The Hong Kong Polytechnic University

Department of Computing

COMP4913 Capstone Project

Proposal

Food Component Detection for Dietary Recommendation

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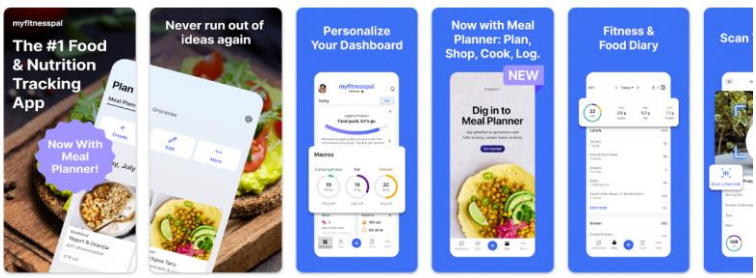
1. Background and Problem Statement

Children's nutrition is a key determinant of physical growth, cognitive development, and the strength of the immune system, especially during the growth period from 3 to 12 years old. The World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC) stress that malnutrition can lead to problems such as delayed development, obesity, and weakened immunity. However, a healthy diet can help people achieve and maintain a healthy weight, consume key nutrients, and reduce the risk of health issues such as high blood pressure, heart disease, and diabetes. According to global statistics, millions of children are affected every year. Many parents struggle to help their children develop healthy eating habits, especially those who are picky eaters.

With the rise of digital tools, a new path for health planning has been provided. For instance, websites and software that have already been released, such as MyFitnessPal, a comprehensive food and fitness tracker that has everything you need to achieve your goals. Control calories, food, and exercise. Everything can be tracked in one software. (*MyFitnessPal: Calorie Counter – Apps on Google Play*, n.d.)



The core issue addressed by this project is that the current market lacks an attractive personalized digital tool, with a focus on achieving balanced nutrition for children aged 3 to 12. Many existing platforms do not incorporate interesting interactive elements (such as games or animated recipes), which can inspire children to develop healthy habits, especially in promoting growth and development, enhancing immunity, and overcoming picky eating. This project aims to develop a user-friendly network system through technology to enhance children's health and strengthen parental support in fun education.

2. Objectives and Outcome

The main objective of this project is to develop a WordPress web system called "Children 's Fun Nutrition Guide" (available at https://kids-nutrition-fun.com, which has been successfully established with SiteGround (the specific steps are in part 5). Provide personalized food recommendations and interactive functions for children aged 3 to 12 and their parents.

Specific goals include:

Functional requirement：

(1) Design an interesting UI (suitable for children aged 3 to 12);

(2) Implement user registration and multiple children's profiles containing detailed information (such as age, allergy history);

(3) Create a searchable database containing data on over 100 kinds of child-friendly foods and nutrition;

(4) Provide 3 to 5 customized recipe options for each health goal (such as growth and development, immunity);

(5) Downloadable nutrition reports and progress charts for users;

(6) Add interactive mini-games. Enhance children's health awareness;

Non-Functional requirement:

(1) Performance: Load <3s, recommendation <5s, support 10 concurrent users

(2) Usability: WCAG-compliant, intuitive UI with cartoon themes using custom WordPress styling, touch-friendly big buttons,

(3) Security: HTTPS, encrypted data with SiteGround, no ads, strict privacy for child data accessible only by parents using role-based access.

This project has made a contribution to the field by designing an innovative approach that combines nutritional science, personalization and gamification, filling the gap of child-centered digital health tools. It offers an expandable framework that can be used for future enhancements (for example, team collaboration in food testing), and provides practical advice for parents based on the evidence from the guidelines of the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC).

3. Project Methodology

This section describes the possibility of achieving the goal within a limited time by outlining the methodology and the technologies to be adopted. I broke down the entire project into manageable tasks in five phases (requirements analysis and planning, system design, implementation and development, testing and optimization, documentation and presentation). Each task adopts a specific approach targeted at its objective to ensure feasibility within the time limit. Based on existing literature, discovering current problems, comparing the existing work in related fields, and developing a practical website.

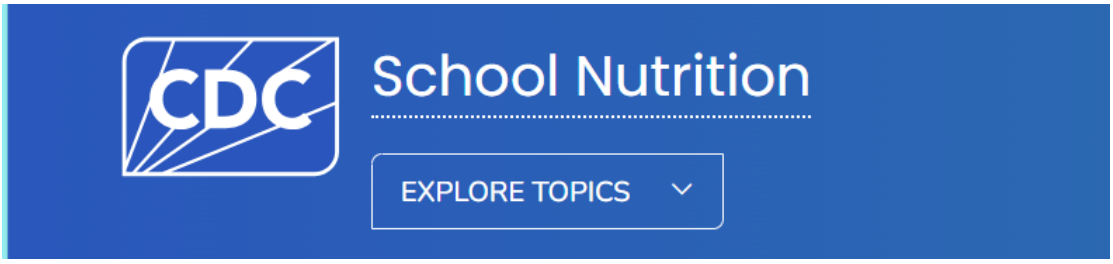
Literature Review:

The research methods in this section are based on the following literature, including existing research achievements in the fields of child nutrition and digital work.

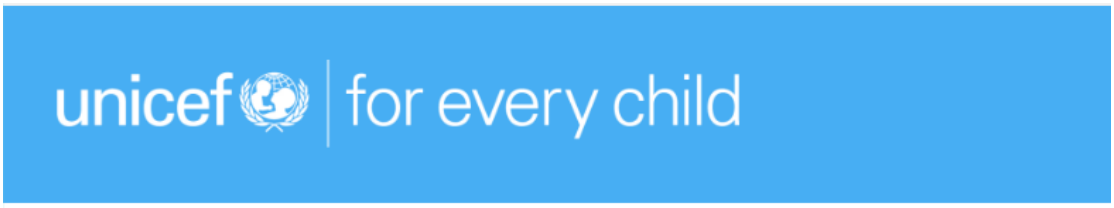
1. As many countries are now witnessing a rapid increase in childhood obesity, the World Health Organization established the Childhood Obesity Commission in 2014. In recent years, the commission has proposed several suggestions to effectively address the issue of childhood obesity in various contexts worldwide. The focus of this project is on children aged 3 to 12. (World Health Organization: WHO, 2020)

2. The healthy eating guidelines of the Centers for Disease Control and Prevention (CDC) in the United States recommend that children and adolescents reduce their sodium intake and limit added sugar. A healthy diet can help people achieve and maintain a healthy weight, consume key nutrients, and reduce the risk of health conditions such as high blood pressure, heart disease, and diabetes. In addition,

having a healthy breakfast can improve cognitive function and mood, and drinking enough water can enhance the cognitive function of children and teenagers. But unfortunately, most children and teenagers do not follow the dietary guidelines. (*Childhood Nutrition Facts*, 2024)



3. UNICEF helps governments around the world adopt policies to promote a healthy food environment, increase the supply and affordability of nutritious food, and protect children from consuming unhealthy food and beverages. Meeting children's nutritional needs can be challenging, and many parents face obstacles in choosing foods suitable for different ages to provide their children with adequate nutrition. (*Childhood Nutrition Facts*, 2024)



4. “Why nutrition programs for children remain important” and "Adequate Nutrition in Early Childhood" Research articles such as these indicate that malnutrition poses a significant threat to human life, with children being the most vulnerable. Children need sufficient nutrition to grow and reach various developmental milestones so that they can survive and engage in meaningful cooperation among their peers and the entire world. (Advances in Food Security and Sustainability, 2023) Children need proper nutrition to prevent negative trends. Establishing a healthy diet pattern during the period from 3 to 12 years old can prevent negative impacts on health in the future and promote a higher quality of life. (Kozioł-Kozakowska, 2023)

Methodology by Task:

1. Requirement Analysis & Planning:

Method & Techniques: Based on the analysis of existing literature, determining the user's goals and problems to be solved, building the WordPress platform, and determining the website. And evaluate the WordPress plugin. Complete the project proposal.

Feasibility: It takes 1 to 2 months and focuses on research (about 12 to 15 hours per week), making use of existing literature and free tools.

2. System design

Method & Techniques: Design a theme interface in a children's style (find suitable plugins and incorporate cartoons and large buttons). Plan the backend using WordPress CMS, custom plugins, and MySQL database integration (final determined dataset) to integrate Game elements (e.g., drag-and-drop puzzles) with JavaScript or WP Game plugin concepts.

Feasibility: The development and preliminary system design will take 1.5 months to ensure the design is completed by mid-December, with an investment of 15 to 20 hours per week.

3. Implementation & Development

Method & Techniques: Build websites on WordPress using SiteGround hosting (https://kids-nutrition-fun.com). Design the UI with Elementor (for example, fun layout), manage the database with ACF, and make recommendations with custom short codes. Implement registration (Ultimate Member), profile, target form (WPForms), and mini-games (custom JS or WP Game). Test the initial integration with the team module. Submit the code to GitHub every week.

Feasibility: Iterate and build for 20 hours per week within two months, to complete the functional prototype by early February.

4. Testing & Optimization

Method & Techniques: Invite 5 to 10 parents/children to take the test and provide feedback on the collected data (optimize the website based on the suggestions). Conduct functional tests (user flow, user experience, etc.) together with the team. Optimize the functions and performance of the website based on all the above suggestions

Feasibility: The working period is approximately 1 month, with 15 hours per week, which is sufficient for iterative fixes and the use of plugin tools for automation.

5. Documentation & Presentation

Method & Techniques: Write the final report in Google Docs, including the methodology, results, and screenshots. Use a screenshot tool to record a demonstration video (for example, a website demonstration). Write user manuals and code comments. Submit via Turnitin before the deadline.

Feasibility: Working 10 to 15 hours per week and ensuring completion within 0.5 to 1 month.

4. Project Schedule

Phase	**Duration**	**Start Date**	**End Date**	**Key Activities**	**Milestones**
1.Requirement Analysis & Planning	1 month	October 15,2025	October 24,2025(project proposal completed) & November 14, 2025	-Background investigation: Analyze the dietary habits of children aged 3 to 12 and the problems encountered by children and their parents in terms of diet - Analysis of problems: Identify issues during the investigation and develop a system/website based on these problems - Analyze the existing system (analyze and investigate the current system regarding improving dietary management for children) Define user roles (parents, children) and collect data on food nutrition (100 pieces of data are collected at this stage for testing and training).	October 24, 2025: -Submit the complete project proposal . Before October 15, 2025: -The UI design has been initially completed -Draft the food database (in Excel/CSV format).

				- Establish the WordPress framework and start evaluating the plugins within WordPress (this stage focuses on evaluating plugins related to UI design). Collect literature content related to children's business Set up a GitHub code repository (invite supervisor to join) and continuously upload important content - Organize the initial materials and complete the proposal	- Plugin Evaluation Report and Suggestions
2. System design	1.5 months	November 14, 2025	December 25, 2025	- Front-end theme design: Design a children-style theme interface (find good plugins and incorporate cartoons and large buttons) -Plan the backend using WordPress CMS, custom plugins, and MySQL database integration (the final determined dataset) - Overview of interactive elements (for example, designing mini-games using JavaScript or WP Game plugins) -Design wireframes and database architectures	-Design wireframes and database architectures - Determine the final interface UI - Approved wireframes and database architectures. -The draft of the interim report (progress summary) has been initiated
3. Implementation & Development	2 months	December 26, 2025	February 25, 2025	-Check and modify the UI according to the suggestions - Realize core functions: User registration, personal profile, fun	- Interim report submitted by Jan 9, 2026 (including demo

				mini-games, database, analysis reports (Visualizer for charts). - Organization of the required integrated APIs - Add design gamification functionality. Start preparing the team's test plan - Complete the interim report by January 9, 2026 (write the report based on the current progress completed).	screenshots) - Basic functions completed (registration, data analysis reports, mini-games, etc.) - The progress of the advancement and the code will be continuously uploaded to GitHub
4. Testing & optimization	1 month	Febru ary 26, 2025	March 25, 2026	-Improve the suggestions made after the previous interim report, and continuously enhance the functions -Conduct functional tests (user processes, user experience, etc.) with the team - Performance testing (loading time) - Test with 5 to 10 parents/children and return the collected data (optimize the website based on the suggestions) -Optimize the website's functions and performance based on all the	- Suggestions for modifying the website for 10 users -Test and fix website bugs and performance -"Optimize the website

				above suggestions	
5. Documentation & presentation	0.5- 1 month	March 26, 2026	April 10, 2026	- Prepare the final report (methods, structure, demonstration screenshots, front-end/dashboard/game screenshots) - Create a demonstration video - Create a presentation PPT -Rehearsing the final speech within the team (to obtain revision suggestions) -The final report submitted to Turnitin	- Completed final report and Turnitin upload by Apr 10, 2026. - Polished demo presentation.

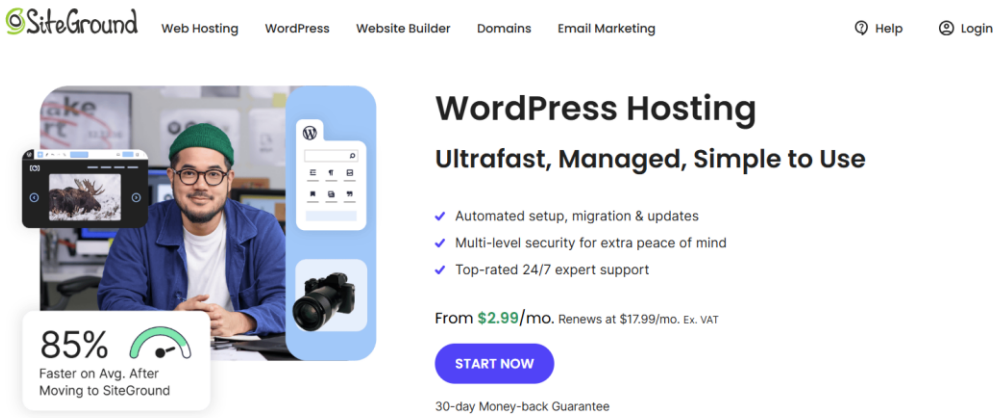
5. Resources Estimation

This section describes the hardware and software resources required for the "Food Component Detection for Dietary Recommendation" - children's fun nutrition guidelines project. I divided the required resources into two parts: hardware (for website development and deployment) and software (including tools, services, and plugins). Project costs are calculated in US dollars, covering the entire project cycle and increasing the required resources based on the situation of each project stage. Where possible, give limited consideration to free/open source resources to minimize costs and keep pace with the progress that WordPress has already implemented.

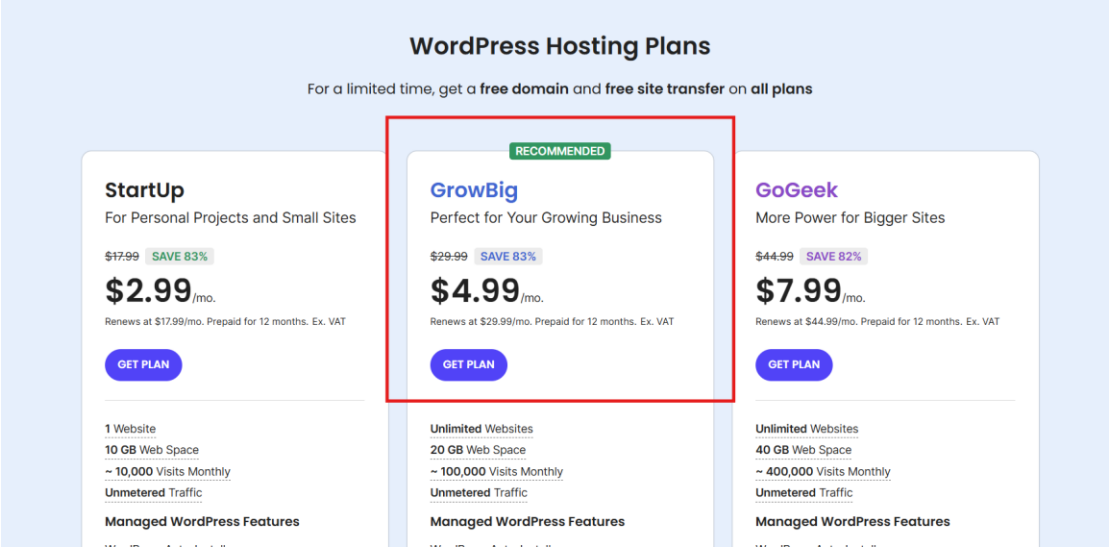
Hardware Resource:

One of the currently confirmed options is to purchase a server/virtual host (no dedicated server is required as WordPress expands through shared hosting). When looking for the most suitable server, I compared three servers (SiteGround, Alibaba Cloud, and Tencent Cloud) at night. After comparing prices, service plans and functional requirements, I finally chose SiteGround. Besides the price, it has a very fast speed, secure hosting, and can make it easier. Start, transfer, and manage WordPress websites more freely. SiteGround's hosting platform is built from scratch

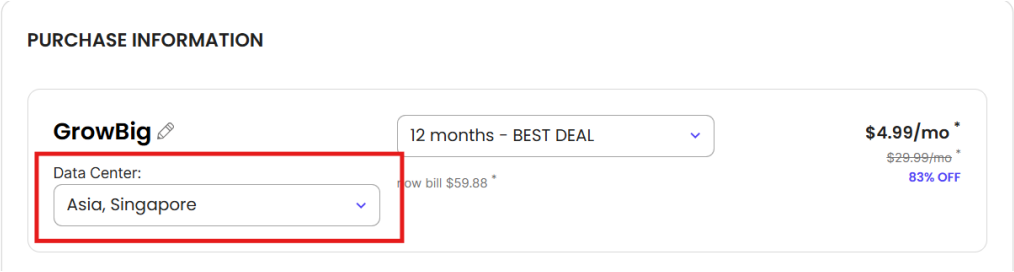
with AI-driven innovation, offering a higher level of performance, security, and scalability.



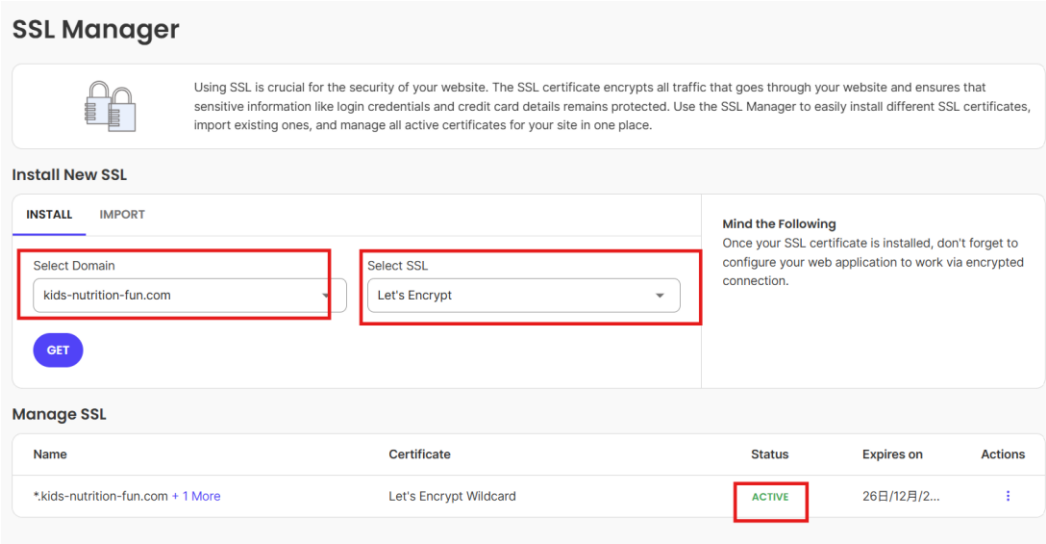
After deciding on SiteGround to build the website, the final plan was determined. Eventually, the GrowBig plan was chosen because it offered better value for money and more web space. In the end, a one-year plan was purchased for a total of 60 US dollars.



Since the target audience of this website is children and parents worldwide, I finally chose to set the Data Center in Singapore, so that the access speed would be faster.

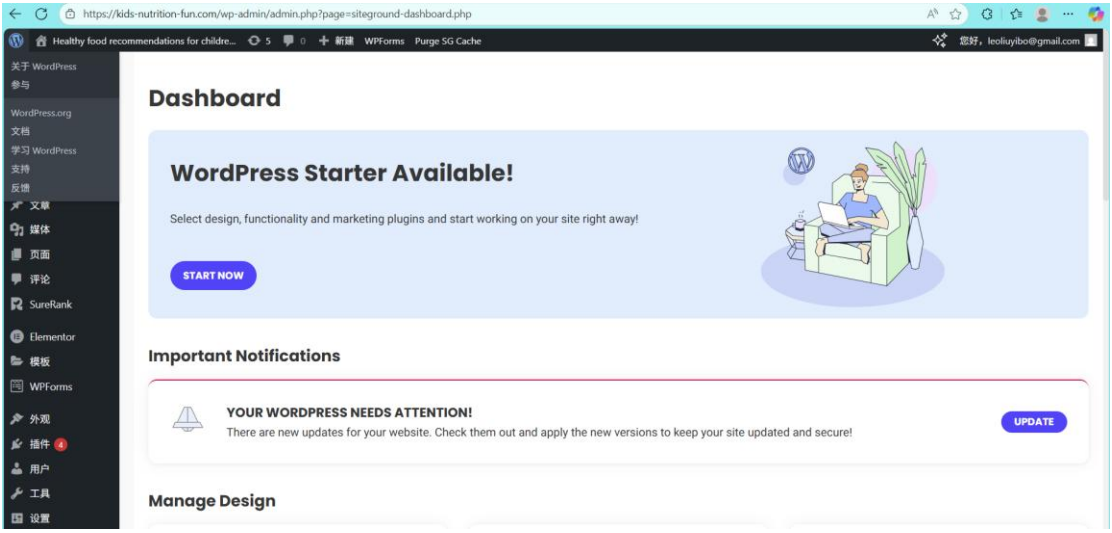


Configure the SSL manager. Using SSL is crucial for the security of your website. The SSL certificate encrypts all traffic that goes through your website and ensures that sensitive information like login credentials and credit card details remains protected. Use the SSL Manager to easily install different SSL certificates, import existing ones, and manage all active certificates for your site in one place.



After configuring all the above contents, the WordPress framework was successfully established, and then the website development and design began. (Start planning

according to Part Four -Project Schedule)



Software Resources:

In my project, the software resources mainly consist of the core plugins of WordPress and the AI tools used. However, the project has just started, and it's still uncertain what plugins will be used in the future. Therefore, the budget for the price difference is yet to be determined. Report to the department regarding AI tools (pending confirmation).

Request for Azure OpenAI API for Capstone projects:

Model to use *

Model	Deployment Name	Version%	Reference Price (per 1000 tokens, in US$)*	Scale Factor (Based on ChatGPT price: $0.002 per 1000 tokens)*
GPT-3.5-turbo$	gpt35	0125	$0.002	1
GPT-3.5-turbo-instruct#	gpt35instruct	0914	$0.002	1
GPT-4-Turbo$	gpt4t-fc	turbo-2024-04-09	$0.03	15
GPT-4o$	gpt4o	2024-08-06	$0.015	7.5
GPT-4o-mini$	gpt4o-mini	2024-07-18	$0.00066	0.33
GPT-4.1$ (Global)	gpt41-g	2025-04-14	$0.008	4
GPT-4.1-mini$	gpt41-mini	2025-04-14	$0.0016	0.8
GPT-4.1-nano$	gpt41-nano	2025-04-14	$0.0004	0.2
GPT-5$	gpt5-g	2025-08-07	$0.01	5
GPT-5-mini$	gpt5-mini-g	2025-08-07	$0.002	1
GPT-5-nano$	gpt5-nano-g	2025-08-07	$0.0004	0.2
GPT-5-chat$	gpt5-chat-g	2025-08-07	$0.01	5
o1$+ (Global)	o1-g	2024-12-17	$0.06	30
o3-mini$+	o3-mini	2025-01-31	$0.00484	2.42
o4-mini$+	o4-mini	2025-04-16	$0.0044	2.2

Based on the current performance and price comparison in the above table, finally choose O1^{5+}(Global) (there are many issues in the project or resource queries that require O1^{5+}(Global) very much). The final choice was 2,000,000 tokens, and the calculated final price was $120. ($0.06*2000000/1000=$120)

To summarize the current project costs, please refer to the table below:

Item	Category	Cost	Total
SiteGround Hosting	Hardware Resources	$60	
O1^{5+}(Global)	Software Resources	$120	
WordPress plugin	Software Resources	TBD	
			$180

From the table, it can be concluded that the current confirmed cost of the required resources is $180. Among them, the WordPress plugin is currently uncertain (and will increase according to the project requirements).

6. References/Bibliography

World Health Organization: WHO. (2020, April 29). *Healthy diet*. https://www.who.int/news-room/fact-sheets/detail/healthy-diet

AI 驱动 智领未来_腾讯云优惠活动. (n.d.).

https://cloud.tencent.com/act/pro/warmup202506?fromSource=gwzcw.9884755.9884755.9884755&utm_medium=cpc&utm_id=gwzcw.9884755.9884755.9884755&msclkid=4cfa91b79f87159afcc5f947e37450c4#LH

Kozioł-Kozakowska, A. (2023). Adequate nutrition in early childhood. *Children*, *10*(7), 1155. https://doi.org/10.3390/children10071155

Hosting, S. W. (n.d.). *Web Hosting Perfected - SiteGround*. SiteGround. https://world.siteground.com/

阿里云权益中心. (2023, September 26).

https://cn.aliyun.com/benefit?from_alibabacloud=&utm_content=se_1021724196

Childhood nutrition Facts. (2024, July 22). School Nutrition. https://www.cdc.gov/school-nutrition/facts/index.html

MyFitnessPal: Calorie Counter – apps on Google Play. (n.d.). https://play.google.com/store/apps/details?id=com.myfitnesspal.android&hl=en-IN&pli=1