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A Development of a Mobile Application for Baby Food Journey

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Abstract: Baby Food Journey Mobile Application is aimed to provide user recipes and information that suits the baby. By using this mobile application, the user also can create a meal plan, recipe, and grocery list. This application was developed due to the problems faced by many new parents or guardians who were not able to figure out what to give to the baby when they started to wean and afterward. Plus, searching for the recipes and information about baby's food in a manual way such as reading a book and surfing the internet is time-consuming. Although there are existing applications that offer user to search baby recipes, it does not have a variety of functions. This matter lead to problems for working parents or guardians to search for recipes and create a meal plan for the baby at the same time. Thus, this application overcomes the limitations by offering multi-function features. The project was designed by using an object-oriented approach and prototype model as its methodology. Software that used in this project are Android Studio and Firebase Database. This application was developed to allow authorized users to access the features included in the system without any errors. With the application, it helped to ease the user to search recipes or information besides conveniently creating baby's meal plan. Baby Food Journey Mobile Application becomes an effective way for concerned guardians out there to provide nothing but the best food for the little ones.

Keywords: Baby Food, Baby Recipes, Meal Plan, Food Journey

1. Introduction

Introducing solid foods to your infant is an exciting milestone. However, searching on the recipes for baby's food and the information regarding it by using manual system such as reading books and surfing internet is quite inefficient and time consuming. Next, the problem may arises as user cannot figure out or plan for the baby's new meal. There was no variation or different nutrition for the baby's growth. Baby nutrition needs will change as he or she grows. Plus, it was hard for users to keep a recipe list along with grocery list in one application so it can be easily accessed.

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The objectives of this project were to design an application that enable user to decide a recipe to cook and get information about baby's food by using object oriented approach, to develop an application by using prototype model, and to test the functions of application if it suits with potential user properly. Modules included in this project are registration module, login module, meal plan module, recipe module, tips and tricks module, grocery module, setting module, and logout module.

At the end of the project, authorized users able to access the application. The application provided a list of recipes along with some tips and tricks for the guardians. This application reduced the user's searching time and gave the user a variety of recipes for the little ones. Besides, this application also allowed its user to be able to create a meal plan, a recipe list, and a grocery list. Lastly, the application service was running smoothly without any downtime error and all the recipes along with users' information were stored in an organized way.

This paper contains of five sections which are introduction, literature review, methodology, results and discussions, and conclusion. Section 1 explains on the introduction and background of the project. Section 2 explains on the literature review related to project study. Section 3 explains the methodology used in this project. Section 4 explains the results and discussion from the project. Finally, Section 5 explains on the conclusion of the project.

2. Literature Review

2.1 Background of Case Study

Baby-Led Weaning is a method of starting to give solid foods in a baby's diet. The process when a baby slowly getting used to eat family or adult foods and become less reliant on breast milk is defined as weaning [1].

Baby will start to wean by eating complimentary food. Complementary foods are food that can be added to breast milk or infant formula from age of six months to 24 months. It can be solid, semi-solid, or soft food that is suitable for babies such as starch, porridge, fruits and biscuits [2].

Some aspects were taken into consideration for the project's feature of meal planning. The meal plan feature built was aimed for the baby ages of 6 months to 1 year old. No gender distinction was applied to this project. The meal plans was based on the recipe list created by the user. The number of meals that can be added to the meal plan were up to 3 meals.

A mobile application can be defined as designed self-contained software for a mobile device and function to do a specific task for its user [3]. The platform for this project a smartphone application. An android operating system is a popular and user-friendly mobile platform. This open-source Linux kernel-based operating system has become a dominating mobile operating system due to its tremendous customization possibilities. [4].

2.2 Comparison of Existing Systems

The comparison of the three existing systems and developed system for the modules and functions is as shown in Table 1 below.

Table 1: The comparison of three existing system with the developed system

Module/Function	Baby Food Chart	Nuttri Baby Food	Baby Weaning & Recipes	Baby Food Journey
Registration	Available	Available	Available	Available
Login	Available	Available	Available	Available
Meal Plan	None	Available	Available	Available

Table 1 (continued)

Module/Function	Baby Food Chart	Nuttri Baby Food	Baby Weaning & Recipes	Baby Food Journey
Recipe	Available	Available	Available	Available
Tips	Available	None	Available	Available
Grocery	Available	None	None	Available
Setting	Available	Available	Available	Available
Logout	Available	Available	Available	Available

From the comparison in Table 1, the availability of the features for Baby Food Journey can enhance the functionality of the existing system. For example, grocery list features are not available in two of the existing systems. By adding the features, the user can get more advantages and can improve the efficiency of the current system.

3. Methodology/Framework

Every project must have methodology as it is going to help in standardize, structure and organize work method. For this project, Prototyping Model has been selected as the software development methodology. The prototyping model is a software development process that involves creating, testing, and reworking a prototype until it achieves the desired result. It is a collaborative effort between developers and users. [5].

This model was chosen because it is appropriate for the project since faults may be recognized early in the development process, and quick feedback from users can lead to improved solutions [6]. This method allow exploring ideas by developing a prototype based on initial requirements [5].

3.1 Phase 1: Requirement Gathering and Analysis

In this phase, the requirements of the system were defined in detail. All the related information was collected and analyzed such as project scope, problem statement, and objective.

3.2 Phase 2: Quick Design

The purpose of this phase is to provide user flows and system functions. In this phase, database, data dictionary, and user interface were designed by using appropriate tools. During this phase also, the software, hardware, and user requirements were studied to understand the system properly before starting building the prototype in the next phase.

Requirement analysis can be defined as the process of studying and analysing the user needs and objectives [7]. The aims of requirement analysis is to identify and define the boundaries of the new system [8]. Functional requirement is a functional behaviour that should be applied by a system or system components [9]. Table 2 shows the functional requirements of the developed system that were based on the modules in the project.

Table 2: The functional requirements of the developed system.

No.	Modules	Functionality
1	Registration	➢ The system should allow new user to register before log in
2	Log in	➢ The system should allow user to log in using registered id and password
3	Meal Plan	➢ The system should allow user to create meal plan for the baby up to 3 meal per day

4	Recipe	➢ The system should allow user to delete the created meal plan ➢ The system should allow user to view the recipes available ➢ The system should allow user to create a recipe list

Table 2 (continued)

No.	Modules	Functionality
5	Tips and Trick	➢ The system should allow user to view the information available
6	Grocery	➢ The system should allow user to create a grocery list
7	Setting	➢ The system should allow user to reset password ➢ The system should allow user to change email.
8	Logout	➢ The system should allow user to log out from the system.

Non-functional requirement is the properties or qualities that a system needed when executing one or more functions [9]. Table 3 shows the types of non-functional requirements of the developed system which are performance, security, operational, and compatibility.

Table 3: The non-functional requirements of the developed system

No.	Requirements	Descriptions
1	Performance	➢ The system should be able to response in less than 10 minutes when any interaction between user and system is made. ➢ The system should be able to record inputted data into the database in less than 2 seconds in heavy traffic. ➢ The system should be available for use of 24 hours per day, 365 days per year.
2	Security	➢ The system should be able accessed only by authorized user. ➢ The system should only provide suitable success to legitimate user.
3	Operational	➢ The system interface should be a user-friendly design that ease the user. ➢ The system interface should be easily maintained and updated.
4	Compatibility	➢ The system should be able to run on an android smartphone. ➢ The system should be able to run on android version 6.0 or later.

User requirements or user needs can be defined as the ability of user to perform activities by using the system [10]. Table 4 shows the user requirement of the developed system.

Table 4: User requirements of the developed system

No.	User Requirements
1.	User should be able to input username and password for registration and login purpose
2.	User should be able to create and delete meal plans
3.	User should be able to view the recipes and information available
4.	User should be able to add and delete recipe list
5.	User should be able to view tips and tricks available
6.	User should be able to create and delete grocery list
7.	User should be able to reset password and change their email
8.	User should be able to logout from the system

Unified Modeling Language (UML) is a common modeling tools for object oriented approach to visually describe the structure and behavior of the system [11]. Figure 1 shows the use case diagram

for Baby's Food Journey Mobile Application. From the use case, there are two actors who are the unregistered and registered user. Total use case in the figure are 16 use cases.

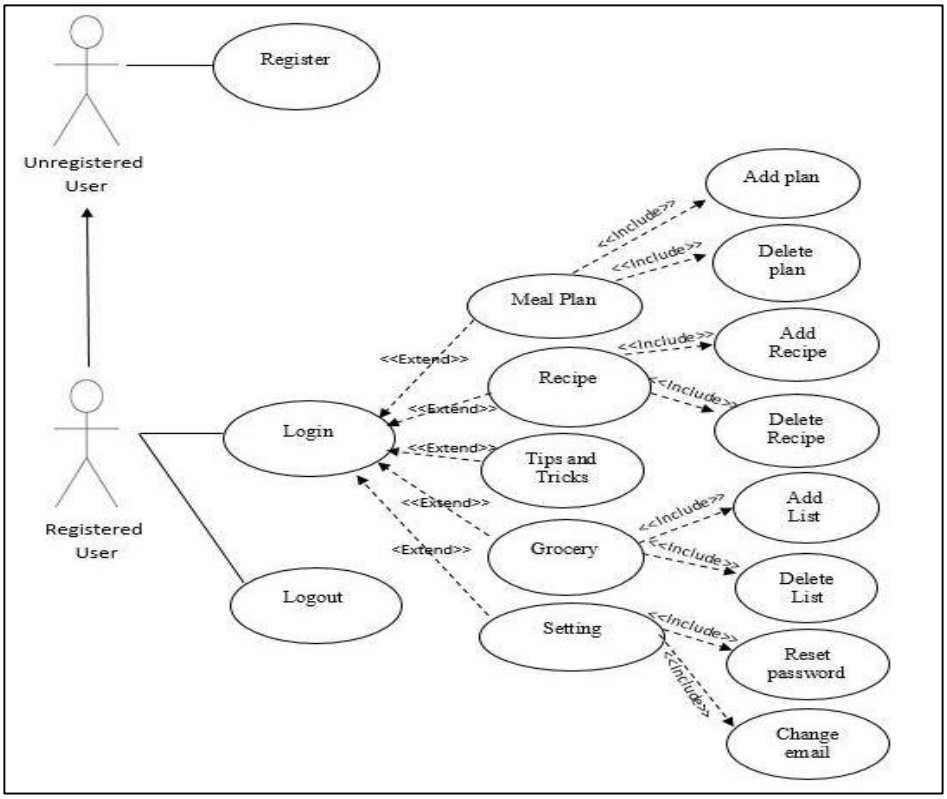

Figure 1: Use case diagram for the system

Class diagram is a static model structure that has classes and relationships that are connected to each other as a graph [11]. Figure 2 shows the class diagram for the system. The class diagram contains of 5 classes that has its own attributes and methods and connected with the relationships.

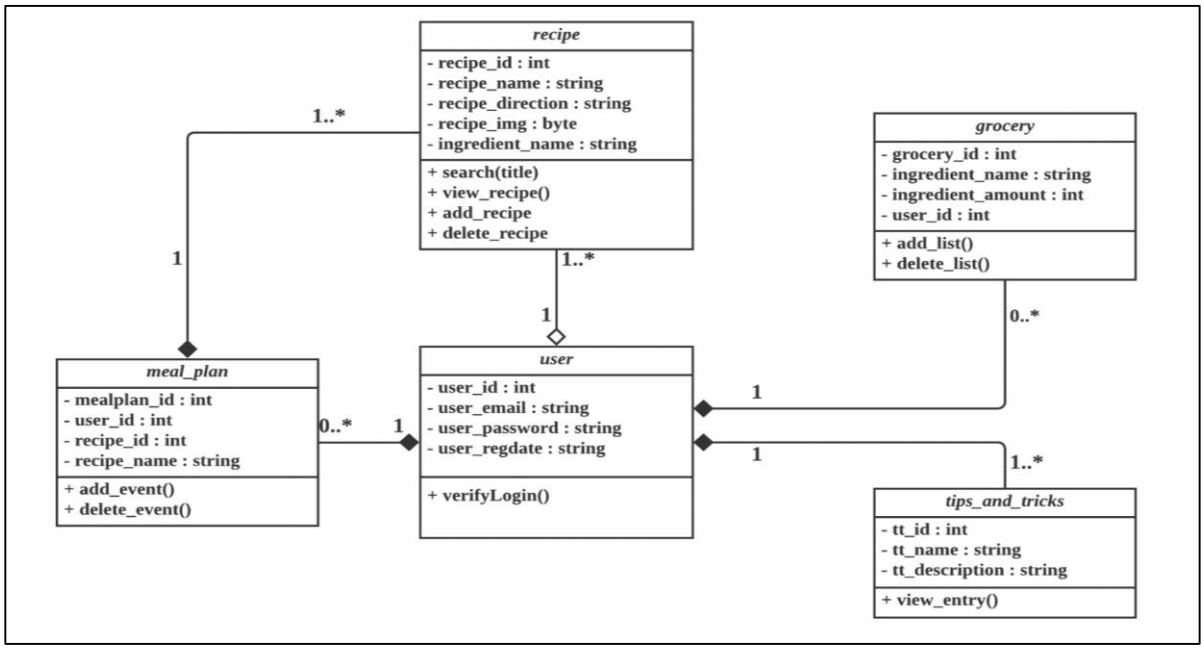

Figure 2: Class diagram of the system

The system design of Baby Food Journey Mobile Application was illustrated by using a system flowchart. According to [10], a system flowchart is a diagram that will explain and help to identify the flow operation of the system. Figure 3 – Figure 5 below show the system flowchart of the system.

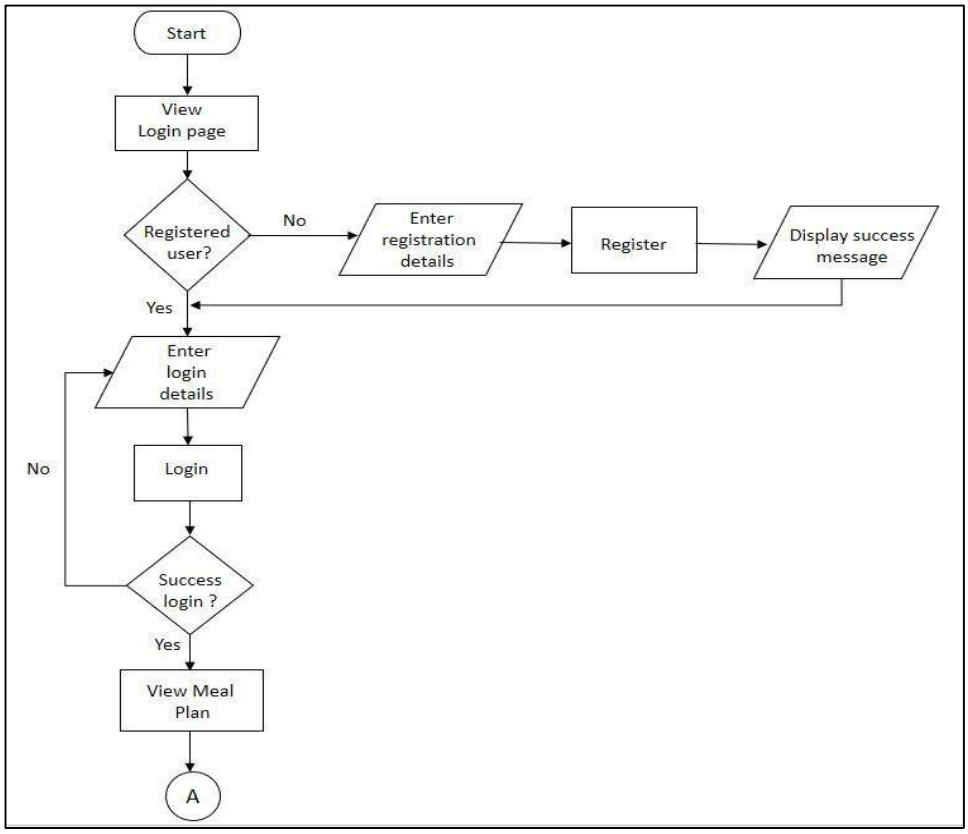

Figure 3: System flowchart

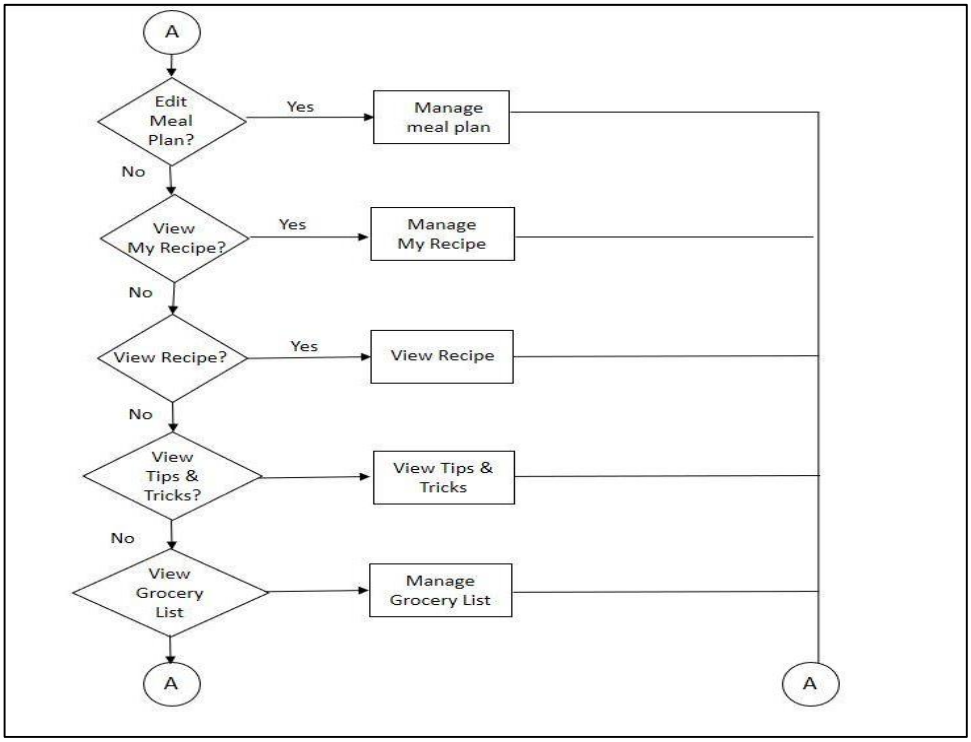

Figure 4: System flowchart (continued)

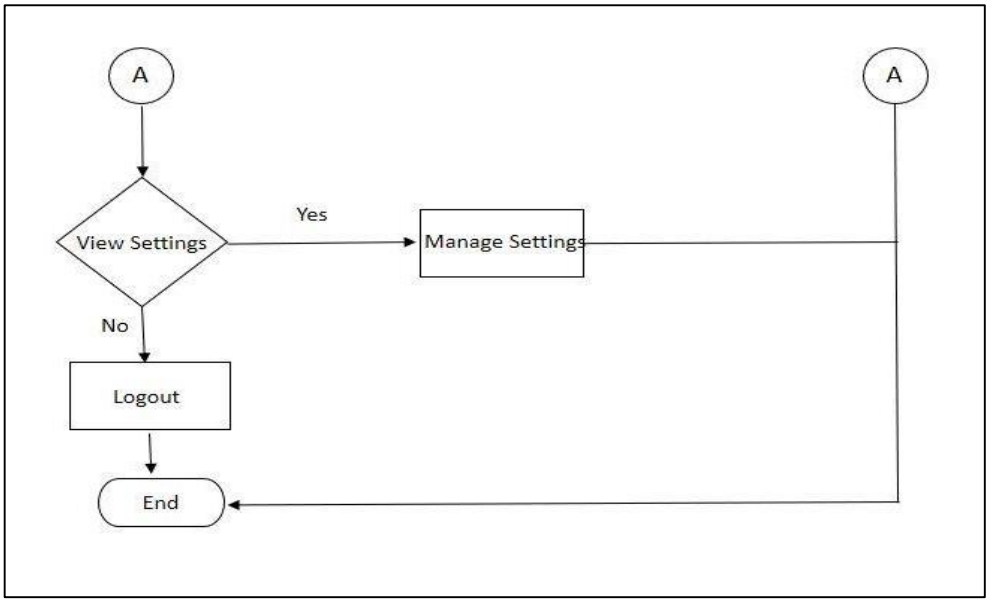

Figure 5: System flowchart (continued)

3.3 Phase 3: Build a Prototype

This phase implements the problem solving solution of the current system. The actual prototype was designed based on information from quick design. The project used JAVA as the programming language. Android Studio and Firebase Database are the software used to build the prototype. Figure 6 – Figure 13 shows the interface of the system.

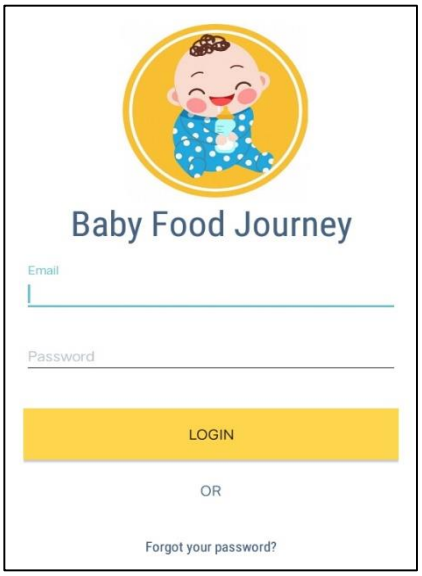

Figure 6: Registration

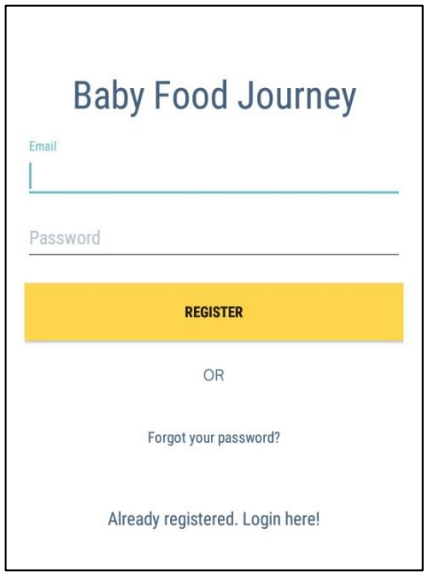

Figure 7: Login interface

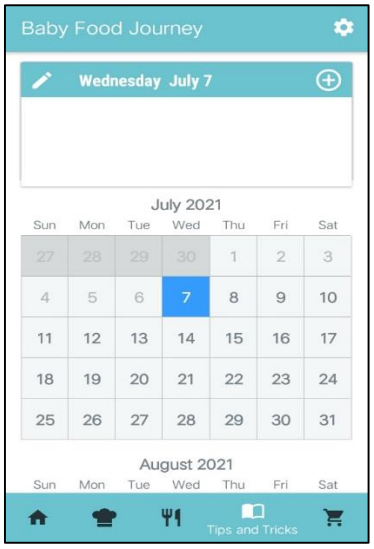

Figure 8: Meal plan interface

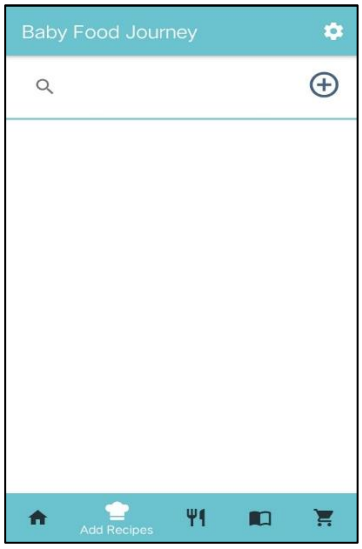

Figure 9: Add recipe interface

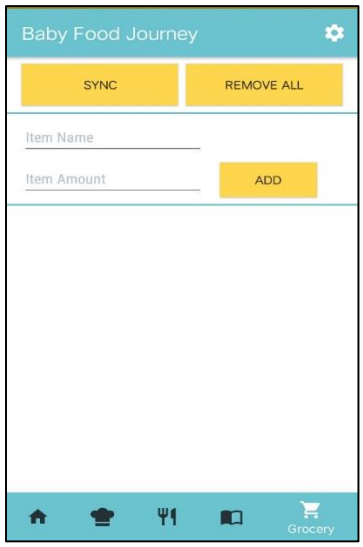

Figure 10: Grocery interface

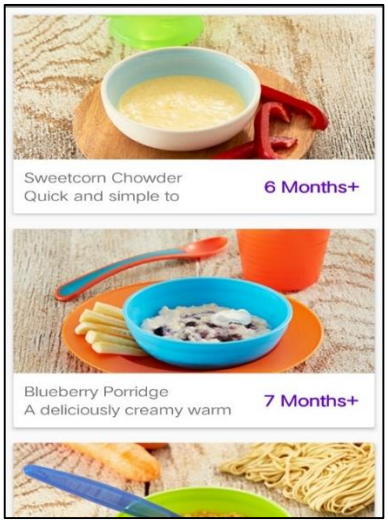

Figure 11: Recipe interface

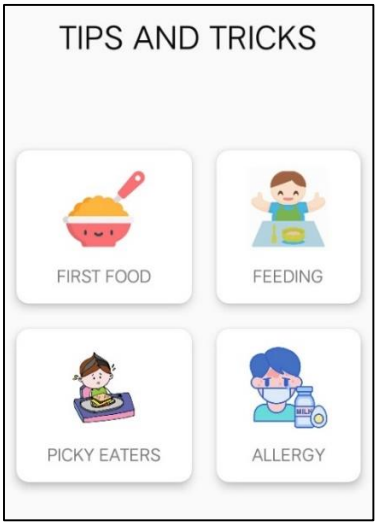

Figure 12: Tips and tricks interface

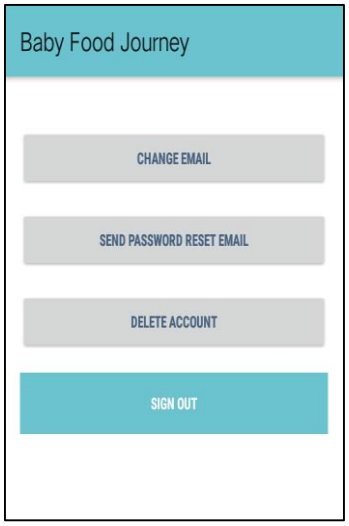

Figure 13: Setting interface

3.3 Phase 4: Initial User Evaluation

The purpose of this phase is to check compatibility of the prototype whether it meets with user requirements or not. From the previous phase, the system was presented to the user for the initial evaluation. By this phase, the strength and weakness of the prototype was found out. The comments and suggestions from the user were collected for the guideline.

The process of testing implementations of technological requirements is referred to as implementation testing. This method verifies that the specification can be implemented in practice and that implementations follow the specification.

Software testing that confirms that the software system fits the functional requirements is known as functional testing. It is used to validate the output of a software application by giving adequate input and comparing it to the functional requirements. Table 5 shows the functional testing for Baby Food Journey Mobile Application.

Table 5: The functional testing for the developed system

Module	Functionality	Expected Outcome	Actual Output
Registration Module	➢ User are able to register before login	➢ User successfully register before login	As expected
Login Module	➢ User are able to log in using registered id and password	➢ User successfully log in using registered id and password	As expected
Meal Plan Module	➢ User are able to create meal plan for the baby up to 3 meal per day ➢ User are able to delete the created meal plan	➢ User successfully create and delete meal plan	As expected
Recipe Module	➢ User are able to view the recipes available ➢ User are able to add and delete recipe list	➢ User successfully view the recipes available ➢ User successfully add and delete recipe list	As expected
Tips and Tricks Module	➢ User are able to view tips and tricks based on category selected	➢ User successfully view tips and tricks based on category selected	As expected
Grocery Module	➢ User are able to add or delete grocery list	➢ User successfully add or delete grocery list	As expected
Settings Module	➢ User are able to reset password ➢ User are able to change email address	➢ User successfully reset password ➢ User successfully change email address	As expected
Logout Module	➢ User are able to logout from the system	➢ User successfully logout from the system	As expected

3.5 Phase 5: Refining Prototype

The purpose of this phase is to improve the prototype based on previous stage products. It was based on user's feedback and suggestions. This phase was keep being done until the user were satisfied with the developed prototype.

3.6 Phase 6: Implement Product and Maintain

The system then tested and installed to production after the final development to reduce downtime and prevent large-scale failures, routine maintenance was performed after.

4. Results and Discussion

Results and discussion section is crucial for interpreting the findings, describing the study's strengths and weaknesses, and discussing the theoretical and practical consequences of the research [12]. In this section, the results of system output and user acceptance testing for the project are presented with its explanation.

4.1 System Output

Figure 14 – Figure 18 below show the outputs of the system. Figure 14 shows the output of the meal plan page after user has selected the meals to the date preffered. Figure 15 shows the output of add recipe page after user has input the details of recipe. Figure 16 – Figure 17 show the information

displayed for each recipe and tips and tricks page respectively. Figure 18 shows the output of the grocery page after user has entered the item name and amount.

Figure 14: Meal plan interface

Figure 15: Add recipe interface

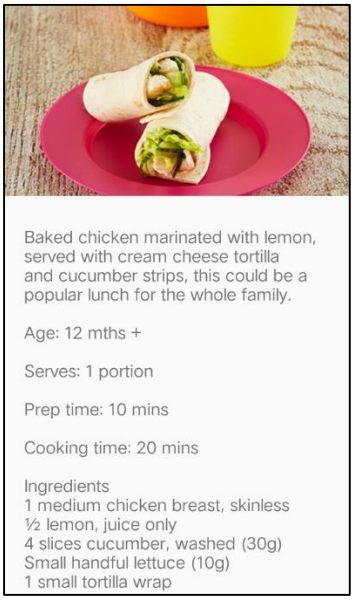

Figure 16: Recipe interface

Figure 17: Tips and trick interface

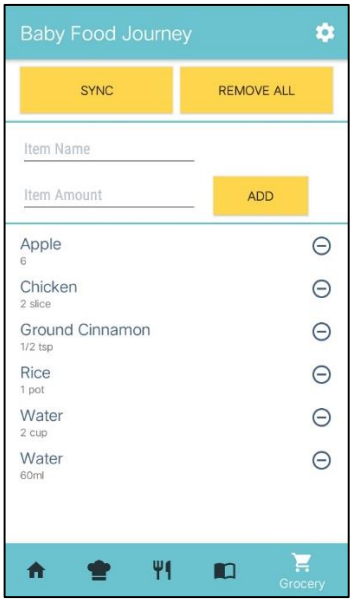

Figure 18: Grocery interface

4.2 User Acceptance Test

The user acceptance test was distributed to the potential users which are parents and guardians by using a questionnaire. These questionnaires were given to a total of 7 potential users. The aim of this test is to make sure the system has met the user requirement. There are 10 questions provided in the questionnaire. The criteria was determined based on the scaling from 5 to 1, where 5 is strongly agree, 4 is agree, 3 is neutral, 2 is disagree and 1 is strongly disagree. Figure 19 – Figure 21 show three out of 10 questions from the questionnaire with its' results and analysis.

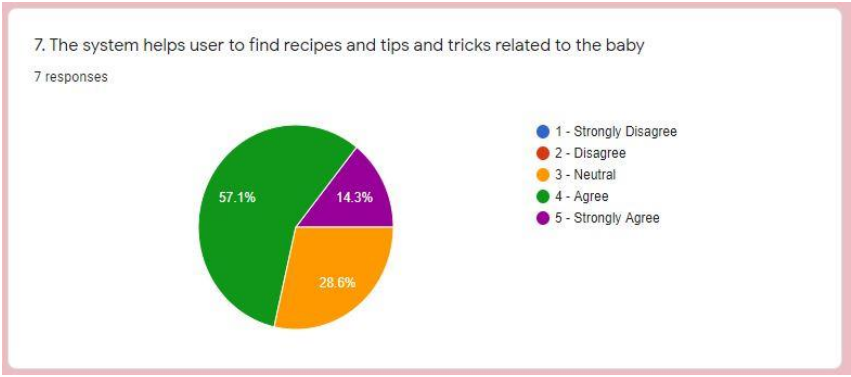

Figure 19: Result of question 7

Figure 19 shows the seventh question asking if the system helps user to find recipes and tips and tricks related to the baby. From the chart, 57.1% agreed on this question while 14.3% were strongly agreed about it. 28.6% were neutral about it. Basically, majority find the system help them to find information related to the baby.

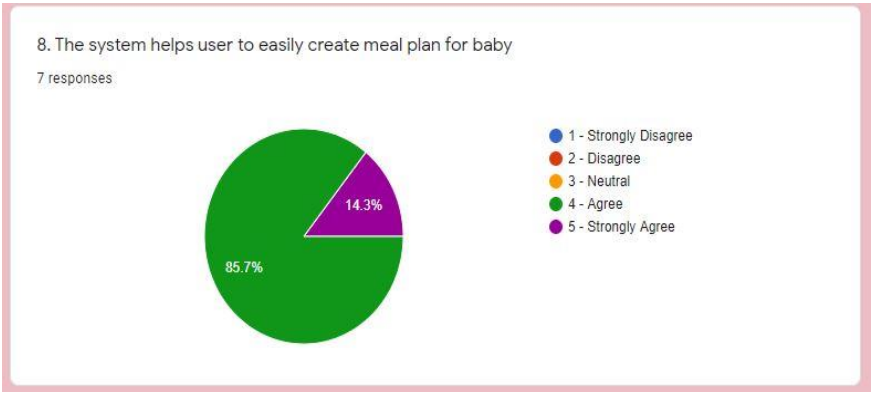

Figure 20: Result of question 8

Figure 20 shows the eighth question asking if the system helps user to easily create meal plan for baby. From the chart, 85.7% agreed on this question while 14.3% were strongly agreed about it. Basically, the chart showing that all of them find the system help them to create meal plan easily.

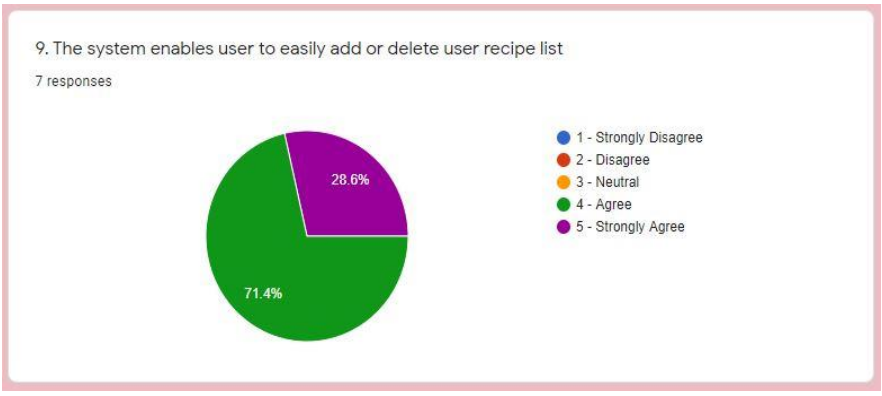

Figure 21: Result of question 9

Figure 21 shows the ninth question asking if the system enable user to easily add or delete user recipe list. From the chart, 71.4% agreed on this question while 28.6% were strongly agreed about it. Basically, the chart showing that all of them find the system helps them to easily add or delete user recipe list.

5. Conclusion

In conclusion, Baby Food Journey Mobile Application was developed for guardians out there to ease the process of finding suitable recipes and tips and tricks for the baby. This mobile application also allows its user to create a meal plan, recipe list, and grocery list. This mobile application has achieved its objectives based on system requirements, scope, and user requirements. This application was able to help reducing the user's searching time and give the user a variety of recipes for the little ones. It greatly improves the searching process for babies' food recipe.

Acknowledgement

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