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FitGuide

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Abstract

FitGuide is a comprehensive fitness and health application that helps users achieve their fitness goals by providing personalized workout plans, nutrition recommendations, and progress tracking. With FitGuide, users can log in and track their workouts, including the type of exercise, duration, and intensity. They can also track their food intake, including the type and quantity of food they consume. In this era, smartphones are constantly on the go and as we continue to evolve into a mobile-centric society, it comes as no surprise that mobile apps are at the forefront of developmental community. Furthermore, health is a very important aspect of human life and now adays as the awareness of a healthy diet increases through social media, people are more concerned about their physical appearances and therefore staying physically fit. This app will allow users which also include patients to enter their medical reports and get their workout and diet plans regarding the needs of their medical conditions. This can include people of all ages and fitness levels, from beginners who are just starting to incorporate exercise into their routine to more advanced athletes looking to optimize their training. One potential problem that this fitness app could address is the difficulty that many people face in maintaining a consistent exercise routine and healthy diet and FitGuide will provide this for users at their home, workplace, or anywhere at any time. Fitness activities can thus become a part of the user's routine without interfering with it.

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*"Education is the passport to the future, for tomorrow
belongs to those who prepare for it today."*

Malcolm X.

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1 Introduction

In this era, smartphones and tablets are constantly on the go and as we continue to evolve into a mobile-centric society, it comes as no surprise that mobile apps are at the forefront of developmental community [5]. Mobile apps provide simple and functional access to services and products that users need in real-time and are available for hands-on interaction. Health is a very important aspect of human life and nowadays as the awareness of a healthy diet increases through social media, people are more concerned about their physical appearance and therefore staying physically fit [3]. This project proposal will focus on the development of a health and fitness mobile application. Unlike other fitness apps, this app can be of service for people who have medical conditions (e.g., high levels of cholesterol). The app will suggest workout and diet plans according to the user's medical reports.

An unhealthy diet, obesity, elevated blood sugar, increased fat levels, and high blood pressure can all be caused by a poor diet and insufficient exercise [4]. To lessen the risk people should maintain a balanced diet and an active lifestyle. This fitness application offers convenience and the opportunity to improve health and fitness at home. Moreover, people have increased amount of screen time due to which they tend to sit more with restricted movements, this is proved to be very unhealthy. For people who wish to shape their bodies, the app will include training categories to give users the opportunity to achieve their dream figure.

It is also made to help people who don't know enough about eating right as the application will also include generic diet plans. The right notification delivered at the right time will boost an app's retention rate. The app will offer time to time reminders of workouts, water-intake. It will track its user activity and will also alert them with a notification to take a walk if their screen time increases past a set limit.

This app will target a great audience who are short on time but wants to stay fit without a help of a trainer for example.

- People with health issues.
- Travelers
- Working men and women.
- Students
- People who prefer to stay at home.

1.1 Benefits

Fitness app can be helpful for individuals who are looking to improve their fitness and overall health [7]. By providing users with tools to track and monitor their workouts and nutrition, fitness apps can help users stay motivated and on

track with their fitness goals.

Fitness apps can also be convenient and cost-effective alternative to traditional methods of tracking workouts and nutrition, such as using a paper journal or hiring a personal trainer. Fitness apps can also offer additional resources and support, such as workout plans and nutritional recommendations, which can be helpful for individuals who are new to exercise or who are looking to take their fitness to the next level.

However, it is important to note that fitness apps are not a substitute for professional medical advice, and users should consult with a healthcare provider before starting any new exercise or nutrition program.

Additionally, it is important for users to be mindful of their own limitations and to listen to their bodies when exercising.

1.2 Motivation

FitGuide is a type of software application that is designed to help users track and improve their physical activity and nutrition. The project background includes the following:

- **Problem or opportunity:** The project background outlines the problem or opportunity that the app is intended to address. For example, the app is designed to help people who have difficulty finding time or motivation to exercise, or who struggle with tracking their nutrition.
- **Competitive landscape:** The project background also assesses the competitive landscape for fitness apps, including any similar apps that already exist, their features and functionality, and their user base. This helps to identify any unique value proposition or differentiators for the app.
- **Market potential:** The project background estimates the potential size and growth of the market for FitGuide, based on data such as the number of people who use fitness apps, the average revenue per user, and the overall trend in the market.
- **Funding:** The project background also outlines the sources of funding for the app development, such as investment, grants, or crowdfunding. It also outlines the budget and timeline for the project.

This is a general overview of the information is included in the project background for a fitness app. The specific details depend on the goals and requirements of the project.

1.3 Problem Description

With the current lifestyle people have started to rely more on mobile phones than going to doctors for their daily health and fitness problems since mobile phones can provide much the same information to them. This app will allow users which also include patients to enter their medical reports and get their workout and diet plans regarding the needs of their medical conditions. People must consult nutritionists to have a daily meal plan according to their lifestyle and fitness trainers for their daily workout routine. This app will allow the mobile users to keep track of their fitness lifestyle under one app. Meal plans will be made according to the consultation of nutritionists and workout plans will be made according to their body type and their target goals. Managing your fitness is a real problem among most of the people nowadays. Various apps inherit these functionalities, but provide them for premium members only. Our app provides all these functions for free and will full services.

1.4 Project Objectives

The app would offer several functionalities. Some of the objectives of the app are as follows:

- To build a system for monitoring basic credentials of the target audience.
- To develop such an application that can be a source of motivation for target audience.
- To help the target audience in achieving their goals.

1.5 Project Scope

Our fitness app could address the difficulty that many people face in maintaining a consistent exercise routine and healthy diet. Many people struggle to find the time, motivation, or resources to exercise and eat healthily on a regular basis. FitGuide could help users overcome these barriers by providing them with convenient and personalized tools to track and improve their physical activity and nutrition. Another problem that a fitness app could address is the lack of guidance and support that many people have when trying to achieve their fitness goals. Many people do not have access to a personal trainer or nutritionist and may not know how to design an effective workout plan or choose the right foods to support their goals. FitGuide could provide users with customized recommendations and support to help them reach their goals in a safe way. The scope of FitGuide will depend on the specific goals and features of the application some of them include, tracking of various fitness metrics such as steps taken, time spent exercising and water intake, tracking progress towards specific fitness goals, such as weight loss or weight gain, providing workout recommendations based on the user's fitness level and goals and providing educational content or resources on fitness, nutrition, and overall wellness. To provide FitGuide users

with these functionalities the app will be built using Android Studio and to save the users' data Firebase will be used as a database. The user will have to provide the app with their basic credentials to help the app to guide them in their health and fitness journey. The users will be expected to stay motivated and active in following the recommendations provided by the app, if they want to be easily succesful in achieving their goals of healthy lifestyle.

2 Literature Review

The literature review examines the issued information in a subject area within a certain time. The literature review provides a convenient guide to a topic. It can give us an outline or act as an immersing stone if we have limited time to conduct research. The main purpose of writing a literature review is to provide background for the topic chose using previous research that already been done by others. Basically, the literature review for fitness app in educational domain includes the previous research on fitness apps for students. Based on the literature review, it is to increase the knowledge and gave a deeper understanding of the proposed system.

2.1 Related work

There are many fitness apps available on the market[6], so it is important to research and understand the existing landscape of related work before we started developing our FitGuide app [2]. Some things we considered when researching related work for a FitGuide include:

- Identifying key competitors: Who are the main players in the fitness app market, and what features do they offer?
- Understanding user needs and preferences: What do users look for in a fitness app, and how do they use these types of apps?
- Evaluating the technology landscape: What new technologies or trends are relevant to the development of a fitness app, and how can they be leveraged to create a unique and differentiated product?
- Analyzing market trends: How is the market for fitness apps evolving, and what is the current demand for these types of apps?
- Conducting a SWOT analysis: What are the strengths, weaknesses, opportunities, and threats of the current market for fitness apps, and how can these inform the development of a new product?

2.1.1 AimFit

AimFit is a home-based gym application [6]. It is an application that is also based in Pakistan. It provides its users with training opportunities at home. It offers workout plans which a user can easily follow. It is a paid application that offers users workout plans starting from Rs4999 per month.

2.1.2 Lifesum

It is a health application that offers users meal plans and nutritious recipes [2]. It also allows users to track their activities. It claims “The first step to a healthier you takes less than a minute”. The app provides users with paid meal plans and recipes. Their offer starts from Rs2300 per month.

2.1.3 Female Fitness

It is a fitness application that provides specifically women workout plans [1]. It offers its users week-by-week workout plans. The first few workout plans are free, however, later to continue with plans the user has to purchase them. This application also contains ads throughout the workout plans.

2.1.4 FitGuide

Our application provides users the option to choose whether they would like to gain or lose weight. Upon the user's selection, the app provides them with daily workout plans with a detailed explanation of how to perform the specific exercise. It also allows the user to time their exercise. It also provides users with diet plans and nutrition tips. Furthermore, FitGuide also takes users' medical-related input and provides them with related exercises. It also allows the users to track their daily activities which include water intake and step count. It offers all its features without charging them any penny. The app is also ad-free allowing the users a smooth and calming experience.

The following Figure 1 compares FitGuide with other applications and show the differences between other applications.

Figure 1: Different applications comparison table

Features	FitGuide	AimFit	Lifesum	Female Fitness
Reward System (Competition)	Yes	No	No	No
Medical suggestions	Yes	No	No	No
Diet plan	Yes	No	Yes	No
Workout plan	Yes	Yes	No	Yes
Recipes	Yes	Yes	Yes	No
Water intake	Yes	No	Yes	No
Step Counter	Yes	No	No	No
Reminders	Yes	Yes	No	No
Free	Yes	No	No	No
Ads	No	No	No	Yes

3 Requirement Specifications

3.1 Introduction

Requirements specifications and Analysis. In requirement analysis user expectations of a product can be determined. These requirements must be quantifiable, relevant, and detailed. These requirements in software engineering are often called functional specifications. In chapter 3 we will discuss functional and non-functional requirements along with use case models.

3.2 Intended Audience and Reading Suggestions

The intended audience for FitGuide is typically individuals who are interested in improving their physical health and wellness. This can include people of all ages and fitness levels, from beginners who are just starting to incorporate exercise into their routine to more advanced athletes looking to optimize their training.

Reading suggestions for those interested in using a Fitness app might include articles on the benefits of regular exercise, tips for sticking to an exercise routine, and guidance on choosing a fitness journey. Some other helpful resources could include blogs, online forums, and social media groups focused on fitness and wellness. Additionally, consulting with a healthcare professional or a personal trainer could be helpful in developing a safe and effective fitness plan.

3.3 Problem Description

One potential problem that a fitness app could address is the difficulty that many people face in maintaining a consistent exercise routine and healthy diet. Many people struggle to find the time, motivation, or resources to exercise and eat healthily on a regular basis. FitGuide could help users overcome these barriers by providing them with convenient and personalized tools to track and improve their physical activity and nutrition. Another problem that a fitness app could address is the lack of guidance and support that many people have when trying to achieve their fitness goals. Many people do not have access to a personal trainer or nutritionist and may not know how to design an effective workout plan or choose the right foods to support their goals. FitGuide could provide users with customized recommendations and support to help them reach their goals in a safe sustainable way.

3.4 Product Functions

FitGuide has the following functionality:

1. User registration and login: Users will be able to create a new account and login into the app.

2. Profile setup: Users will be able to set up their profile, including their personal details (i.e., age, height, weight), fitness goals, and any relevant medical information.
3. Exercise tracking: The app will allow users to track their workouts, including the type of exercise, duration, and intensity.
4. Nutrition tracking: The app will allow users to track their food intake, including the type and quantity of food they consume.
5. Progress Tracking: The app will display user's progress towards their fitness goals, including metrics such as weight.
6. Workout plans: The app will provide users will customizable workout plans based on their fitness goals and current fitness level.
7. Nutritional recommendations: The app should provide users with nutritional recommendations based on their fitness goals and current diet.
8. Push notifications: The app will send users push notifications to remind them to track their workouts and meals, and to encourage them to stay on track with their fitness goals.

3.5 Operating Environment

The operating environment of FitGuide refers to the specific platform or device on which the app can be used. Some operating environment for FitGuide include:

- Smartphones: FitGuide is mainly designed to be used on smartphones using Android OS. It offers a convenient and portable platform for tracking workouts and nutrition on the go.

3.6 Design and Implementation constraints

Here are some potential design and implementation constraints that we considered while development of FitGuide:

- User experience: The app is easy to use and navigate, with a clean and intuitive interface.
- Device compatibility: The app should be compatible with a range of devices, including smartphones and tablets, and should be optimized for different screen sizes and resolutions.
- Performance and scalability: The app should be able to handle many users and a high volume of data without experiencing performance issues.
- Regular updates and maintenance: The app should be regularly updated to fix bugs and add new features, and there should be a plan in place for maintaining and supporting the app over the long term.

- Legal and regulatory considerations: The app should comply with any relevant laws and regulations, including those related to health and fitness data.
- Cost and budget: There should be a clear budget and plan for the development and maintenance of the app, and any costs should be carefully considered and managed.

3.7 Existing Systems

Existing fitness apps can generally be classified into two categories: standalone apps that are designed to be used on their own, and apps that are part of a larger ecosystem or platform [8].

Standalone fitness apps typically offer a range of features and functionality, such as tracking workouts, setting, and tracking fitness goals, and providing personalized workout recommendations. These apps may also offer integration with external devices, such as wearable fitness trackers, and may provide educational content on topics such as nutrition and overall wellness[9].

Apps that are part of a larger ecosystem or platform may offer similar features but may also be more tightly integrated with other products or services offered by the same company. For example, a fitness app from a major athletic apparel brand might be more closely tied to the company's other products and services, such as its online store or its physical retail locations[1].

In general, the existing system of fitness apps is highly competitive, with many different players offering a wide range of features and functionality. To stand out in this crowded market, it is important for a new fitness app to offer unique and differentiated features that meet the needs and preferences of its target users.

3.8 Proposed System

People nowadays engage in very little physical activity and have high rates of preventable health conditions such as obesity and cardiovascular disease. Participating in more fitness and wellness activities can help them improve their overall health and well-being. However, many fitness and wellness organizations are unsure of how to serve this population effectively or how to support their inclusion in their programmes. To address this issue, we have developed a health and fitness mobile application. Unlike other fitness apps, this app can be of service for people who have medical conditions (e.g. high levels of cholesterol). The app will suggest workout and diet plans according to the user's medical reports[10].

Moreover, people are becoming more health-conscious, but they don't have enough time to devote to going to the gym. This is why working people all over the world prefer health and fitness apps. With a busy schedule balancing work and personal life, most people find it difficult to find time to go to the gym. Even if they really want to join a gym, they are unable to change their workout schedules. This was the most common issue for many fitness enthusiasts who

wanted to go to the gym but couldn't manage their schedule. An app for fitness can be used in the user's own home. Users can use it whenever it is convenient for them. Fitness activities can thus become a part of the user's routine without interfering with it.

Staying fit should not be costly. Gym memberships are costly, and hiring a personal trainer is even more so. This is not something that everyone can afford. Personal training apps can be extremely cost-effective. FitGuide app provides users with workout guide as well as personalized recipes for nutritious dishes. These types of features in health and fitness app development can make our very appealing to users.

There is a wealth of information available on the internet about anything. Unfortunately, because the internet is accessible to everyone and everywhere, it is prone to containing inaccurate information. The same is true for internet-based health and fitness information. It has become difficult to distinguish between facts and myths. People were oblivious to what was right and wrong. Our health and fitness app FitGuide is free of such incorrect information. It is a workout and diet app where we have uploaded personal healthy recipes and workout guide. Our application will use concise, easy-to-understand (non-technical) language to guide fitness enthusiasts. We have taken help from medical experts to develop the application that offers accurate and inch-perfect guide to its users. Our app will make it easier for users to obtain useful information while saving time rather than searching for and filtering correct from incorrect information. A meal plan for weight loss and gain is included in the nutrition guide. Another interesting offered will be that it will allow users to keep a food journal. Users may not have all the necessary training equipment. As a result, the app includes an in-app purchase option for all of the fitness essentials that the user requires.

3.9 Requirement Specifications

3.9.1 Functional Requirements:

- Profile and Personalization:
User will create his/her own profile. To create the profile, the user will be asked to enter full name, username, email address and gender.
- Push Notifications and reminders:
The users will be given time to time notifications. The notifications will help them keep in touch with their workout and diet plans. Through notifications, users will also be sent reminders. Water reminder will be a reminder to drink water and step counter reminder will consist of reminding the user to take a walk.
- Workout Plan:
Users will be able to select their own choice of workout plan, or they will be suggested different types of workout plans according to their BMI and medical reports.

- **Healthy eating and calorie control:**
Users will be able to select their own choice of diet plan, or they will be suggested different types of diet plans according to their medical reports.
- **Journal record:**
As the users are setting goals and will be following plans, they can keep a track of their journey on a journal. They will be able to make notes and make records on a personal journal.
- **App will record footsteps:**
This module of the app will work as a step counter. Users will be able to count their steps which will have help them to keep track of their workout journey.

3.9.2 Non-Functional Requirements:

- **Security:**
Passwords shall never be kept within the system or viewable at any point.
- **Usability:**
FitGuide shall be easy to use by everyone. 99 percent of the users shall be able to fully understand the application in less than 5 minutes. User shall require no training to use FitGuide as it would be self-explanatory.
- **Reliability:**
The app will be good at performance.
- **Efficiency:**
The system shall never exceed 80 percent of the available memory and storage. The time taken to respond to user's request shall be less than one second.
- **Portability:**
FitGuide will be available to use anywhere, at your home or at your office.

3.10 Use cases

3.10.1 User Registration Use Case

User registration allows user to register their account. User will have to enter their email address, password and confirm their password. The following figure shows with the description the use case for User Registration.

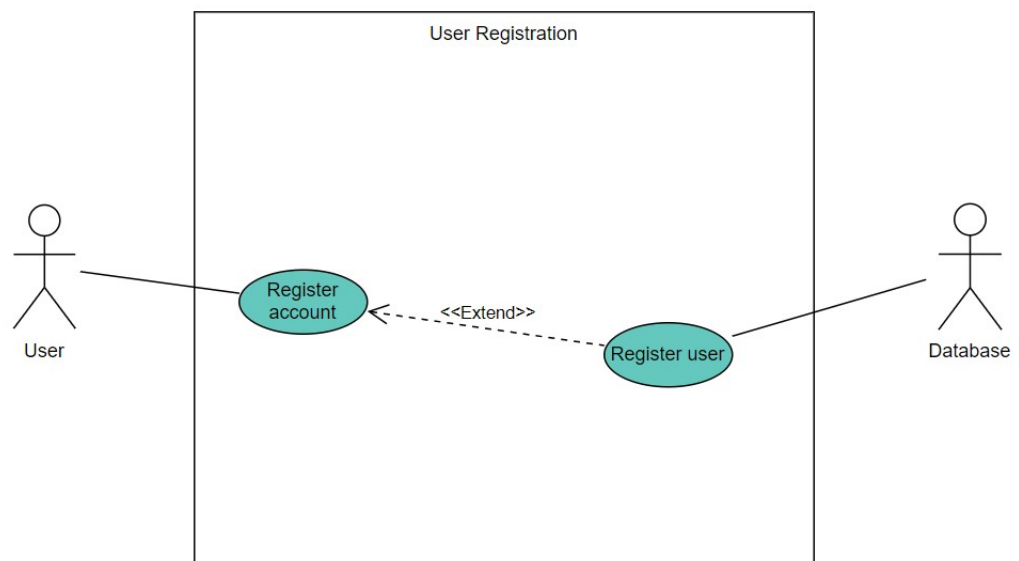


Figure 2: User Registration

Figure 3: Tabular description for User Registration

Use Case ID	0001	
Use Case Name	User Registration	
Actor(s)	User	
Data	Username, Gender, Set Password, Age	
Stimulus	Open FitGuide application to register as a new user	
Pre-conditions	FitGuide application installed	
Steps	Normal	Alternative
	<ul style="list-style-type: none"> User registration successful. 	<ul style="list-style-type: none"> Send an error to user to enter correct information.
Response	<ol style="list-style-type: none"> Registration successful. If registration is not successful send the error tell the user to enter correct credentials. 	
Post Condition	User gains access to the app.	
Comments		

3.10.2 User Login Use Case

User login allows user to login into their account. User will have to enter their email address and correct password. The following figure shows with the description the use case for User Login.

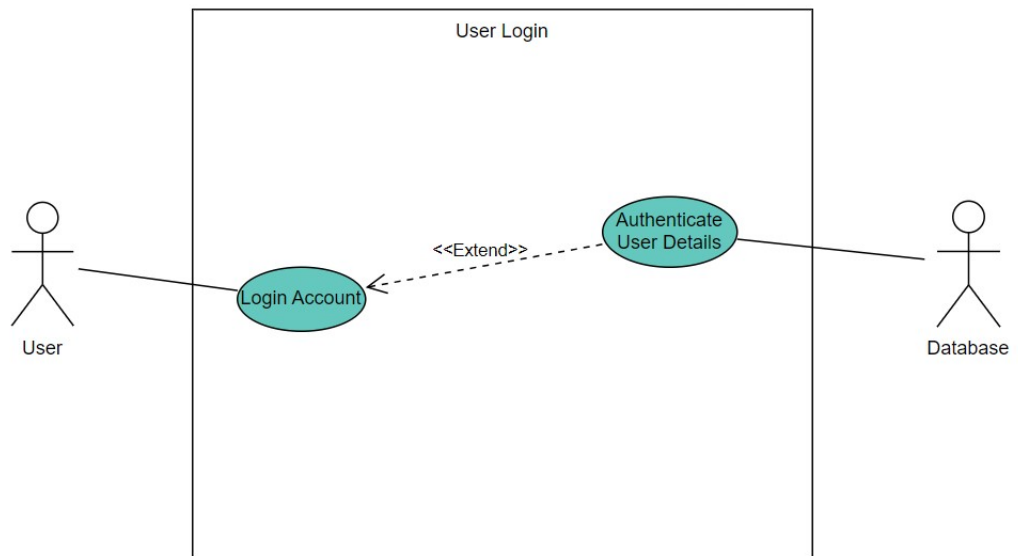


Figure 4: User Login

Figure 5: Tabular description for User Login

Use Case ID	0002	
Use Case Name	User Login	
Actor(s)	User	
Data	Username, Password	
Stimulus	Open Fit Guide app to login user account	
Pre-condition	Fit Guide application installed	
Steps	Normal	Alternative
	<ul style="list-style-type: none"> • User login successful 	<ul style="list-style-type: none"> • Send the error. • Tell the user to make sure credentials are correct
Response	<ol style="list-style-type: none"> 1. Login Successful 2. If login is not successful send the error tell the user to enter correct credentials 	
Post Condition	User gains access to the app	
Comments		

3.10.3 Questionnaire Use Case

The user will have to fill the questionnaire which will be saved in their user profile. The following figure shows the use case for questionnaire.

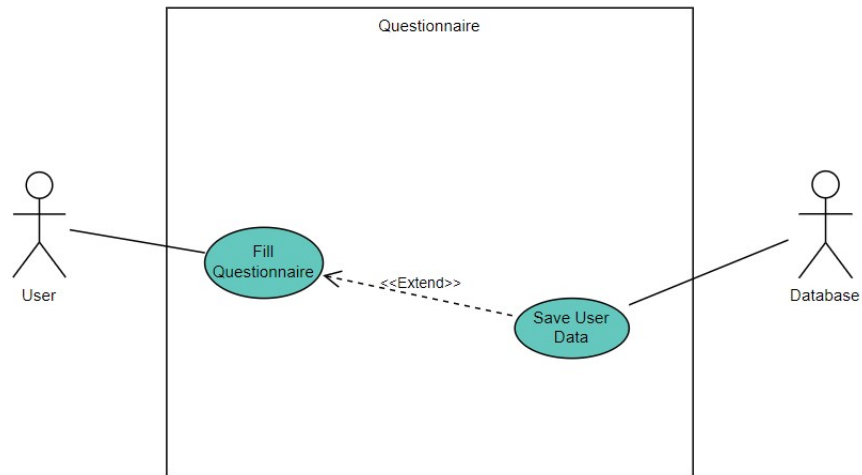


Figure 6: Questionnaire

Figure 7: Tabular description for Questionnaire

Use Case ID	0003	
Use Case Name	User Questionnaire	
Actor(s)	User	
Data	Enter details of user to generate workout plan and diet plans	
Stimulus	Select Questionnaire option on application	
Pre-conditions	User login/signup to account	
Steps	Normal	Alternative
	<ul style="list-style-type: none"> • Enter pre-existing medical conditions. • Select weight goal. • Enter fitness level. 	<ul style="list-style-type: none"> • Send an error to user to enter correct information.
Response	<ol style="list-style-type: none"> 3. Questionnaire has been filled. 4. Enter correct information. 	
Post Condition	Questionnaire has been filled	
Comments		

3.10.4 Check Insights Use Case

Insights will check user to check their goals. The following figures describe the use case for check insights.

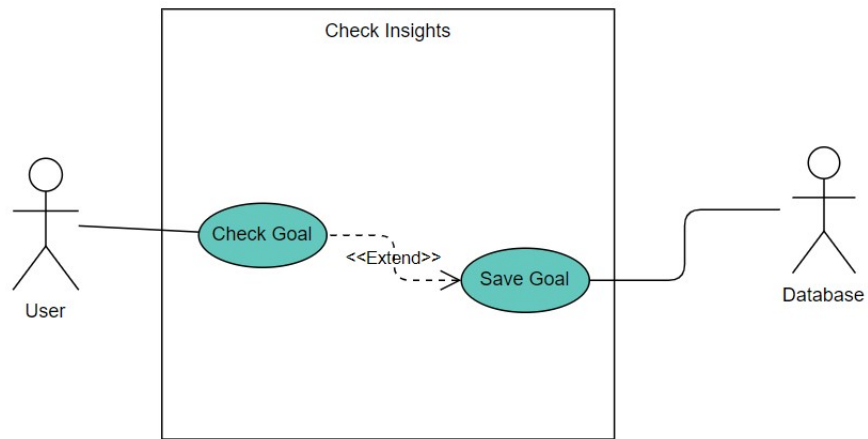


Figure 8: Check insights

Figure 9: Tabular description for Check insights

Use Case ID	0004	
Use Case Name	Check Insights	
Actor(s)	User	
Data	Select preferred details to check personal insights of user	
Stimulus	Select Check Insights option on application	
Pre-conditions	User login/signup to account	
Steps	Normal	Alternative
	<ul style="list-style-type: none"> • Users must select monthly goal. • Select weekly goal. • User can check goals. 	<ul style="list-style-type: none"> • Send an error to user to enter correct information.
Response	<ol style="list-style-type: none"> 5. Goal has been set. 6. Enter correct information. 	
Post Condition	User has checked insights.	
Comments		

4 Design

4.1 System Architecture

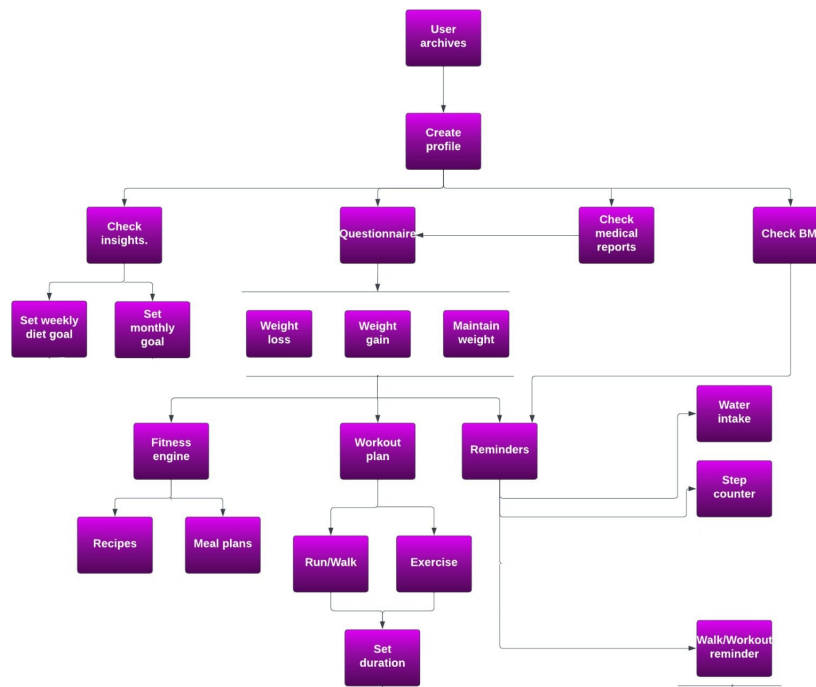


Figure 10: System Architecture

4.2 Design Constraints

4.2.1 Software Requirements

An Android Mobile Phone

4.2.2 Development Environment Requirements

Android Studio Firebase

4.2.3 Programming Language

Kotlin and Java for App Development

4.2.4 Technical Limitations

- Only relies on mobile phone sensors to calculate movement.

- Users will only be able to see their daily step count if the app has permissions for locations and body sensors.
- The app will suggest workout routine and diet plans according to the details provided by the user only.
- Water intake can only be calculated if the user enters it by his/her own.

Design constraints refer to the limitations and constraints that were considered when designing a fitness app. Some potential design constraints for FitGuide include:

1. **Technical limitations:** FitGuide may be limited by the capabilities of the device or platform on which it will be used. For example, the app may be constrained by the processing power, memory, or battery life of a smartphone.
2. **User experience:** FitGuide is intuitive and easy to use, with a clear and simple UI that is optimized for the intended operating environment (e.g., smartphone, tablet).
3. **Accessibility:** The app is designed to be accessible to users with disabilities, in accordance with relevant guidelines and standards.
4. **Performance:** The app is designed to be efficient and perform well, with a fast-loading time and minimal downtime.
5. **Compatibility:** FitGuide is designed to be compatible with any relevant external systems or services, such as fitness tracking devices.

4.3 Design Methodology

4.3.1 Partitioning Techniques:

There are several partitioning techniques that we can use to divide the workload of a FitGuide application among the available parallel resources. Some common techniques include:

- **Data partitioning:** This involves dividing the data among parallel resources. For example, we could partition a dataset of workout records among different CPU cores or GPU threads and have each resource process a portion of the data.
- **Task partitioning:** This involves dividing the tasks to be performed by FitGuide among the parallel resources. For example, we could assign different tasks, such as calculating heart rate or tracking steps, to different CPU cores or GPU threads.

- Space partitioning: This involves dividing the space in which the fitness application operates into smaller regions and assigning each region to a different resource. For example, we could divide a virtual environment for a fitness game into smaller chunks and assign each chunk to a different CPU core or GPU thread.
- Time partitioning: This involves dividing the time over which FitGuide operates into smaller intervals and assigning each interval to a different resource. For example, we can assign different time slices to different CPU cores or GPU threads and have each resource process a portion of the workload during its assigned time slice.

By using these partitioning techniques, we can divide the workload of FitGuide application among the available parallel resources, allowing the application to take advantage of parallelism and improve its performance.

4.3.2 Communication Requirements:

The communication requirements for FitGuide will depend on the specific features and functionality of the app. Some common communication requirements for FitGuide include:

- Syncing data with a server: FitGuide allow users to track their workouts, nutrition, and other health data, and may need to sync this data with a server to store it and make it available across devices.
- Sending notifications: FitGuide may need to send notifications to users to remind them to track their workouts or to congratulate them on achieving a fitness goal.

To meet these communication requirements, FitGuide may need to use a variety of communication protocols, such as push notifications for sending notifications, and API integration.

4.3.3 Agglomeration Strategy:

An agglomeration strategy is a way to group or combine data or tasks to improve the efficiency of a parallel algorithm. In the context of FitGuide, an agglomeration strategy might involve combining data from multiple workouts or health metrics to calculate a more comprehensive view of a user's fitness.

There are several ways to implement an agglomeration strategy for a FitGuide:

- Data agglomeration: This involves combining data from multiple sources to perform more complex analysis. For example, FitGuide could combine data from a user's workouts, nutrition, and sleep to calculate an overall wellness.
- Task agglomeration: This involves combining multiple tasks into a single task to improve efficiency. For example, FitGuide could combine several

smaller tasks, such as tracking water intake and tracking steps, into a single larger task that is more efficient to execute in parallel.

- Hierarchical agglomeration: This involves grouping data or tasks into smaller units at lower levels of a hierarchy and then combining them into larger units at higher levels. This can help to reduce communication overhead and improve efficiency.

By using an agglomeration strategy, we can improve the efficiency of the parallel algorithms used in FitGuide, allowing it to make better use of the available parallel resources.

4.3.4 Mapping (degree of concurrency, processor requirement etc.):

The mapping of FitGuide onto available parallel resources refers to the process of assigning tasks to the resources in a way that maximizes efficiency and performance. There are several factors that can influence the mapping of our app, including the degree of concurrency, the processor requirement of the tasks being performed, and the characteristics of the parallel resources. To map FitGuide onto available parallel resources, we can use a variety of techniques, such as data partitioning, task partitioning, space partitioning, and time partitioning. These techniques allow us to divide the workload of the app among the resources in a way that takes advantage of the available parallelism.

In addition, we may need to use load balancing techniques to ensure that the workload is distributed evenly among the resources, and to adapt to changes in resource availability. We may also need to use communication and synchronization techniques to coordinate the tasks being performed by the different resources.

By carefully mapping the tasks of the app onto the available parallel resources, we can improve the efficiency and performance of the app and provide a better user experience.

The mapping of FitGuide, in terms of degree of concurrency and processor requirement, will depend on the specific features and functionality of the app. Some factors that may influence the mapping of our app include:

- Degree of concurrency: The degree of concurrency in our app will depend on the number and complexity of the tasks that can be performed concurrently. For example, FitGuide allows users to track their workouts and nutrition, which may have a high degree of concurrency, as these tasks can be performed independently of each other.
- Processor requirement: The processor requirement of FitGuide will depend on the computational demands of the tasks being performed. For example, our app performs complex calculations, such as analyzing data from multiple workouts or generating personalized training plans, which may have a higher processor requirement than a simpler app that only tracks basic health metrics.

To map FitGuide onto available parallel resources, we will need to consider both the degree of concurrency and the processor requirement of the app and decide how to assign tasks to the available resources in a way that maximizes efficiency and performance. This may involve using techniques such as data partitioning, task partitioning, and load balancing to divide the workload among the resources.

4.4 High Level Design

4.4.1 Sequence Diagram

User Login

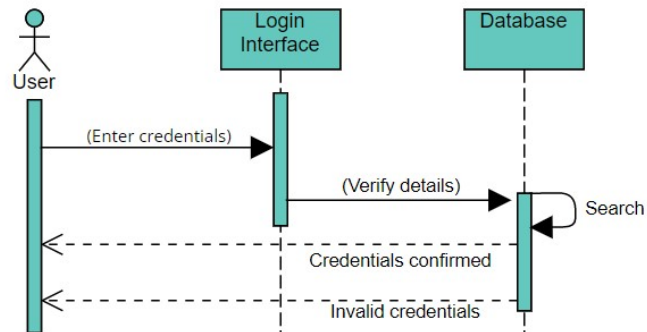


Figure 11: User login sequence diagram

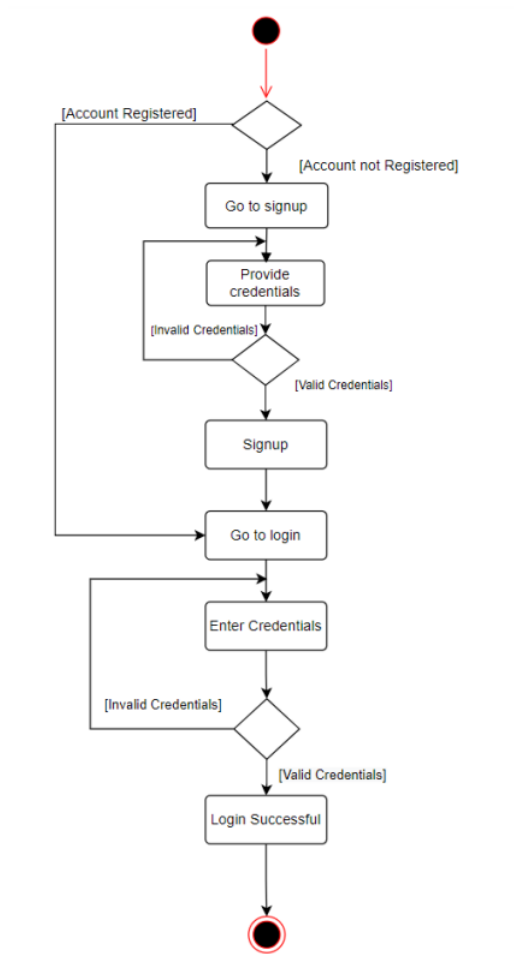
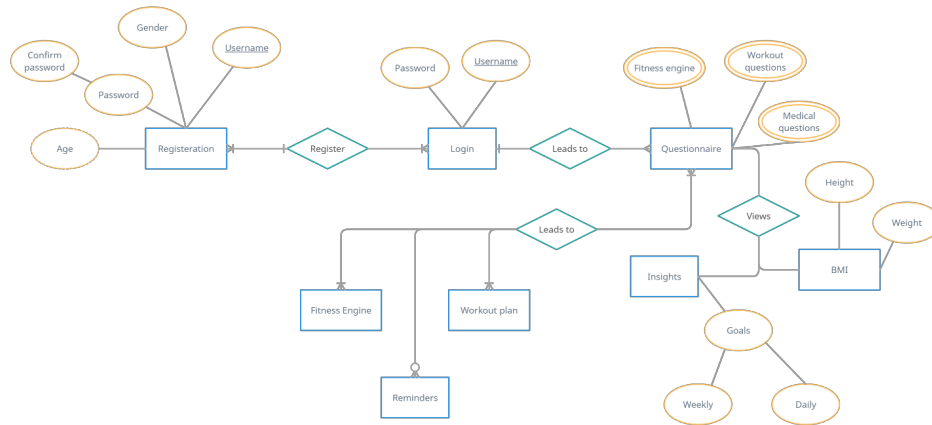


Figure 12: Activity Diagram

4.5 Database Design



Sequence Diagram

4.6 GUI Design

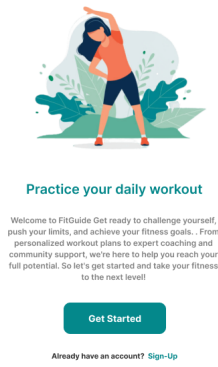


Figure 13: Splash screen

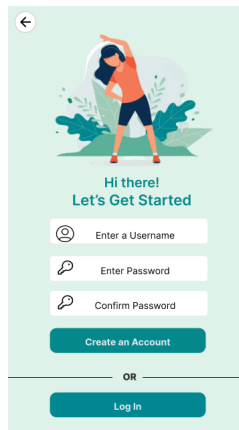


Figure 14: SignUp activity

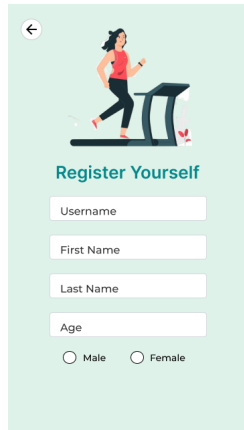


Figure 15: Register user activity

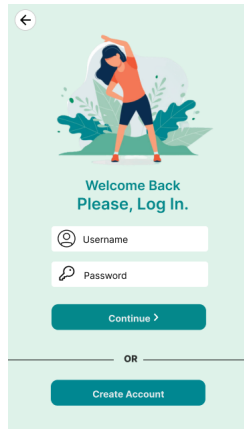


Figure 16: Login activity

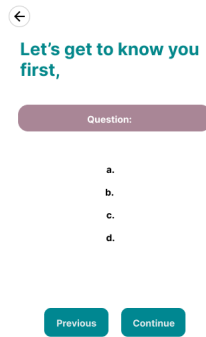


Figure 17: Questionnaire activity



Figure 18: Track Features activity

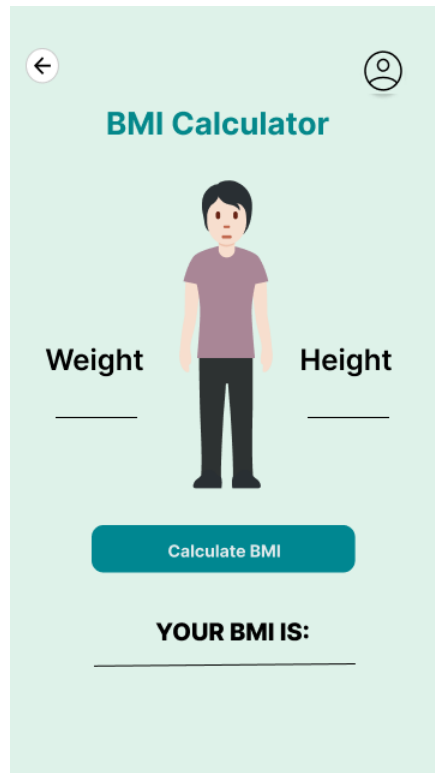


Figure 19: BMI activity



Let's get into shape!

SET REMINDER

Figure 20: StepCounter activity

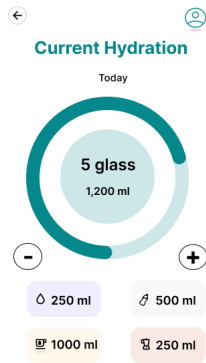


Figure 21: Water intake activity

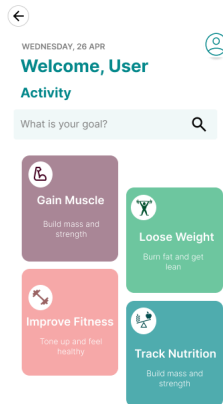


Figure 22: Goal activity

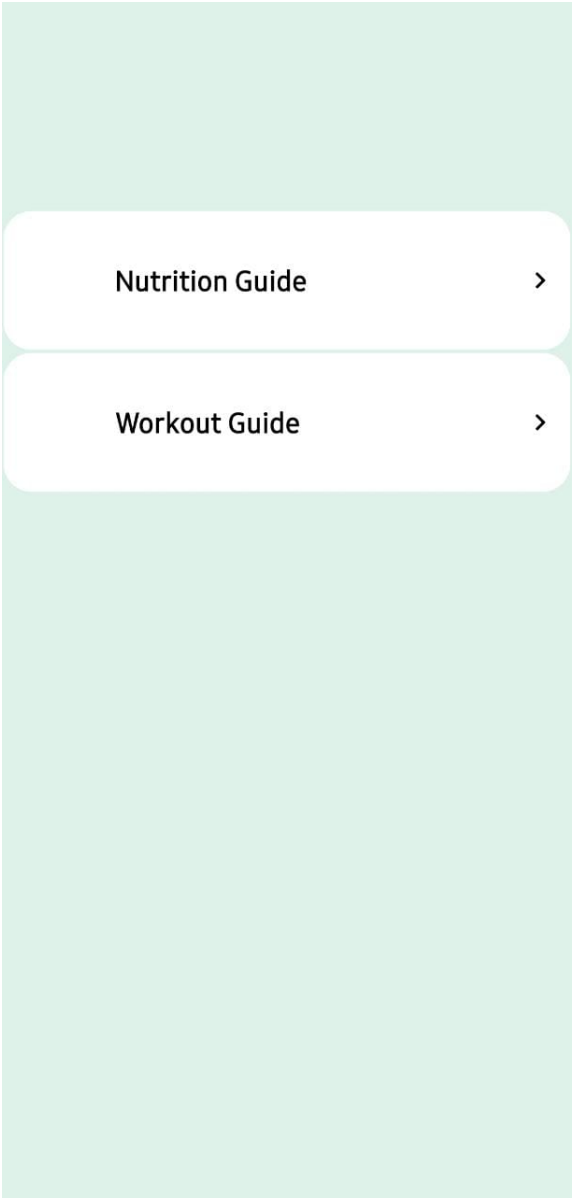


Figure 23: Plan activity

Select Workout Day

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

SUNDAY

Figure 24: Weekly activity

MOUNTAIN CLIMBER

Repeat 2 Times

01:00 MIN



BASIC CRUNCHES

Repeat 2 Times

01:00 MIN



BENCH DIPS

Repeat 2 Times

01:00 MIN



BICYCLE CRUNCHES

Repeat 2 Times

01:00 MIN



LEG RAISE

Repeat 2 Times

01:00 MIN



ALTERNATIVE HEEL TOUCH

Repeat 2 Times

01:00 MIN



LEG UP CRUNCHES

Repeat 2 Times

01:00 MIN



SIT UP

Repeat 2 Times

01:00 MIN



Figure 25: Exercises activity



01:00

START

How To Do This

Step 1:- This movement is performed with a bench and a foot stool.

Step 2:- Place a bench behind yourself and rest on it with your hands. Place your legs straight out in front of you. You may also place them at an elevated level as shown above.

Step 3:- Begin with arms in a fully. Slowly bend at your elbows keeping the rest of your body straight. Be sure to keep your elbows back and close together.

Figure 26: Exercise activity

00:53

PAUSE

How To Do This

Step 1:- This movement is performed with a bench and a foot stool.

Step 2:- Place a bench behind yourself and rest on it with your hands. Place your legs straight out in front of you. You may also place them at an elevated level as shown above.

Step 3:- Begin with arms in a fully. Slowly bend at your elbows keeping the rest of your body straight. Be sure to keep your elbows back and close together.

Step 4:- Dip down until your arms form a 90 degree angle and you feel a stretch in the triceps.

Step 5:- Slowly extend your arms raising your body back up. Pause and contract your triceps muscles at the top. Pause and repeat the movement.

Figure 27: Exercise description activity

Breakfast

1. Two whole eggs scrambled with two slices of whole wheat toast.
2. 1/2 an avocado on the side.
3. A glass of whole milk

Lunch

1. Grilled chicken breast with quinoa and mixed vegetables.
2. An apple for dessert

Snack

Greek yogurt with a handful of almonds and a drizzle of honey

Dinner

1. Grilled salmon with sweet potato wedges and broccoli.
2. A glass of orange juice.

Figure 28: Nutrition plan activity

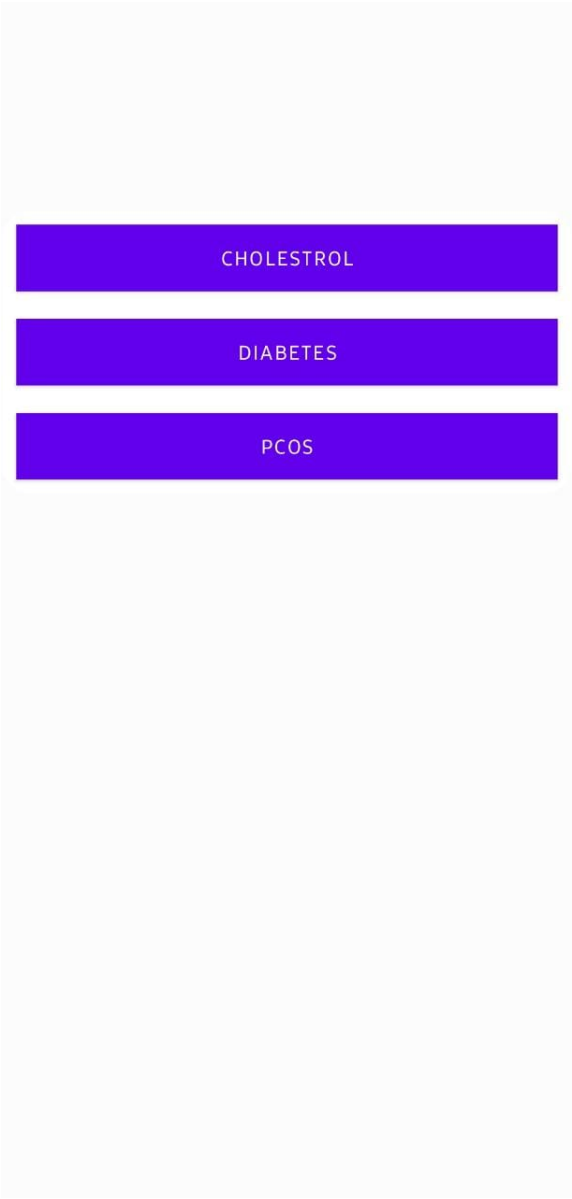


Figure 29: Medical activity

Breakfast

1. Oatmeal with sliced almonds or walnuts, topped with fresh berries.
2. A glass of freshly squeezed orange juice or a piece of whole fruit.

Lunch

1. Grilled chicken or fish (salmon, trout, or mackerel) seasoned with herbs and lemon juice.
2. A large salad with mixed greens, colorful vegetables (such as tomatoes, cucumbers, and bell peppers), and a drizzle of olive oil and vinegar dressing.
3. A small serving of whole grain bread.

Snack

Greek yogurt topped with a sprinkle of ground flaxseeds or chia seeds and a handful of berries.

Dinner

1. Baked or grilled lean protein options like skinless chicken breast.
2. Steamed or roasted vegetables like broccoli, cauliflower, asparagus.
3. A small serving of whole grains like brown rice, whole wheat pasta.

Figure 30: Medical plan activity

< Tips & Diet

Avoid Fast Food

Never Skip Breakfast

Choose Low Calorie Supper

Eat Healthy Lunch

Forget About Desserts

Figure 31: Tips and Diet activity



Avoid Fast Food

To avoid fast food, it's important to plan and prepare your meals in advance. Cook at home using fresh ingredients, and pack your lunch and snacks when you're on the go. Keep healthy alternatives and snacks readily available, practice mindful eating, and seek support from others to stay motivated on your journey towards a healthier diet.



Figure 32: Tip Food activity



Never Skip Breakfast

Never skip breakfast as it provides essential fuel to kickstart your day. Eating a balanced breakfast helps stabilize blood sugar levels, boosts metabolism, and improves concentration and focus. Include protein, whole grains, and fruits or vegetables to ensure a nutritious start to your day and set yourself up for better overall health and productivity.



Figure 33: Tip breakfast activity



Choose Low Calorie Supper

When choosing a low-calorie supper, opt for lean protein sources such as grilled chicken or fish. Fill your plate with plenty of vegetables, which are low in calories but rich in nutrients. Minimize the use of oils and choose cooking methods like steaming or baking to keep the calorie count low.



Figure 34: Tip Calorie activity



Eat Healthy Lunch

Eating a healthy lunch is crucial for sustaining energy and supporting overall well-being. Include a balance of lean proteins like grilled chicken or tofu, whole grains such as quinoa or brown rice, and a variety of colorful vegetables. Avoid fried or processed foods, and instead choose homemade or freshly prepared options to ensure you're getting a nutritious and satisfying meal that fuels your body and mind.



Figure 35: Tip Healthy activity



Forget About Desserts

While desserts can be tempting, it's important to prioritize your health by minimizing their consumption. Instead, focus on satisfying your sweet tooth with naturally sweet options like fresh fruits or yogurt with a drizzle of honey. If you still crave a treat, opt for healthier alternatives like dark chocolate or homemade baked goods made with nutritious ingredients. Remember, moderation is key when it comes to indulging in desserts.



Figure 36: Tip Desserts activity

5 System Implementation

This chapter presents in detail the implementation details of the system in the following sections.

5.1 System Architecture

As described earlier, the project has major components that we have integrated together. In this section we will discuss the components of our system individually and the communication between them.

FitGuide typically consists of several internal components that work together to provide a comprehensive user experience. The internal components of our app are:

1. User Login: This component allows users to access the features of FitGuide app by logging in.

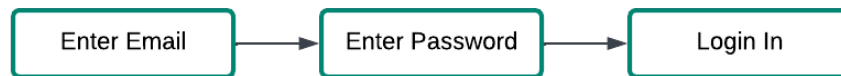


Figure 37: User login component

2. User Signup: This component allows users to access the features of FitGuide app by simply creating an account with their email address and logging in.



Figure 38: User Register component

3. User Profile: This component allows users to create and manage their profile, including their personal information, fitness goals, and progress tracking.
4. BMI Calculator: This component allows users to calculate their BMI by entering their height and weight.

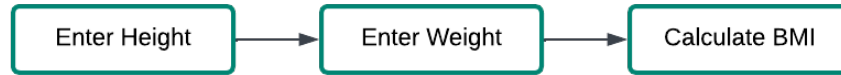


Figure 39: BMI Calculator component

5. Step Counter: Another important component of our app is the step counter. It manages step calculation based on the steps taken by users.
6. Water Intake: This component allows users to keep a track of their water intake and involves push notification to remind them on staying hydrated.
7. Nutrition and Workout Plans: This component allows user to access nutrition and workout plan generated according to their input.

5.1.1 System Flow/ Communication

he communication between each component of project is illustrated below:

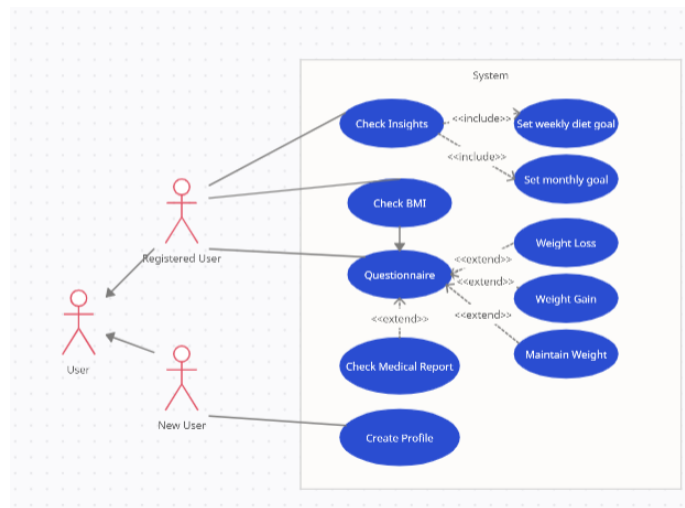


Figure 40: System Flow/ Communication of FitGuide

5.1.2 Tools and Technology Used

The following tools and technologies have been employed in our project.

- Android Studio

- Figma
- Firebase
- Java/Kotlin

5.1.3 Libraries Used

The following libraries have been employed in our project.

- Firebase

5.1.4 Development Environment/ Languages Used

Java and Kotlin have been used as the development language as Android Studio supports both languages. User Interface has been designed using Figma and then exported to Android Studio. The database is supported by Firebase, which keeps records of all user data and displays it in the user profile component.

5.1.5 Processing Logic/ Algorithms

FitGuide typically uses several algorithms and processing logic to provide various features related to fitness tracking, data analysis, and recommendations. The basic logic employed in our system is as follows:

1. **Activity Tracking:** FitGuide uses an algorithm to track the users' steps and display it to him. This involves processing data from sensors.
2. **Workout Planning:** FitGuide provides personalized workout plans based on the user's fitness goals and preferences. The app's backend uses algorithms to generate these plans, considering factors such as the user's fitness level, body composition, preexisting conditions.
3. **Nutrition Planning:** FitGuide also offers nutrition planning features that provide users with personalized diet plans. This involves an algorithm that analyzes the user's dietary preferences and health goals and suggests meal plans that meet their requirements.
4. **Goal Tracking:** Our app users set goals related to their fitness, such as steps walked, water intake or distance covered.
5. **User Questionnaire:** The app includes a questionnaire that asks user about his/ her preferences and then displays the app functionality.

6 System Testing and Evaluation

FitGuide could provide users with customized recommendations and support to help them reach their goals in a safe sustainable way. It is built using Android Studio and Firebase to store user details. The app is easy to use and navigate, with a clean and intuitive interface. Moreover, the app should handle user data responsibly and securely, including any personal information and fitness data. To design the user interface Figma is used for an interesting and attractive user experience.

- Register user was successfully connected to Firebase and input data was saved to Firebase.
- User can successfully log in through authentication from Firebase.
- User can successfully create their profile and their information is saved to Firebase.
- User can successfully read their data from reading details from Firebase.

6.1 Test Cases

Table 1: Test case of Register User

Test Case ID	TC-1
Test Case Name	Register user
Test Performed By	Eesha Tir Radiah Faisal
Description	Verify the user's account registration after clicking on the 'Register' button, with complete input data
Test Data	Username: Email: eesha.faisal@ymail.com Password: 12345678 Confirm Password: 12345678
Expected Result	User registered successfully
Pass/Fail	Pass

Table 2: Test case of Register User

Test Case ID	TC-2
Test Case Name	Register user
Test Performed By	Eesha Tir Radiah Faisal
Description	Verify the user's account registration after clicking on the 'Register' button, with an incorrect confirm password.
Test Data	Username: Email: eesha.faisal@ymail.com Password: 12345678 Confirm Password: 123678
Expected Result	"Passwords do not match" error displayed
Pass/Fail	Pass

Table 3: Test case of Login User

Test Case ID	TC-3
Test Case Name	Login user
Test Performed By	Eesha Tir Radiah Faisal
Description	Verify the user's account login after clicking on the 'Login' button, with the correct input
Test Data	Username: Email: eesha.faisal@ymail.com Password: 12345678
Expected Result	Successfully login user
Pass/Fail	Pass

Table 4: Test case of Login User

Test Case ID	TC-4
Test Case Name	Login user
Test Performed By	Eesha Tir Radiah Faisal
Description	Verify the user's account login after clicking on the 'Login' button, with the incorrect password
Test Data	Username: Email: eesha.faisal@ymail.com Password: 123478
Expected Result	Login failed message displayed to the user
Pass/Fail	Pass

Table 5: Test Case of User Profile

Test Case ID	TC-5
Test Case Name	Login user
Test Performed By	Eesha Tir Radiah Faisal
Description	Verify the user's account login after clicking on the 'Login' button, with the incorrect email address
Test Data	Username: Email: eesha.fal@ymail.com Password: 12345678
Expected Result	Login failed message displayed to the user
Pass/Fail	Fail, as no error is displayed to the user.

Table 6: Test case of User Profile

Test Case ID	TC-6
Test Case Name	User profile
Test Performed By	Hooriya Rizwan
Description	Input all details from user to user profile
Test Data	Username: Hoor12 First Name: Hooriya Last Name: Rizwan Age: 15 Gender: Female
Expected Result	User profile details saved to Firebase. "Successfully saved" message showed. Directed to next page.
Pass/Fail	Pass

Table 7: Test Case of User profile

Test Case ID	TC-7
Test Case Name	User profile
Test Performed By	Hooriya Rizwan
Description	Input all details from user to user profile
Test Data	Username: HRizwan First Name: Hoor Last Name: Asad Age: 20 Gender: Female
Expected Result	User profile details not saved to Firebase.
Pass/Fail	Failed, as the internet connection was turned off.

Table 8: Test Case of Questionnaire

Test Case ID	TC-8
Test Case Name	Questionnaire
Test Performed By	Hooriya Rizwan
Description	User selects an answer and is directed to next question.
Test Data	–
Expected Result	User selects an answer and is directed to next question Progress bar updates. Progress number updates.
Pass/Fail	Pass

Table 9: Test Case of BMI

Test Case ID	TC-9
Test Case Name	BMI
Test Performed By	Eesha Tir Radiah Faisal
Description	User checks his/her BMI
Test Data	Weight= 50kg Height= 172cm
Expected Result	16.9. Underweight.
Pass/Fail	Pass

Table 10: Test Case of Step Counter

Test Case ID	TC-10
Test Case Name	StepCounter
Test Performed By	Hooriya Rizwan
Description	Step counter increments as user walks.
Test Data	Walking.
Expected Result	Step counter increments as user walks.
Pass/Fail	Pass

Table 11: Test Case of Weekly exercise

Test Case ID	TC-11
Test Case Name	Weekly exercise
Test Performed By	Hooriya Rizwan
Description	User selects the day and exercises are displayed
Test Data	-
Expected Result	User selects the day and exercises are displayed
Pass/Fail	Pass

Table 12: Test Case of Water Tracker

Test Case ID	TC-12
Test Case Name	Water Tracker.
Test Performed By	Hooriya Rizwan
Description	User saves water intake details.
Test Data	User increments number of glasses.
Expected Result	Number of water milliliter intake increases.
Pass/Fail	Pass

Table 13: Test Case of Exercise

Test Case ID	TC-13
Test Case Name	Exercise.
Test Performed By	Eesha Tir Radiah Faisal
Description	User selects exercise and exercise details are displayed
Test Data	–
Expected Result	User selects exercise and exercise details are displayed
Pass/Fail	Pass

Table 14: Test Case of Nutrition and Tips

Test Case ID	TC-14
Test Case Name	Nutrition and tips.
Test Performed By	Eesha Tir Radiah Faisal
Description	Nutrition and tips
Test Data	–
Expected Result	Nutrition and tips are displayed upon user's click.
Pass/Fail	Pass

7 Conclusions

7.1 Conclusion

Many people have little or no knowledge about how to exercise the right way. FitGuide will provide them with different exercises and a detailed description of how to perform those exercises. Other than knowledge, people also do not have the time to go to gym or fix a time with a personal trainer in their busy routines. Our application provides an easy solution for this, the users can exercise according to a guide and whenever they want by using FitGuide. It is already stressful enough to manage work and personal health. FitGuide offers a nutrition guide and tips that a user can easily follow wherever they are. In this social media era people tend to keep sitting at a place for a long time using their phones, FitGuide offers features that remind them to take a walk and also a friendly reminder to stay hydrated by drinking water from time to time.

7.2 Future Improvements/Recommendation

Our future goals include integrating the application with different social media platforms or sites online, to increase the connectivity between people who are interested in fitness. To increase the connectivity further, we will also include a message feature that allows users to chat with their friends. We will be open to feedback from the users and will try our best to provide a user-friendly application. Moreover, to improve the applications from time to time with latest trends and requirements.

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