS database to be stored.
2	The system shall updated the new food information in AWS database
3	The system shall delete the deleted food information in AWS database.

3.1.4 Calendar Information

No.	Function requirements
1	The system shall fetch the calendar information from AWS database.

3.1.5 Application Notification

No.	Function requirements
1	The system shall fetch the notification information from AWS database.
2	The system shall delete the notification record from the AWS database after the user deletes notification.

3.1.6 AI Food Detection

No.	Function requirements
1	The system shall detect user uploaded food through the AI food detector API.
2	The system shall detect user uploaded food's dimension through AI dimension API.

3.1.7 User Meal Information

No.	Function requirements
1	The system shall send the user added meal into the AWS database to be saved.
2	The system shall fetch the existing meal information from the AWS database.

3.1.8 User Meal Share

No.	Function requirements
1	The system shall communicate with a third-party platform API to let the user share the meal.

3.1.9 User Payment

No.	Function requirements
1	The system shall communicate with the payment company to process payment.
2	The system shall send the user payment result to the AWS database in order to save the user subscription record.
3	The system shall fetch the user subscription information to display user subscription status.

3.2 Usability requirements

3.2.1 Measurable effectiveness

- The system shall support 2 payment methods in the market.
- The system shall support 100% of the email address to let users register their account.
- The system shall allow the user to share their meal to 6 social media platforms.

3.2.2 Efficiency

- The system shall save the user account and password within 1ms.
- The system shall verify users' identity within 1ms.
- The system shall display the log-in error page within 50ms after the user failed to login to the system.
- The system shall update the user's personal information within 1ms.
- The system shall update the user saved food information within 1ms.
- The system shall load the calendar view within 50ms.
- The system shall load the notification page within 50ms.
- The system shall call the AI detection API within 10ms after the user uploaded the meal image.
- The system shall load the main meal page within 50ms.
- The system shall communicate with the third-party social media platform API within 20ms after the use shares the meal.
- The system shall communicate with the payment company within 20ms after the user processes the payment.
- The system shall load the payment result with 50ms.

3.2.3 Satisfaction

- The system shall be able to be reviewed by the users on Apple Store and Google Play Store.
- The system shall maintain a review rate higher than 4/5 in the Apple Store.
- The system shall maintain a review rate higher than 4/5 in the Google Play Store.
- The system shall provide a feedback survey to let users fill in.

3.2.4 Avoidance of Harm

- The system shall not expose user's data to external entities (outside of the application) without users consent.
- The system shall not allow users to enter illegal code to modify the database.
- The system shall communicate with the payment company using standard protocol to process payment.

3.3 Performance requirements

- The data shall be saved into Amazon Web Service within 20ms.
- The data save failure rate shall not be greater than 0.005%.
- The data fetch process shall be finished under 20ms.
- The data fetch process failure rate shall not be greater than 0.005%
- The credit card payment service success rate shall be greater than 99.95%.
- The recovery password process failure rate shall not be greater than 0.05%.

3.4 Interface requirements

Interface	Interdependencies	Requirements
Database	SQL standards in ISO/IEC CD 9075-1	The AWS database shall interface with the system to select, insert, update, delete the record.
Payment	PCI Security Standard	The payment interface for each payment company shall interface with the system to process the subscription payment.
Git	HTTP, Secure Shell	The Git shall interface with the system for version control and to update.
AWS	AWS Documentation	The AWS service shall interface with the system to serve the main application to users.

3.5 System operations

3.5.1 Human system integration requirements

- The security implementation for the system to access the AWS database.
- The security implementation regarding safety concerns for users' private/sensitive information.
- The setup for AWS database schema, tables, and relationship.
- The accuracy for the system to calculate the total amount of calories.

3.5.2 Maintainability requirements

- The system's Mean Time To Repair shall not exceed 2 hours.
- The system shall be available in normal operation state 99.5% of the time.
- The system's Mean Numbers of Developers To Repair shall not exceed 2 people.

- The system's Mean Cost of Fixing Failures shall not exceed 40 dollars per hour per person.

3.5.3 Reliability requirements

- The system's Mean Time Between Failures shall be greater than 2000 hours, which are 83.3 days.

3.5.4 Other quality requirements

- The system shall be capable of 100% of the smartphones on the market.

3.6 System modes and states

The system shall work in Basic mode and Pro mode.

- Basic Mode
    - Basic mode shall provide the nutrition name to the users.
    - Basic mode shall allow users to manually input ingredients.
    - Basic mode shall track users' food intake information for the current date.
    - Basic mode shall allow users to manually input the weight of the food and calculate the total amount of calories.
    - Basic mode shall allow users to store their data on their own devices.

- Pro Mode
    - Pro mode shall provide the nutrition name, among, and recommendations to the users.
    - Pro mode shall use the AI engine to identify ingredients automatically from the picture.
    - Pro mode shall track all the information that the users have uploaded.
    - Pro mode shall use the AI engine to measure the weight of the food automatically from the picture and calculate the total amount of calories.
    - Pro mode shall allow users to backup and restore their data to AWS.

3.7 Physical characteristics

- Physical requirements
    - The system shall be installed on iPhone 7 or newer model with 500MB of storage or more and running iOS 9 or newer version, and Android with 4GB of memory and 500 MB of storage or more and running Android 5 or newer version.
- Adaptability requirements
    - The system shall work on future hardware and software.

3.8 Environmental conditions

- The system shall take pictures when the light Illuminance is greater than 200 lux
- The system shall work in any other environmental conditions as long as the phone can be powered on.

3.9 System security requirements

- The system shall show the users' data after they logged in with their password.
- The system shall allow users to restore their data if they accidentally delete it.
- The system shall encrypt the users' data and save them on the users' own phones.
- The system shall backup users' data on AWS.
- The system shall restore users' data from AWS.
- The system shall prevent anyone else except the users from accessing their data.
- The system shall prevent attacks from hackers.
- The system shall encrypt users' payment information.

3.10 Information management requirements

- The system shall receive username and password for logging in.
- The system shall receive username, email, password, name, age, gender, weight and height for signing up.
- The system shall receive nutrition information, ingredients and weight manually inputted by users.
- The system shall receive pictures from users and use the AI engine to identify the nutrition information and weight of food from the picture for pro users.
- The system shall receive users' payment method, card number, name, CVR, expiration date and billing address for subscription payment.
- The system shall receive users' saved food.
- The system shall store users' data on their own devices.
- The system shall backup users' data on AWS for pro users.
- The system shall allow users to restore their data.
- The system shall calculate the total calories and nutrition in a day.
- The system shall share users' food pictures, calories and nutrition when the users click the share button.

3.11 Policy and regulation requirements

- The system shall support different payment methods.

- The system shall allow users to request refund within 7 days after the payment if they are not satisfied with the pro features.
- The system shall support English, French, Chinese and Spanish.
- The system shall prevent anyone else except the users from accessing their data.

3.12 System life cycle sustainment requirements

- The system shall receive reviews from Google Play Store and Apple App Store.
- The system shall use AWS for cloud service.
- The system shall have a ten-people support team to help users with any questions.

3.13 Packaging, handling, shipping and transportation requirements

- The system shall be released through Google Play Store and Apple App Store.

4. Verification

4.1 Functional requirement Verification:

4.1.1 User Registration and Log-in

No.	Main verification	Description
1	Add user registration to database	The system saves the registration information filled in by the user to the AWS database.
2	Username/Password validity	The system validates the log-in information entered by the user with the existing user data in the AWS database.
3	Username/Password validity	The system rejects the sign-in attempts where the username and password does not match with any of the existing user data in the AWS database.

4.1.2 User Personal Information

No.	Main verification	Description
1	Database Update	The system updates the edited user information in the AWS database.
2	Database Update	The system deletes the non-existing user from the AWS database.

4.1.3 User Saved Food

No.	Main verification	Description
1	Add food info to the database	The system saves the saved food information to the AWS database associated with the correct user.
2	Update food info to the database	The system updates the edited saved food information in the AWS database associated with the correct user.
3	Delete food info from the database	The system removes the deleted saved food information in the AWS database associated with the correct user.

4.1.4 Calendar Information

No.	Main verification	Description
1	Load information	The system fetches all the information required for the calendar page from the AWS database associated with the correct user.

4.1.5 Application Notification

No.	Main verification	Description
1	Load information	The system fetches all the information required for the notification page from the AWS database associated with the correct user.

2	Update the database	The system removes the deleted notification in the AWS database associated with the correct user.

4.1.6 AI Food Detection

No.	Main verification	Description
1	AI detection	The system discovers the food information from the uploaded picture by the user with the artificial intelligence integrated within the software.
2	AI detection	The system identifies the food dimension from the uploaded picture by the user with the AI dimension API.

4.1.7 User Meal Information

No.	Main verification	Description
1	Add meal info to the database	The system saves the uploaded meal information to the AWS database associated with the correct user.
2	Load information	The system fetches all the existing meal information for the current day from the AWS database associated with the correct user.

4.1.8 User Meal Share

No.	Main verification	Description
1	API integration	The system communicates with the third-party platform API to share the uploaded meal.

4.1.9 User Payment

No.	Main verification	Description
1	User Payment	The system communicates with the payment company API to proceed the payment.
2	Add payment record to database	The system saves the successful payment receipt to the AWS database associated with the correct user.
3	Load information	The system fetches the subscription information from the AWS database associated with the correct user.

4.2 Usability requirements verification

4.2.1 Measurable effectiveness

- The system can allow users to process their payment with Visa and MasterCard.
- The system can let users register with their email address for over 100% of the test runs.
- The system can let users share their meal to Messenger, Whatsapp, Instagram, Discord, Facebook and Twitter.

4.2.2 Efficiency

- The system can save the user account and password within 1ms for over 80% of the test runs.
- The system can verify users' identity within 1ms for over 80% of the test runs.
- The system can display the log-in error page within 50ms after the user failed to login to the system for over 80% of the test runs.
- The system can update the user's personal information within 1ms for over 80% of the test runs.
- The system can update the user's saved food information within 1ms for over 80% of the test runs.
- The system can load the calendar view within 50ms for over 80% of the test runs.
- The system can load the notification page within 50ms for over 80% of the test runs.
- The system can call the AI detection API within 10ms after the user uploaded the meal image for over 80% of the test runs.
- The system can load the main meal page within 50ms for over 80% of the test runs.
- The system can communicate with the third-party social media platform API within 20ms after the user shares the meal for over 80% of the test runs.

- The system can communicate with the payment company within 20ms after the user processes the payment for over 80% of the test runs.
- The system can load the payment result with 50ms for over 80% of the test runs.

4.2.3 Satisfaction

- User reviews are enabled in Apple Store and Google Play Store.
- The system can receive user reviews from the Apple Store.
- The system can receive user reviews from the Google Play Store.
- The system can receive user feedback survey results.

4.2.4 Avoidance of Harm

- Users data get encrypted before getting stored in the database.
- User inputs get sanitized before running on the system.
- Payments are processed under PCI Security Standard.

4.3 Performance requirements verification

- The latency for data transfer and data storage, between the system and AWS is under 20ms.
- The save failure rate for the system to save the data to the AWS database is not greater than 0.005%.
- The speed that the system fetches all the required information from the AWS database is under 20ms.
- The fetch failure rate for the system to fetch the data from the AWS database is not greater than 0.005%.
- The success rate for the system to verify and proceed the payment is greater than 99.95%.
- The failure rate to process the password recovery is under 0.05%.

4.4 System interface requirements verification

Interface	Interdependencies	Description
Database	SQL standards in ISO/IEC CD 9075-1	The AWS database can perform select, insert, update, delete operations with the system follows the SQL standards in ISO/IEC CD 9075-1

Payment	PCI Security Standard	The payment interface can process the payment with the system using PCI Security Standard.
Git	HTTP, Secure Shell	The Git can interface with the system for version control and to update.
AWS	AWS Documentation	The AWS service can interface with the system to serve the main application to users based on AWS Documentation.

4.5 System Operations verification

4.5.1 Human system integration requirements verification

- The system can provide secure access to the AWS database.
- The system encrypted users' private/sensitive information.
- The AWS database configuration is under the SQL standards in ISO/IEC CD 9075-1
- The system can accurately calculate the amount of calories in the food for over 80% of the test runs.

4.5.2 Maintainability Requirements

To verify the maintainability, it is not possible to test it by program since simulating the program is different than running the system on live. So we need to verify those maintainability requirements gradually when the system is running live.

- The system's Mean Time To Repair shall not exceed 2 hours.
- The system shall be available in normal operation state 99.5% of the time, when the system is running lively, it shall be available in normal operation 363.1 days in 1 year timeframe.
- The system's Mean Numbers of Developers To Repair shall not exceed 2 people.
- The system's Mean Cost of Fixing Failures shall not exceed 40 dollars per hour per person.

4.5.3 Reliability requirements Verification

- The system's Mean Time Between Failures shall be greater than 2000 hours, which are 83.3 days.

4.5.4 Other Quality requirements Verification

- The system can perform 100% of the functionality over 100% of the smartphone on the market after installation.

4.6 System modes and states

The users are in Basic mode at the beginning, after subscription, they can use the Pro mode.

- Basic Mode
    - Users can see the nutrition name in Basic mode.
    - Users can manually input ingredients in Basic mode.
    - Users can track their food intake information for the current date in Basic mode.
    - Users can manually input the weight of the food and the system can calculate the total amount of calories in Basic mode.
    - Users can store their data in their own device in Basic mode.

- Pro Mode
    - Users can see the nutrition name, among, and recommendations in Pro mode.
    - Users can upload pictures and the AI engine can identify ingredients automatically in Pro mode.
    - Users can track all the information in Pro mode.
    - Users can upload pictures and the AI engine can measure the weight of the food automatically and calculate the total amount of calories in Pro mode.
    - Users can backup and restore their data to AWS in Pro mode.

4.7 Physical characteristics

- Physical requirements
    - Users can use the system on iPhone 7 or newer model with 500MB of storage or more and running iOS 9 or newer version, and Android with 4GB of memory and 500 MB of storage or more and running Android 5 or newer version.

- Adaptability requirements
    - Users can use the system on future hardware and software.

4.8 Environmental conditions

- Users can take pictures when the light condition is good.
- Users can use the system in any other environmental conditions as long as their phone can be powered on.

4.9 System security requirements

- Users can access their data after they logged in with their password.
- Users can restore their data if they accidentally delete it.
- Users can see their data are saved on their own device and encrypted.
- Users can see their data backed up by the system automatically on AWS.
- Users can restore their data from AWS.
- No one can access users' data.
- Hackers cannot attack the system.
- Users' payment information is encrypted.

4.10 Information management requirements

- The system can receive username and password when they log in.
- The system can receive username, email, password, name, age, gender, weight and height when they sign up.
- The system can receive nutrition information, ingredients and weight when the users record their meal.
- The system can receive pictures from users and use the AI engine to identify the nutrition information and weight of food from the picture for pro users.
- The system can receive users' payment method, card number, name, CVC, expiration date and billing address when the users pay for the subscription.
- The system can receive users' saved food.
- The system can store users' data on their own devices.
- Pro Users can backup their data on AWS.
- Users can restore their data.
- The system can calculate the total calories and nutrition in a day.
- users can share their food picture, calories and nutrition when the users click the share button.

4.11 Policy and regulation requirements

- Users can choose different payment methods.
- Users can request a refund within 7 days after the payment if they are not satisfied with the pro features.
- Users can choose between English, French, Chinese and Spanish.
- No one else except the users can access users' data.

4.12 System life cycle sustainment requirements

- The system can receive reviews from Google Play Store and Apple App Store.
- The system will use AWS for cloud service.
- There is a ten-people support team to help users with any questions.

4.13 Packaging, handling, shipping and transportation requirements

- The system will be released through Google Play Store and Apple App Store.

5. Appendices

5.1 Assumptions and dependencies

The speed requirements for Android and iOS devices shall be based on the Samsung Galaxy S21 and iPhone 11 models, both 128GB.

The ingredient training images shall be taken from an iPhone 11.

5.2 Acronyms and abbreviations

AI	Artificial Intelligence
PCI	Payment Card Industry
AWS	Amazon Web Service
CVV	Card Verification Value