Muscles Stretching App

BS Software Engineering Final Year Project Report

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CECOS University of IT and Emerging Sciences Hayatabad Peshawar

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A Final Year Project Report submitted in partial fulfillment of the requirements for the degree of

B.S (Software Engineering)

Final Year Project Report Supervisor:

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ABSTRACT

The aim of this project is to develop a fitness app that enables users to maintain their fitness and well-being from the comfort of their homes. The app offers a range of features including diet recommendations, animated demonstrations of stretching exercises, gym workout sessions, and yoga simulations. By providing a comprehensive set of resources, users can easily access and follow tailored fitness routines.

The app incorporates functionalities such as a calendar, alarm, and timer, allowing users to schedule and track their exercises efficiently. Leveraging the power of Flutter, an open-source UI software development kit (SDK) by Google, the app ensures cross-platform compatibility, enablingusers to access it seamlessly from both iOS and Android devices. Furthermore, Firebase, a cloud- based platform, is utilized for secure data storage, authentication, and real-time updates.

With its intuitive user interface, visually appealing design, and interactive features, the fitness app aims to motivate and guide users in achieving their fitness goals. By bringing together the convenience of technology, expert recommendations, and engaging user experiences, the app provides an effective solution for individuals seeking to improve their fitness and lead a healthier lifestyle.

UNDERTAKING

I certify that research work titled "*Muscle Stretching Mobile Application*" is my own work. The work has not been presented elsewhere for assessment. Where material has been used from other sources it has been properly acknowledged / referred.

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I am grateful to Allah for blessing mankind with intelligence, knowledge, and wisdom. May the peace and blessings of Allah be upon the Holy Prophet who emphasized the importance of seeking knowledge.

*First and foremost, I would like to extend my heartfelt appreciation to my supervisor,[**Dr. Kifayat Ullah**] for his unwavering support, patience, motivation, enthusiasm, and extensive expertise. His guidance has been invaluable throughout the entire project. Lastly, I would like to express my deep gratitude to my parents for their constant moral and spiritual support throughoutmy life.*

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CHAPTER 1

Introduction

1.1 Overview

In today's modern and busy lifestyle, maintaining fitness and leading a healthy life has become increasingly challenging. Many individuals struggle to find the time, resources, and guidance necessary to stay fit. In response to these challenges, this Final Year Project (FYP)aims to develop a fitness mobile application using the Flutter framework. The application will provide users with the means to stay fit and healthy within the comfort of their homes. Itwill offer features such as diet recommendations, animated stretching exercises, animated gym exercises, yoga simulations, and exercise tracking tools.

1.2 Problem Statement

The sedentary nature of modern living, coupled with restricted access to fitness facilities, has led to a decline in physical activity levels and an increase in health-related issues.
Furthermore, individuals often struggle to maintain a balanced diet and find suitable exercise routines tailored to their specific needs and preferences. Consequently, there is a need for a mobile application that addresses these challenges and provides a convenient platform for users to stay fit and healthy within the confines of their homes.

1.3 Scope

The scope of this project revolves around developing a fitness mobile application that offers a range of features to support users in their fitness journeys. The application will focus on diet recommendations, animated stretching exercises, animated gym exercises, yoga simulations, and exercise tracking tools. These features will be designed to cater to various fitness levels and accommodate users with different preferences and goals. The application will primarily target users who seek to maintain their fitness while staying at home.

1.4 Objectives

The main objectives of this project are as follows:

1. Develop a fitness mobile application using the Flutter framework.
2. Provide users with personalized diet recommendations based on their preferences and dietary requirements.
3. Implement animated stretching exercises to enhance flexibility and prevent injuries.

4. Incorporate animated gym exercises to target different muscle groups and promote strength and endurance.
5. Offer yoga simulations through animated sequences to facilitate relaxation and mind-body harmony.
6. Integrate a calendar, alarm, and timer functionality to enable users to set and track their exercise routines.
7. Ensure an intuitive and user-friendly interface to enhance the overall user experience.

1.5 Tools and Technology

The fitness mobile application will be developed using the Flutter framework. Flutter is a cross-platform development framework that allows for efficient code sharing across multiple platforms, including iOS and Android. It offers a rich set of pre-built UI components, animations, and widgets, enabling the development of visually appealing and responsive applications. Flutter's Dart programming language will be utilized to build the application's logic and implement the required features. Additionally, the application will make use of backend services and APIs to fetch diet recommendations, exercise data, and other relevant information.

CHAPTER 2

Background Study

In recent years, there has been a surge in the popularity of fitness mobile applications, catering to users' needs for convenient and accessible fitness solutions. Several apps have emerged in the market with similar features to the proposed fitness app. A comparative analysis of some of these competitors is presented below, highlighting the unique strengths and advantages of our app.

2.1 FitTrackr:

FitTrackr is a comprehensive fitness app that uses tracking algorithms to monitor various fitness parameters. It tracks your heart rate, sleep patterns; steps, calories burned. It provides personalized workout recommendations and integrates with smartwatches for real-time tracking. However, FitTrackr offer various fitness tracking and workout features, it doesn't have an animation system like Muscle Stretching Mobile Application. Muscle Stretching Mobile Application incorporates an advanced animation system that provides users with visual demonstrations of exercises, ensuring proper form and technique. This feature enhances user understanding and reduces the risk of injury during workouts.

2.2 FlexConnect:

The app provides a wide range of workout routines and nutrition plans, and users can earn virtual rewards for reaching their goals. However, FlexConnect didn't explicitly mention having a diet recommendation system, Muscle Stretching Mobile Application distinguishes itself by integrating a comprehensive diet recommendation system. Muscle Stretching Mobile Application goes beyond by considering users' fitness objectives, body composition, and dietary preferences to offer tailored nutrition plans. This system assists users in maximizing their exercise routines by providing appropriate nutritional guidance.

2.3 YogaZen:

YogaZen is a specialized app for yoga enthusiasts. It offers a vast library of yoga poses and guided meditation sessions for users of all levels. However, Yogazen did not the mentioned specifically having a diet recommendation system, Muscle Stretching Mobile Application stands out by incorporating a comprehensive diet recommendation system. It analyzes users' fitness goals, body composition, and dietary preferences to provide personalized

nutrition plans. This system helps users optimize their workouts by providing them with theright nutritional guidance alongside their fitness routines.

2.4 HIIT Pro:

HIIT Pro is a high-intensity interval training (HIIT) app designed for those seeking intense and efficient workouts. It offers a variety of HIIT routines with customizable durations and difficulty levels. The app includes audio cues and countdown timers to guide users through each interval, maximizing their workout efficiency. However, FitTrackr offers a range of fitness tracking and workout functionalities, it lacks an animation system similar to Muscle Stretching Mobile Application. Muscle Stretching Mobile Application, on the other hand, integrates an advanced animation system that presents users with visual representations of exercises, promoting correct form and technique. This characteristic improves user comprehension and minimizes the likelihood of injuries while exercising.

2.5 GymBuddy:

GymBuddy is a specialized application catered to individuals who frequent the gym. It features an extensive collection of exercises accompanied by in-depth instructions and videosfor each one. Users have the ability to customize their own workout routines, monitor their advancements, and record the weights and repetitions they perform. However, GymBuddy did not explicitly state the inclusion of a diet recommendation system, Muscle Stretching Mobile Application sets itself apart by incorporating a comprehensive one. Muscle StretchingMobile Application surpasses expectations by taking into account users' fitness goals, body composition, and dietary preferences to provide personalized nutrition plans. This system aids users in optimizing their workout routines by offering suitable nutritional guidance.

2.6 MindfulMoves:

MindfulMoves is an exceptional fitness application that blends physical exercise with mindfulness techniques. The app encompasses yoga-inspired movements, breathing exercises, and meditation sessions. However, MindfulMoves provides various fitness tracking and workout features, it does not possess an animation system akin to Fittop. In contrast, Muscle Stretching Mobile Application incorporates an advanced animation system that offers users visual demonstrations of exercises, ensuring proper form and technique. This attribute enhances user understanding and reduces the risk of injuries during workouts.

2.7 Home Workout– No Equipment:

The primary purpose of the Home Workout– No Equipment application is to offer users a selection of exercise routines that can be easily performed within their homes. It provides a wide range of exercises and workout plans that specifically focus on various muscle groups and cater to diverse fitness objectives. However, Home Workout– No Equipment did not directly mention having a diet recommendation system, Muscle Stretching Mobile Application distinguishes itself by integrating an all-encompassing one. Muscle Stretching Mobile Application goes beyond expectations by considering users' fitness goals, body composition, and dietary preferences to deliver personalized nutrition plans. This system assists users in maximizing the effectiveness of their workout routines by providing appropriate nutritional guidance.

Table 2.1: Existing System Comparison Table

S#	**Title**	**Diet Recommendation System:**	**AnimationSystem:**
1	FitTrackr	No	No
2	FlexConnect	No	Yes
3	YogaZen	No	No
4	HIIT Pro	No	No
5	GymBuddy	No	Yes
6	MindfulMoves	No	No
7	Home Workout– No Equipment	No	Yes
8	**Muscle Stretching**	**Yes**	**Yes**

CHAPTER 3

System Requirements, Architecture and Design

3.1 Functional requirements:

3.1.1 User Login

Table 3.1: User Login Functional Requirement

ID	001
Name	User Login
Description	Users should be able to log in to the system without credentials.
Rational	User Authentication
Dependency	None

3.1.2 Diet Recommendation

Table 3.2: Diet Recommendation Functional Requirement

ID	002
Name	Diet Recommendation
Description	Users should be able to access information about various diets and nutritional guidelines.
Rational	Diet recommendation
Dependency	001

3.1.3 Stretching Exercise Widget

Table 3.3: Stretching Exercise Functional Requirement

ID	**003**
Name	Stretching Exercise Widget
Description	Users should be able to access a variety of stretching exercises with instructions and demonstrations.
Rational	Displaying Stretching sessions
Dependency	001

3.1.4 Gym Exercises Widget

Table 3.4: Gym Exercises Functional Requirement

ID	**004**
Name	Gym Exercise Widget
Description	Users should be able to explore various gym exercises categorized by different sessions.
Rational	Displaying gym exercise sessions
Dependency	001

3.1.5 Yoga Exercises Widget

Table 3.5: Yoga Exercises Functional Requirement

ID	**005**
Name	Yoga Exercise Widget
Description	Users should be able to access a collection of yoga exercises and sequences for relaxation and flexibility
Rational	Displaying Yoga sessions
Dependency	001

3.1.6 Calendar

Table 3.6: Calendar Functional Requirement

ID	**006**
Name	Calendar
Description	Users should be able to set and manage a calendar within the application.
Rational	Scheduling exercise
Dependency	001

3.1.7 Alarm

Table 3.7: Alarm Functional Requirement

ID	**007**
Name	Alarm
Description	Users should be able to set alarms within the application.
Rational	Scheduling reminder
Dependency	001

3.1.8 Timer

Table 3.8: Timer Functional Requirement

ID	**008**
Name	Timer
Description	Users should be able to set timers within the application.
Rational	Exercise Tracking
Dependency	001

3.1.9 Show Alarm

Table 3.9: Alarm Functional Requirement

ID	**009**
Name	Show Alarm
Description	The application should display the set alarms and notify users when the alarms are triggered.
Rational	Scheduling reminder
Dependency	001

3.1.10 Show Timer:

Table 3.10: Show Timer Functional Requirement

ID	**010**
Name	Show Timer
Description	The application should display the set timers.
Rational	Exercise Tracking
Dependency	001

3.1.11 Show Stretching Exercise Sessions

Table 3.11: Show Stretching Functional Requirement

ID	**011**
Name	Show Stretching Exercise Sessions
Description	The application should show a list of available stretching exercise sessions through the display stretching exercise widget.
Rational	Viewing Stretching sessions
Dependency	003

3.1.12 Show Gym Exercise Sessions

Table 3.12: Show Gym Exercises Functional Requirement

ID	**012**
Name	Show Gym Exercise Sessions
Description	The application should show a list of available gym exercise sessions through the display gym exercise widget.
Rational	Viewing Gym sessions
Dependency	004

3.1.13 Show Yoga Sessions

Table 3.13: Show Yoga Exercises Functional Requirement

ID	**013**
Name	Show Yoga Exercise Sessions
Description	The application should show a list of available yoga sessions through the display Yoga widget.
Rational	Viewing Yoga sessions
Dependency	005

3.1.14 About Us Page

Table 3.14: Show About us Page Functional Requirement

ID	**014**
Name	About us page
Description	The application should include an "About Us" page, providing information developers.
Rational	Viewing Information
Dependency	001

3.1.15 BMI Calculator

Table 3.14: Show About us Page Functional Requirement

ID	**015**
Name	BMI Calculator
Description	The app should include a BMI (Body Mass Index) calculator functionality that allows users to calculate their BMI based on their height, weight, and gender.
Rational	Viewing Information
Dependency	001

3.2 Non Functional Requirements:

3.2.1 Usability

- The application should have a user-friendly interface, with intuitive navigation and clear instructions.
- The layout and design should be visually appealing and easy to comprehend.
- The application should provide proper feedback and error handling to guide users in case of mistakes or invalid inputs.

3.2.2 Performance

- The application should be responsive and provide quick loading times for various screens and functionalities.
- The animations and transitions within the application should be smooth and fluid, enhancing the user experience.

3.2.3 Reliability

- The application should be stable and robust, ensuring minimal downtime or crashes.
- It should handle unexpected errors or exceptions gracefully, recovering from failures without data loss or system instability.

3.2.4 Compatibility

- The application should be compatible with popular mobile platforms (e.g., Android, iOS) and devices.
- It should be optimized for various screen sizes and resolutions to provide a consistent user experience across different devices.

3.2.5 Maintainability

- The application code should be modular, well-structured, and easily maintainable by developers.
- The system should be designed with proper documentation and version control practices to facilitate future enhancements and modifications.

3.3 System Architecture and Design

3.3.1 Use Case Diagram

The use case diagram visually represents the interactions between actors and the system, illustrating the different use cases and their relationships. The following use case diagram depictsthe major functionalities and interactions of the fitness mobile application:

The primary actors in the use case diagram are:

User: Represents the users of the fitness mobile application who interact with the system to access various features and functionalities.

The major use cases identified in the use case diagram are as follows:

User Login:
Allows users to log in to the system without credentials and access the home screen.

Access Diet Recommendations:
Enable users to navigate to a page displaying different diet recommendations.

Access Stretching Exercise Sessions:
Allow users to access a page showcasing various stretching exercise sessions.

Access Gym Exercise Sessions:
Enable users to explore different gym exercise sessions.

Access Yoga Sessions:
Allow users to access various yoga sessions.

Set Calendar:
Enables users to set and manage exercise schedules using a calendar feature.

Set Alarm:
Allow users to set alarms for exercise session reminders.

Set Timer:
Enable users to set timers to track exercise durations.

Show Alarm:
Displays the set alarms and notifies users when alarms are triggered.

Show Timer:
Displays the set timers and provides real-time updates during the countdown.

Show Stretching Exercise Sessions:
Show a list of available stretching exercise sessions.

Show Gym Exercise Sessions:
Show a list of available gym exercise sessions.

Show Yoga Sessions:
Show a list of available yoga sessions.

Access About Us:
Allows users to access information about the application and its developers.

The use case diagram provides a high-level overview of the interactions and functionalities of the fitness mobile application. It serves as a visual representation of the system's behavior, illustrating the relationships between actors and use cases. The identified use cases form the basis for further analysis, design, and development of the application.

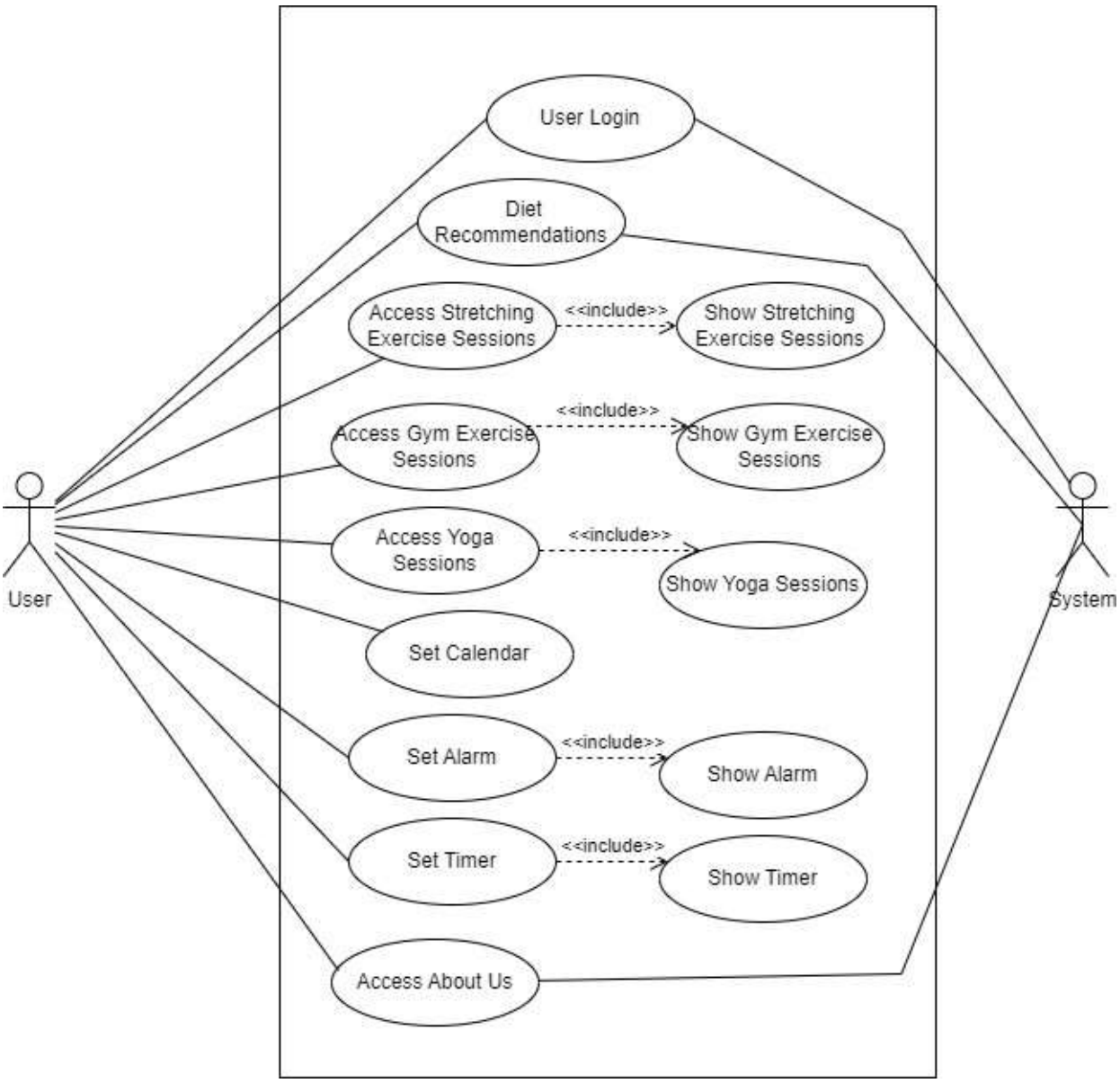

Fig 3.1**:** Use Case Diagram

3.3.2 Expanded Use Cases:

UC1: User Login

Table 3.15**:** User Login use case

UC1	
Name	User Login
Actors	User, System
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case describes the process of user login to the fitness mobile application without requiring credentials.
Cross Reference	001
Pre-Conditions	The System is installed on the user's device.
Successful Post Conditions	The user is successfully logged in, and the home screen is displayed.

Typical Course of Events			
Actor Action		**System Response**	
1	User opens the fitness mobile system.		
		2	The system verifies the absence of user credentials
		3	The system displays the home screen.

UC2: Diet Recommendations

Table 3.16**:** Diet Recommendation use case

UC2	
Name	Diet Recommendations
Actors	User, System
Purpose	This use case allows users to access a page displaying different diet recommendations.
Description	This use case allows users to access a page displaying different diet recommendations.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view the diet recommendation page.

Typical Course of Events			
Actor Action		**System Response**	
1	User navigates to the diet recommendation widget on the home screen.		
		2	The system displays the diet recommendation page with a list of different diets.

UC3: Access Stretching Exercise Sessions

Table 3.17**:** Access Stretching Exercise Sessions use case

UC3	
Name	Access Stretching Exercise Sessions
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case enables users to access a page showcasing various stretching exercise sessions.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view the stretching exercise session page.

Typical Course of Events			
Actor Action		**System Response**	
1	User taps on the stretching exercise widget on the home screen.		
		2	The application navigates to the stretching exercise session page, displaying a list of available sessions.

UC4: Display Gym Exercise Sessions

Table 3.18**:** Display Gym Exercise use case

UC4	
Name	Display Gym Exercise Sessions
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case allows users to access a page that shows different gym exercise sessions.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view the gym exercise session page.

Typical Course of Events			
Actor Action		**System Response**	
1	User selects the gym exercise widget on the home screen.		
		2	The system navigates to the gym exercise session page, displaying a list of available sessions.

UC5: Display Yoga Exercises

Table 3.19**:** Display Yoga Exercises use case

UC5	
Name	Display Yoga Exercises
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case enables users to access a page that shows different yoga sessions.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view the yoga session page.

Typical Course of Events			
Actor Action		**System Response**	
1	User taps on the yoga exercise widget on the home screen.		
		2	The system redirects to the yoga session page, displaying a list of available sessions.

UC6: Set Calendar

Table 3.20**:** Set Calendar use case

UC6	
Name	Set Calendar
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case allows users to set and manage exercise schedules using a calendar feature.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user's exercise schedule is updated.

Typical Course of Events			
Actor Action		**System Response**	
1	User accesses the calendar functionality within the system.		
		2	The system presents a calendar interface for the user to set exercise schedules by selecting specific dates.

UC7: Set Alarm

Table 3.21**:** Set Alarm use case

UC7	
Name	Set Alarm
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case allows users to set alarms for exercise session reminders.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user has successfully set an alarm.

Typical Course of Events			
Actor Action		**System Response**	
1	User accesses the alarm feature within the system.		
		2	The system presents an interface for the user to set the alarm time and choose the exercise session associated with it.
3	User confirms the alarm settings.		
		4	The system saves the alarm settings.

UC8: Set Timer

Table 3.22**:** Set Timer use case

UC8	
Name	Set Timer
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case enables users to set timers to track exercise durations.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user has successfully set a timer.

Typical Course of Events			
Actor Action		**System Response**	
1	User accesses the timer functionality within the system.		
		2	The system presents an interface for the user to set the timer duration and choose the exercise session associated with it.
3	User starts the timer.		
		4	The system begins counting down the time.

UC9: Show Alarm

Table 3.23**:** Show Alarm use case

UC9	
Name	Show Alarm
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case displays the set alarms and notifies users when alarms are triggered.
Cross Reference	007
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user is notified of triggered alarms.

Typical Course of Events			
Actor Action		**System Response**	
1	User navigates to the alarm feature within the system.		
		2	The system displays a list of set alarms.
		3	When an alarm is triggered, the system provides a notification to the user.

UC10: Show Timer

Table 3.24**:** Show Timer use case

UC10	
Name	Show Timer
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case displays the set timers and provides real-time updates during the countdown.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view and monitor active timers.

Typical Course of Events			
Actor Action		**System Response**	
1	User accesses the timer functionality within the system.		
		2	The system displays a list of set timers.
3	User can view the active timers and monitor the countdown.		

UC11: Show Stretching Exercise Sessions

Table 3.25**:** Show Stretching use case

UC11	
Name	Show Stretching Exercise Sessions
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case shows a list of available stretching exercise sessions accessed through the display stretching exercise widget on the home screen.
Cross Reference	001,003
Pre-Conditions	User is logged in and on the home screen and selected the stretching exercise widget.
Successful Post Conditions	The user can view the list of stretching exercise videos of the selected session.

Typical Course of Events			
Actor Action		**System Response**	
1	User selects a session among different sessions on display stretching exercise screen.		
		2	The system navigates to the stretching exercise session videos list, displaying the list of stretching exercise videos.

UC12: Show Gym Exercise Sessions

Table 3.26**:** Show Gym Exercises use case

UC12	
Name	Show Gym Exercise Sessions
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case shows a list of available gym exercise sessions accessed through the display gym exercise widget on the home screen.
Cross Reference	001,004
Pre-Conditions	User is logged in and on the home screen and selected the gym exercise widget.
Successful Post Conditions	The user can view the list of gym exercise videos of the selected session.

Typical Course of Events			
Actor Action		**System Response**	
1	User selects a session among different sessions on the home display gym exercise screen.		
		2	The system navigates to the gym exercise session videos list, displaying the list of gym exercise videos.

UC13 Show Yoga Sessions

Table 3.27**:** Show Yoga Sessions use case

UC13	
Name	Show Yoga Sessions
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case shows a list of available yoga sessions accessed through the display yoga widget on the home screen.
Cross Reference	001,005
Pre-Conditions	User is logged in and on the home screen and selected display yoga widget on the home screen.
Successful Post Conditions	The user can view the list of yoga exercise videos of the selected session.

Typical Course of Events			
Actor Action		**System Response**	
1	User selects a session among different sessions on the display Yoga screen.		
		2	The system navigates to the Yoga exercise session videos list, displaying the list of gym exercise videos.

UC14: About Us Page

Table 3.28**:** About Us use case

UC14	
Name	About Us Page
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	This use case allows users to access information about the development team.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view the About Us page.

Typical Course of Events			
Actor Action		**System Response**	
1	User selects the About Us option in the system's navigation bar.		
		2	The system displays the About Us page, providing information about the development team

UC15: BMI Calculator

Table 3.29**:** BMI calculator use case

UC15	
Name	BMI Calculator
Actors	User
Purpose	To provide a seamless login experience for users without the need for credentials.
Description	The app should include a BMI (Body Mass Index) calculator functionality that allows users to calculate their BMI based on their height, weight, and gender.
Cross Reference	001
Pre-Conditions	User is logged in and on the home screen.
Successful Post Conditions	The user can view the BMI result.

Typical Course of Events			
Actor Action		**System Response**	
1	User selects the Gender and enter BMI details.		
		2	The system displays the BMI results according to gender

3.3.3 Domain Model

The domain model provides a visual representation of the key entities, their relationships, and the attributes within the fitness application's domain. It helps in understanding the structure and behavior of the system. The domain model for the fitness mobile application is as follows:

1. **User:**

Attributes: User ID

Associations: Participates in Exercise Session, Sets Alarms, Sets Timers

2. **Stretching Exercise Session:**

Attributes: Session ID, Session Name, Description, Duration,

Associations: Linked to Exercise Session

3. **Gym Exercise Session:**

Attributes: Session ID, Session Name, Description, Duration

Associations: Linked to Exercise Session

4. **Yoga Session:**

Attributes: Session ID, Session Name, Description, Duration

Associations: Linked to Exercise Session

5. **Alarm:**

Attributes: Alarm ID, Time, Exercise Session

Associations: Associated with User

6. **Timer:**

Attributes: Timer ID, Duration, Exercise Session

Associations: Associated with User

7. Diet Recommendation:

Attributes: Recommendation ID, Title, Description, Nutritional Information

Associations: Associated with User

8. Calendar:

Attributes: Calendar ID, Date, Exercise Session

Associations: Associated with User

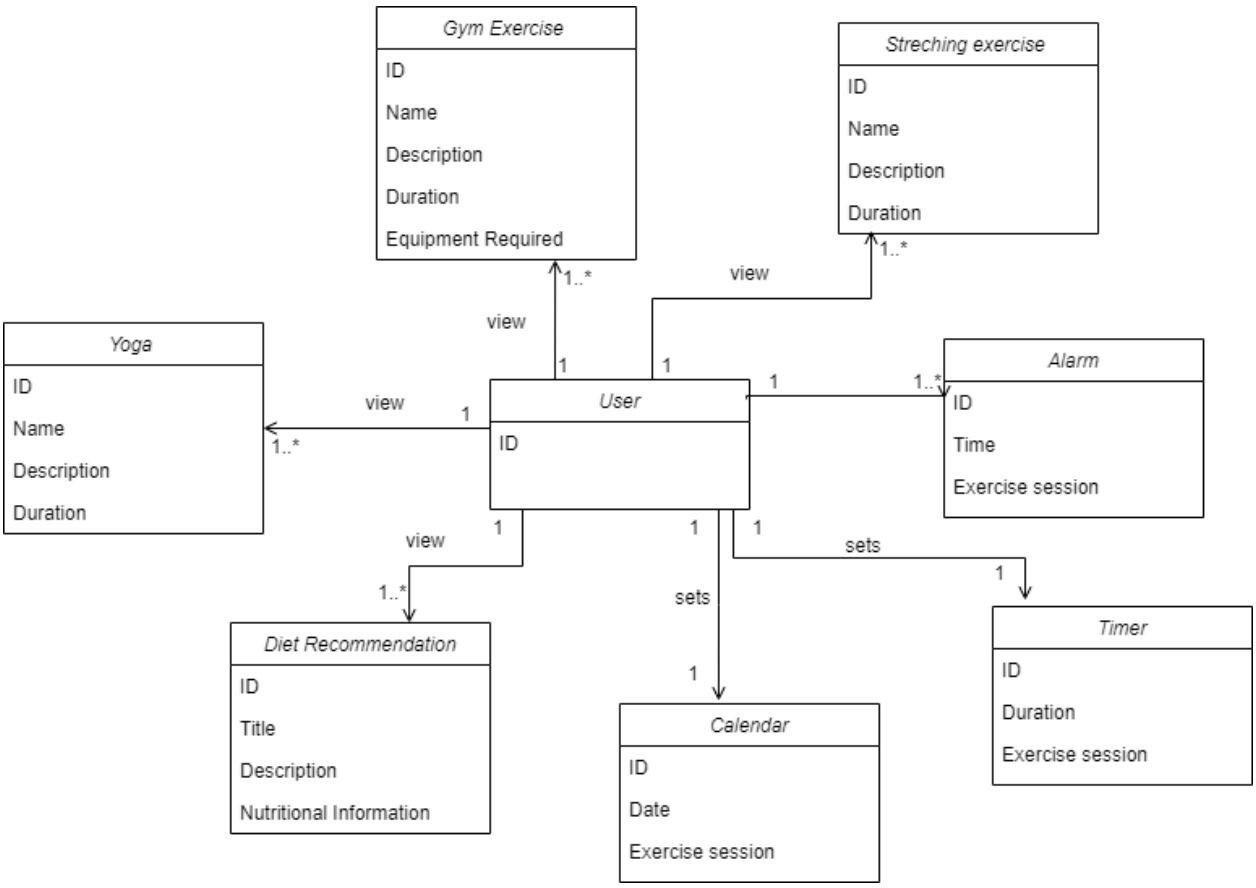

Fig 3.2**:** Domain Model

3.3.4 Sequence Diagram

Access Diet Recommendations

This sequence diagram showcases the steps involved in accessing diet recommendations within the app. It starts with the user selecting the diet recommendation option from the home screen. The app retrieves the necessary data from the database, including different diet plans and their details. The app then presents the diet recommendations to the user, allowing them to browse and choose a specific plan. Once the user selects a diet plan, the app displays the relevant information, such as meal suggestions, nutritional values, and dietary guidelines.

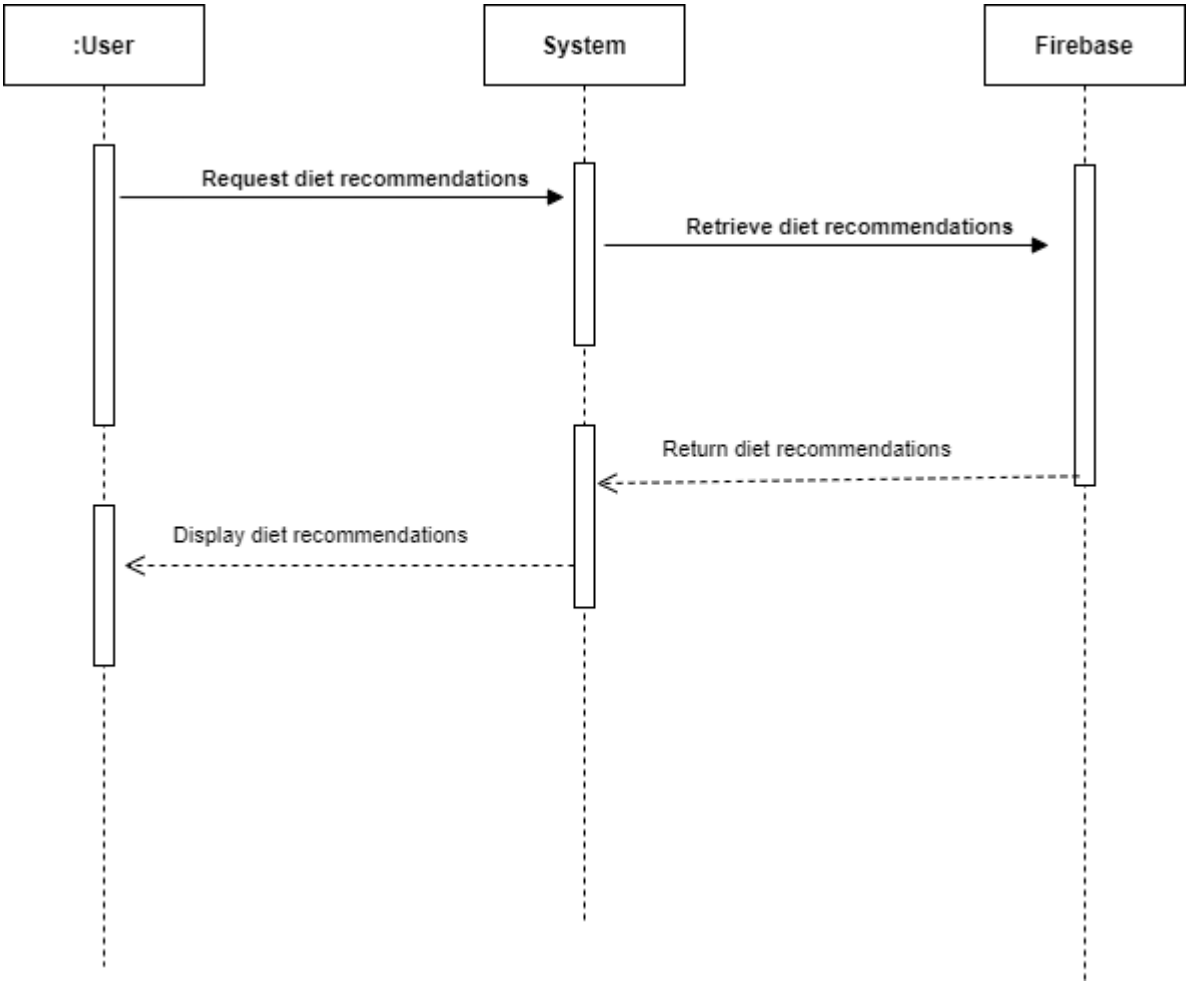

Fig 3.3**:** Access Diet Recommendation Sequence Diagram

Stretching Exercise Sessions

The Stretching Exercise Sessions sequence diagram illustrates the steps involved in accessing and performing stretching exercises within the fitness app. It shows how the user selects the stretching exercise option from the home screen, retrieves session data from the Firebase database, and selects a specific session of interest. The diagram also highlights the process of displaying instructions and demonstrations, guiding the user through the exercises, tracking theirprogress, and updating exercise history. Overall, the sequence diagram showcases the smooth flow of accessing and performing stretching exercises within the app to promote flexibility and well-being.

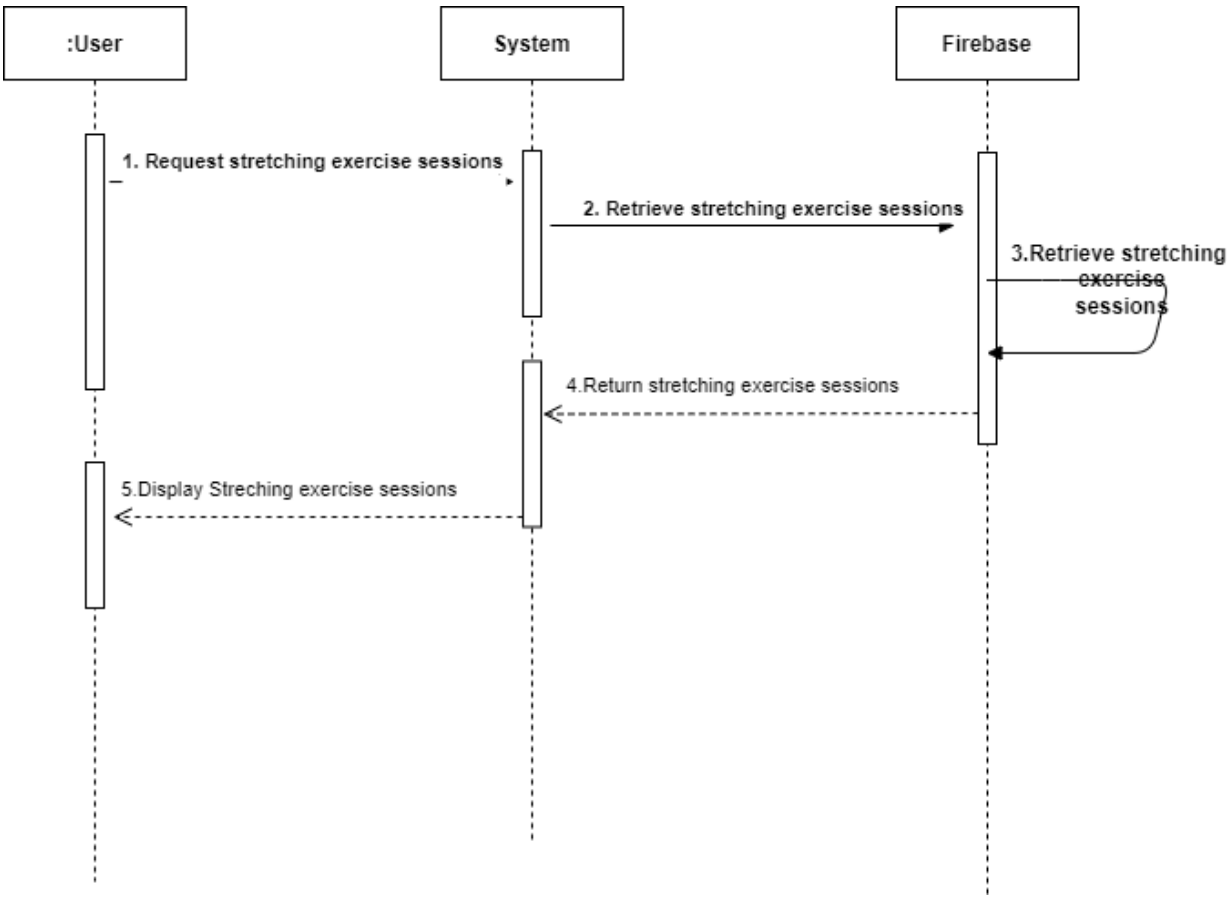

Fig 3.4**:** Stretching Exercise Sessions Sequence Diagram

Gym Exercise Sessions

This sequence diagram demonstrates the process of accessing gym exercises in the fitness app. It begins with the user selecting the gym exercises option from the home screen. The app retrieves the exercise data from the database, including various gym exercise sessions and their details.
The app then presents the exercise sessions to the user, allowing them to browse and choose a specific session. Upon selection, the app displays the exercise instructions and demonstrations, enabling the user to perform the exercises correctly and safely.

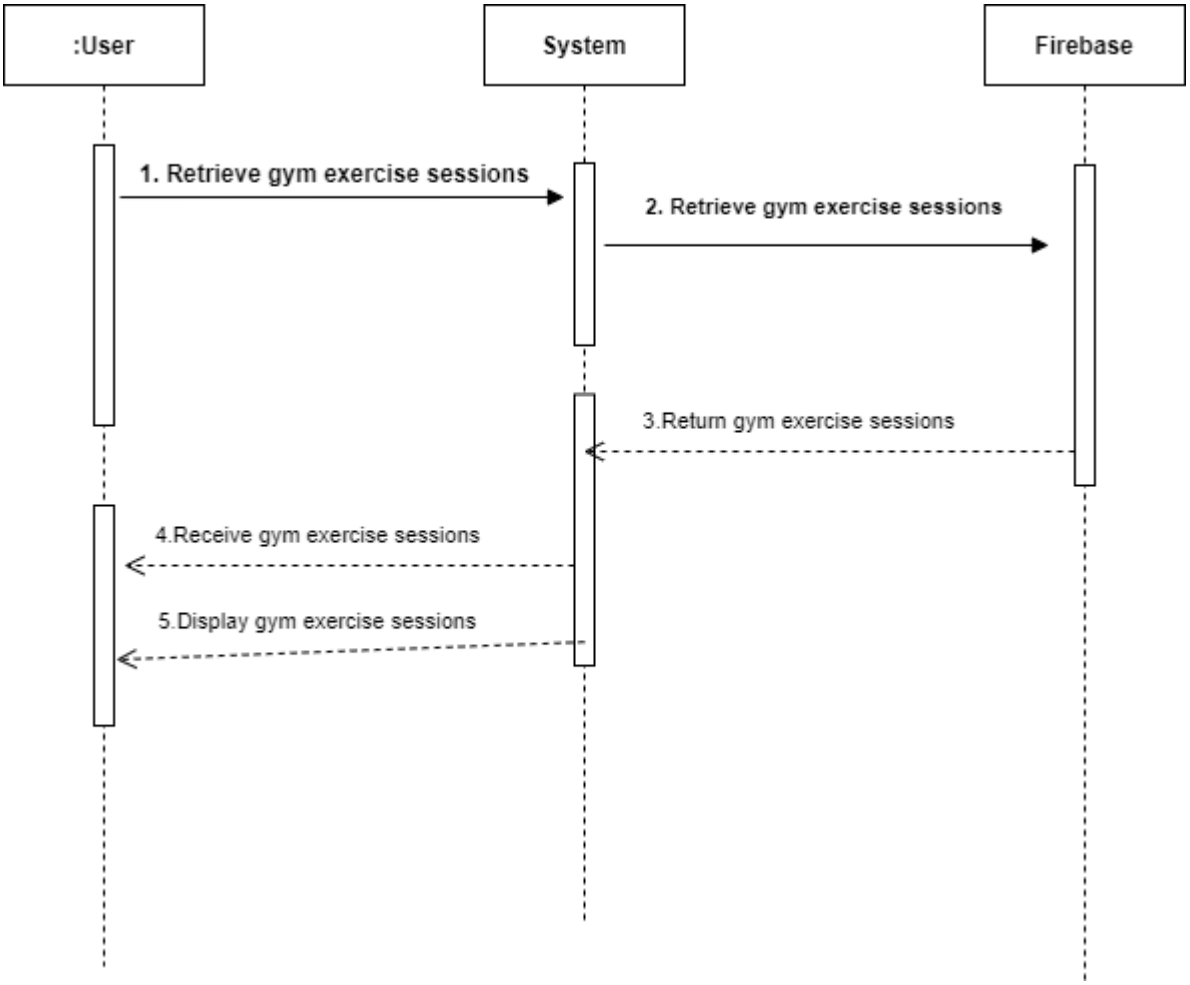

Fig 3.5**:** Gym Exercise Sessions Sequence Diagram

Yoga Sessions

This sequence diagram illustrates the flow of accessing yoga sessions in the fitness app. It starts with the user selecting the yoga option from the home screen. The app retrieves the yoga session data from the database, including different yoga sessions and their details. The app then presents the yoga sessions to the user, allowing them to browse and select a specific session. Once a session is chosen, the app displays the yoga poses, instructions, and animated demonstrations, guiding the user through the yoga practice.

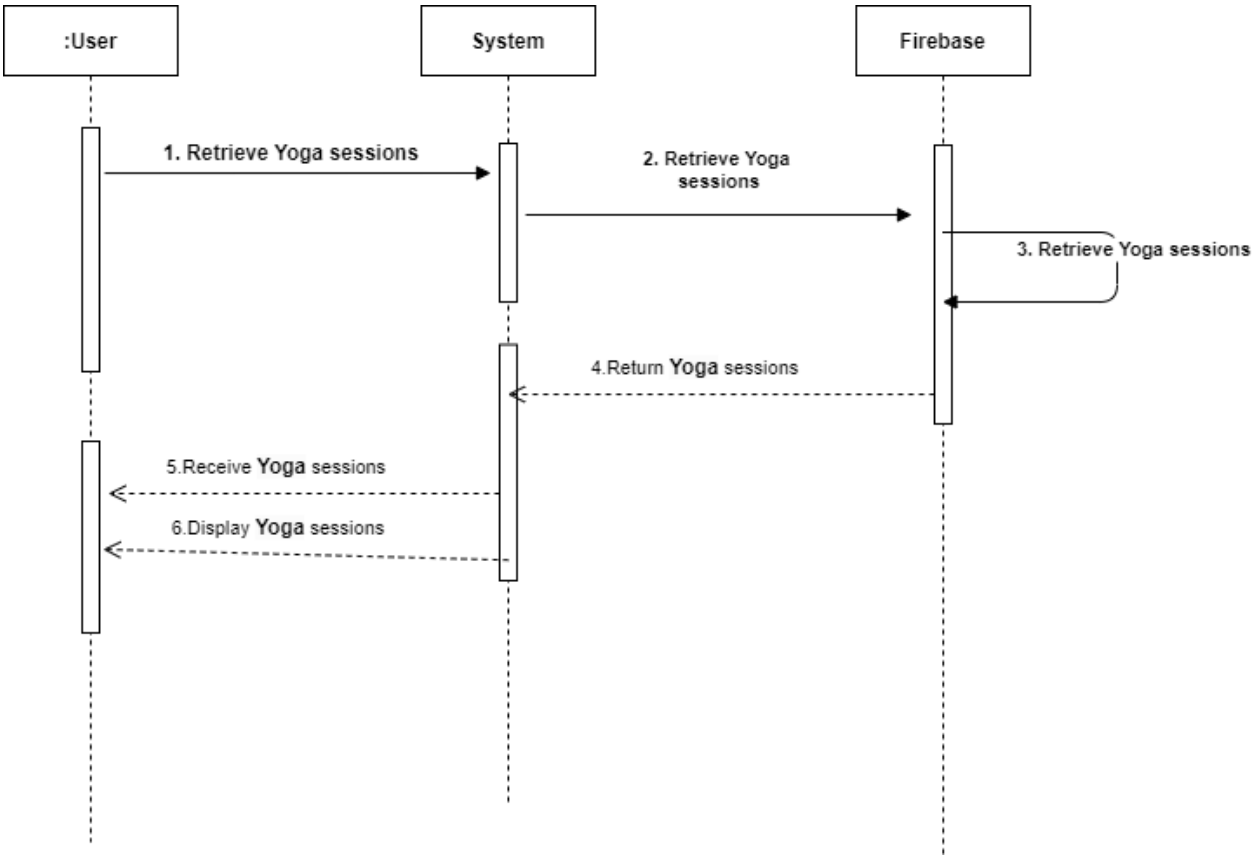

Fig 3.6**:** Yoga Sessions Sequence Diagram

Set Calendar

The Set Calendar sequence diagram outlines the steps involved in setting a calendar event within the fitness app. It illustrates how the user selects the "Set Calendar" option, enters the event details, and confirms the event. The diagram shows the interaction between the app and the device's calendar system, where the event is created and stored. Finally, the user receives a confirmation message indicating the successful setting of the event in their calendar.

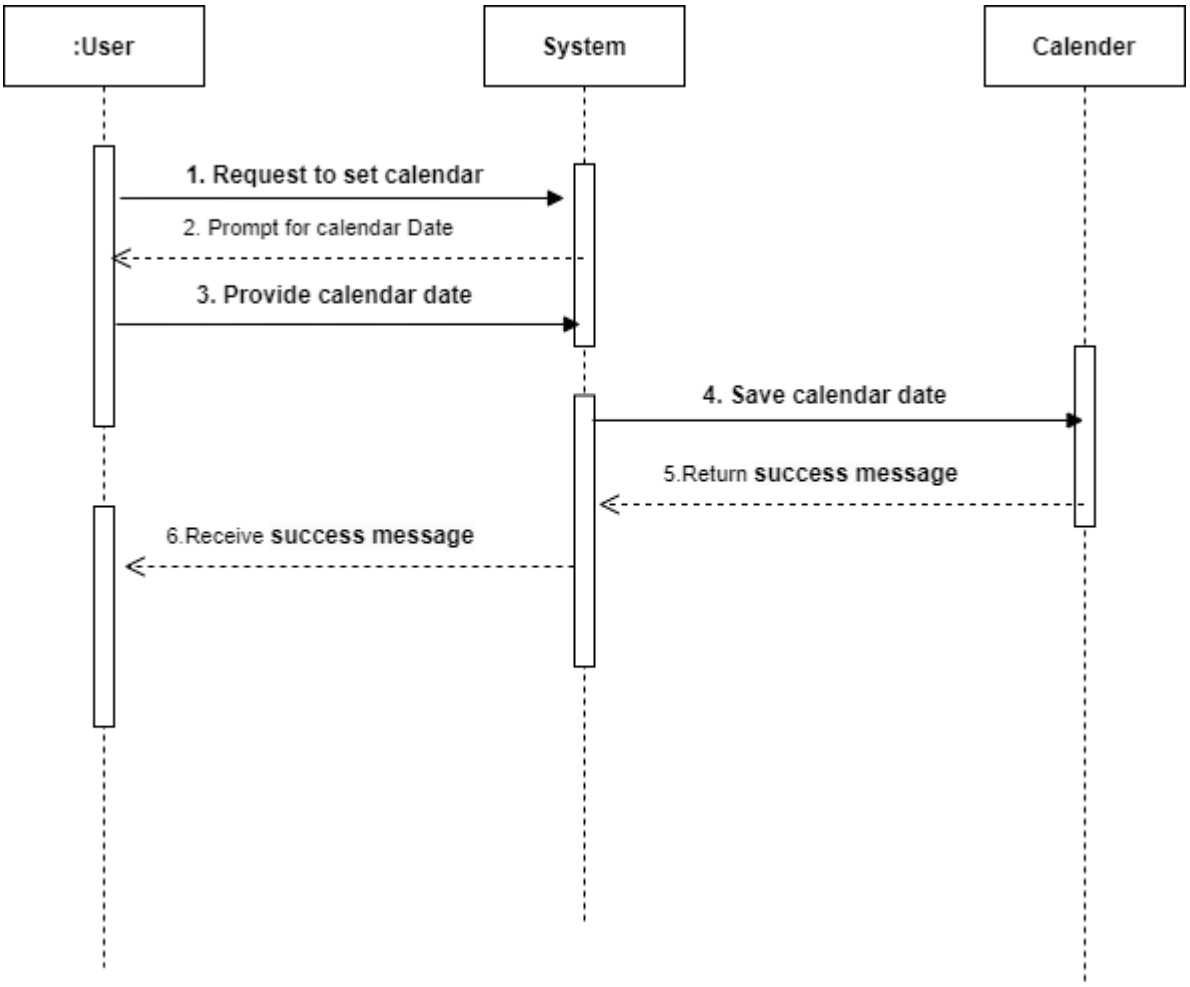

Fig 3.7**:** Set Calendar Sequence Diagram

Set Alarm

This sequence diagram demonstrates the steps involved in setting an alarm in the app. It starts with the user selecting the alarm option from the home screen. The app presents an alarm interface, allowing the user to set the desired time for the alarm. The user inputs the alarm time,and the app validates and saves the input. The app then activates the alarm, and at the specifiedtime, it triggers an alarm notification, alerting the user with the selected sound or vibration.

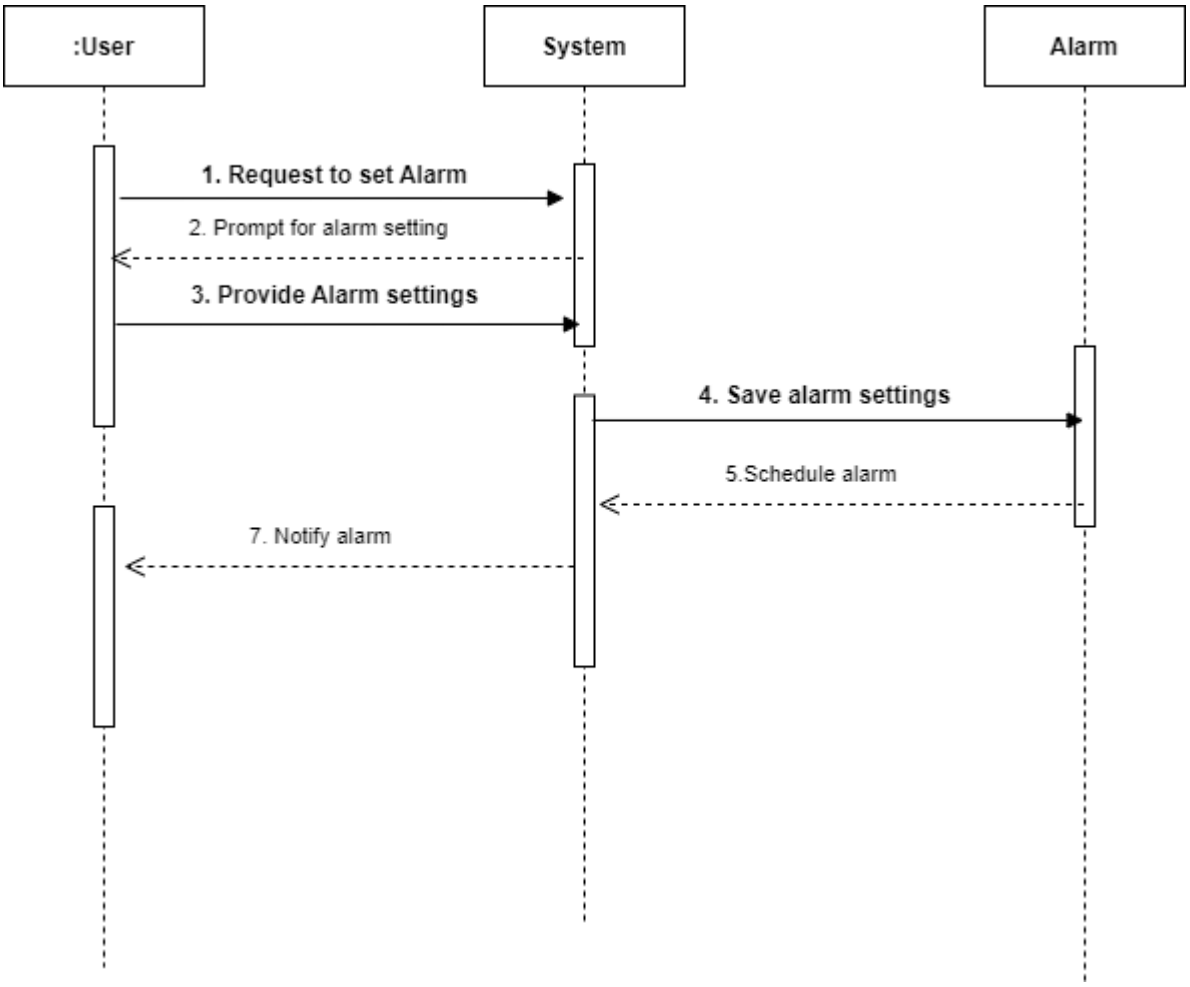

Fig 3.8**:** Set Alarm Sequence Diagram

Set Timer

This sequence diagram showcases the process of setting a timer in the app. It begins with the user selecting the timer option from the home screen. The app presents a timer interface, allowing the user to input the desired duration. The user enters the timer duration, and the app validates and saves the input. The app then starts the countdown, displaying the remaining time to the user. When the timer reaches zero, the app notifies the user, indicating that the set time haselapsed.

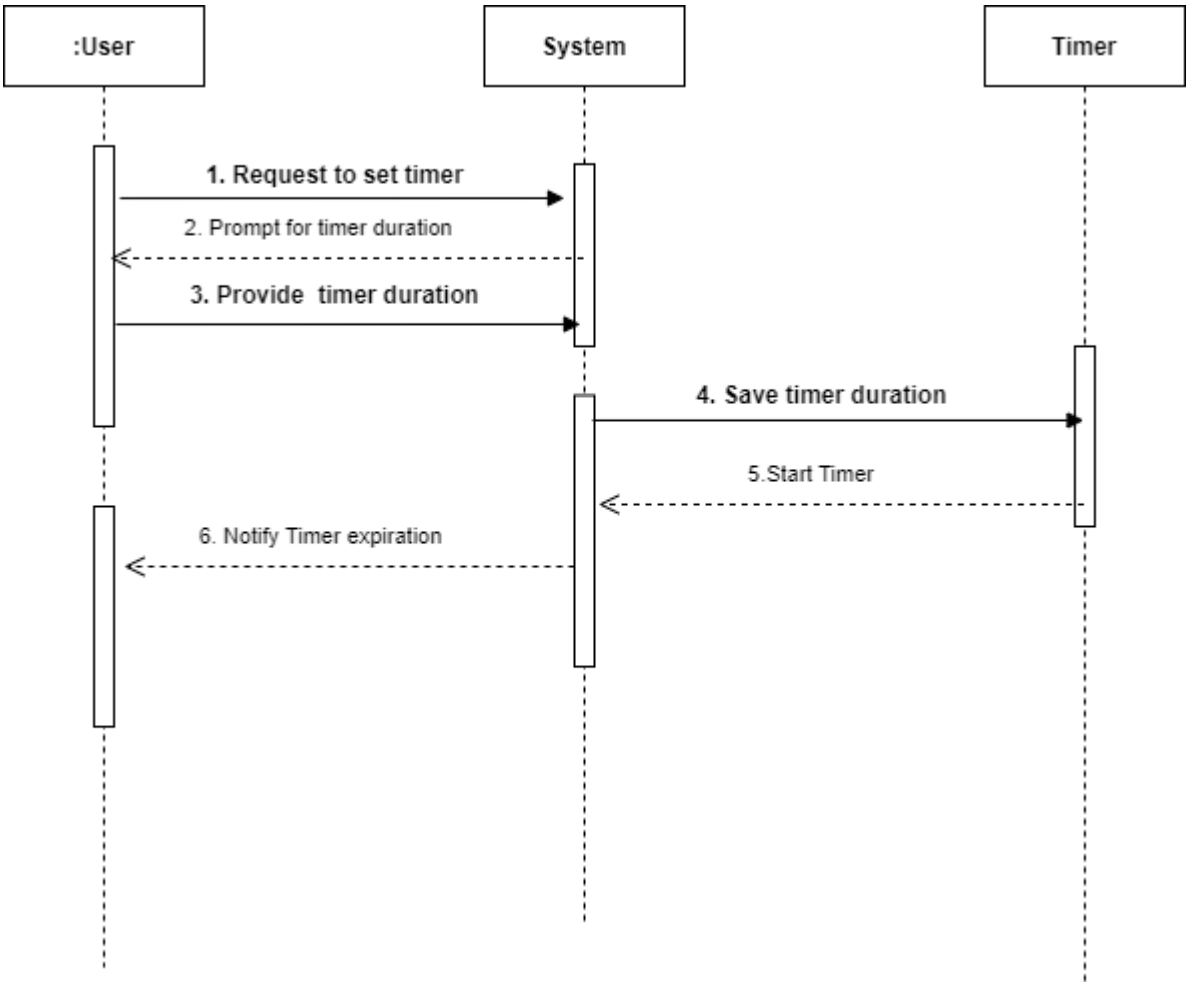

Fig 3.9**:** Set Timer Sequence Diagram

3.3.5 Data Flow Diagram (DFD)

Level-0

The Level 0 Data Flow Diagram (DFD) represents the high-level overview of the flow of data and interactions in the fitness app.

In this diagram:

- The user initiates the process by scheduling exercises and searching for exercise sessions. This input is represented as data flows into the system.
- The system, based on the user's input, retrieves exercise sessions from the database.
- The database responds by sending the exercise sessions to the system, completing the data flow between them.
- Once the system receives the exercise sessions, it displays them to the user, allowing them to view and select the desired sessions.

Overall, the Level 0 DFD showcases the primary data flow in the fitness app, highlighting the interaction between the user, the system, and the database.

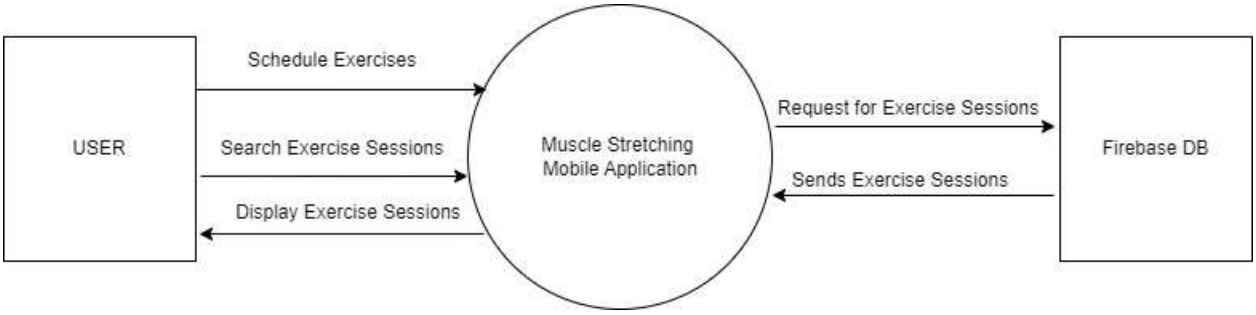

Fig 3.10**:** Level-0 DFD

3.3.6 Architecture Diagram

The Flutter architecture diagram illustrates the overall structure and organization of the Flutter-based fitness app. It showcases the key components and their interactions within the app's architecture.

At the center of the architecture is the Flutter framework, which provides the foundation for building the app. The framework includes various libraries and tools that enable the creation of cross-platform mobile applications.

On the top layer of the architecture, we have the User Interface (UI) components, which are responsible for presenting the app's visual elements and handling user interactions. These UI components are built using Flutter's widget system, which offers a wide range of customizableand reusable widgets.

Beneath the UI layer, we have the Business Logic layer, which contains the core functionality and business rules of the app. This layer includes modules such as the Diet Recommendation, Stretching Exercises, Gym Exercises, and Yoga Simulation, each responsible for their respective functionalities.

The Data layer represents the interaction with the Firebase database, where exercise videos, userdata, and other relevant information are stored. This layer includes modules for data storage, retrieval, and synchronization with the app.

Overall, the Flutter architecture diagram provides a visual representation of how the different components of the fitness app are organized and interact with each other, showcasing the clear separation of concerns and the modular structure of the application.

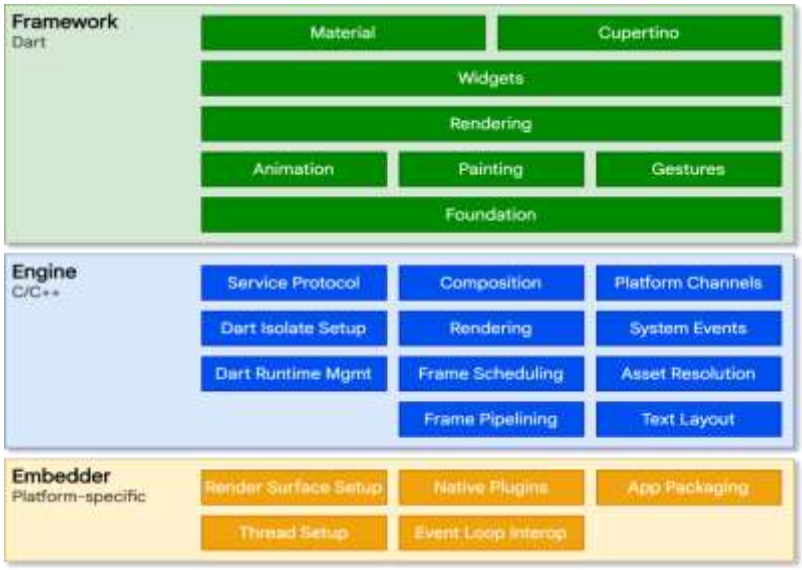

Fig 3.11**:** System Architecture

CHAPTER 4

Methodology

4.1 Flutter

Flutter, developed by Google, is an open-source UI software development kit (SDK) that offers a powerful framework for building high-performance mobile applications that run on multiple platforms. Our project benefits from Flutter in several ways:

- **Unified Codebase:** With Flutter, we can write code once and deploy it across various platforms, such as iOS and Android, minimizing development time and effort.
- **Rapid Development:** Flutter's hot-reload feature enables quick prototyping and iterative development, allowing us to test and refine app features with ease.
- **Customizable User Interfaces:** Flutter provides an extensive collection of customizable widgets and UI components, empowering us to create visually appealing and interactive interfaces tailored to our fitness app.
- **Native-like Performance:** By utilizing a rendering engine that directly interfaces with the underlying platform, Flutter ensures that our app performs with native-like speed and smooth animations.
- **Thriving Community:** The active and vibrant Flutter developer community offers abundant resources, documentation, and packages that enhance development productivity and provide valuable support.

By leveraging the strengths of Flutter, we have harnessed its cross-platform capabilities andrich features to build a robust fitness app that delivers a seamless user experience.

4.2 Firebase:

Firebase, a comprehensive cloud-based platform provided by Google, presents a range of tools and services for the development of mobile and web applications. In our fitness app, we utilize Firebase for crucial functionalities like data storage, authentication, and real-time updates. The advantages of employing Firebase are as follows:

- **Real-time Database:** Firebase's real-time database is a NoSQL solution that facilitates seamless synchronization of data across multiple devices. This ensures that exercise videos, instructions, and user data remain consistently up to date.
- **Authentication:** Firebase offers robust authentication services, enabling secure user logins without the need for credentials. This ensures the privacy and security of users' personal information.
- **Analytics and Crash Reporting:** Firebase Analytics provides valuable insights into user behavior, empowering us to make data-driven decisions and optimize the app's

performance. Additionally, Firebase Crash Reporting aids in identifying and addressing application crashes, thereby enhancing overall stability.

- **Easy Integration:** Firebase seamlessly integrates with Flutter, providing dedicated plugins and libraries specifically designed for Flutter development. This simplifies the implementation of Firebase services within our app.

By leveraging the strengths of both Flutter and Firebase, we have developed a robust and feature-rich fitness app that delivers a seamless user experience. The combination of Flutter's cross-platform capabilities and Firebase's cloud services allows us to focus on app development and user-centric features while ensuring reliable data storage and synchronization.

4.3 Interfaces

Home Screen

The user interface of the Home screen page presents a visually appealing and intuitive layoutwhere users can access a variety of fitness-related features and navigate seamlessly through different sections of the app, providing a centralized hub for their fitness journey.

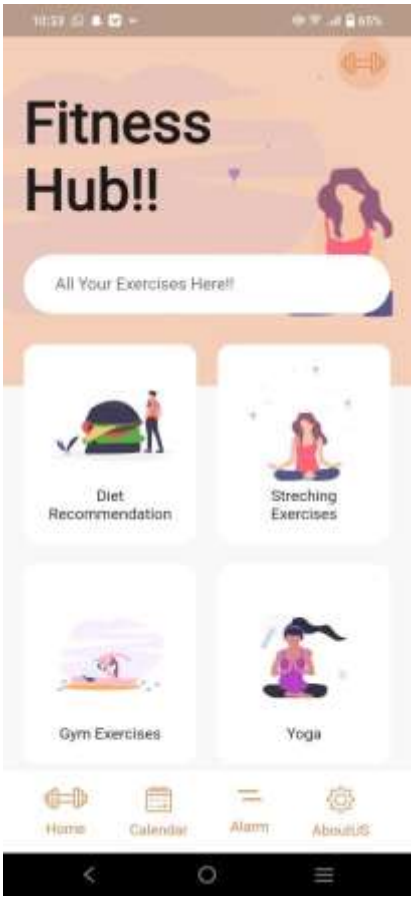

Fig 4.1**:** Home Screen

Gender Selection

The gender selection page is a user interface component in the fitness app that allows users to choose their gender. It provides a simple and intuitive interface where users can select their gender from predefined options such as male, femaleThis page is an essential step in personalizing the app's features and functionalities to meet the specific needs and preferences of each user. By selecting their gender, users can ensure that the app provides them with accurate and tailored information, recommendations, and exercise sessions that are relevant to their gender-specific requirements.

Fig 4.2**:** Gender Selection

BMI Calculator

The BMI calculator page is a user interface component in the fitness app that allows users to calculate their Body Mass Index (BMI). Users can input their height and weight into the calculator, and based on these values, the app will calculate their BMI and display the result. TheBMI calculation provides users with an indication of whether their weight is within a healthy range for their height. This information can help users monitor their overall health and make informed decisions about their fitness and wellness goals. The BMI calculator page is designed to be user-friendly, with clear input fields and an intuitive interface, making it easy for users to obtain their BMI quickly and conveniently. By providing this feature, the app empowers users totake charge of their health and make informed decisions about their fitness and lifestyle choices.

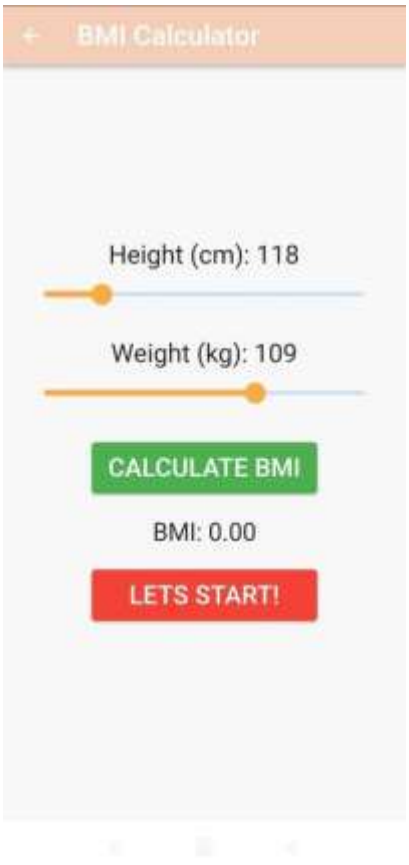

Fig 4.3**:** BMI Calculator

Diet Recommendation

The user interface of the diet recommendation page provides a visually appealing and intuitive layout where users can access a variety of diet plans and recommendations tailored to their fitness goals and dietary preferences

Fig 4.4**:** Diet Recommendation Screen

Stretching Exercises

The user interface of the stretching exercises page presents a curated list of stretching sessions and exercises, encompassing a wide range of stretching techniques such as static stretches, dynamic stretches, and flexibility exercises, accompanied by detailed instructions and animated demonstrations for each exercise.

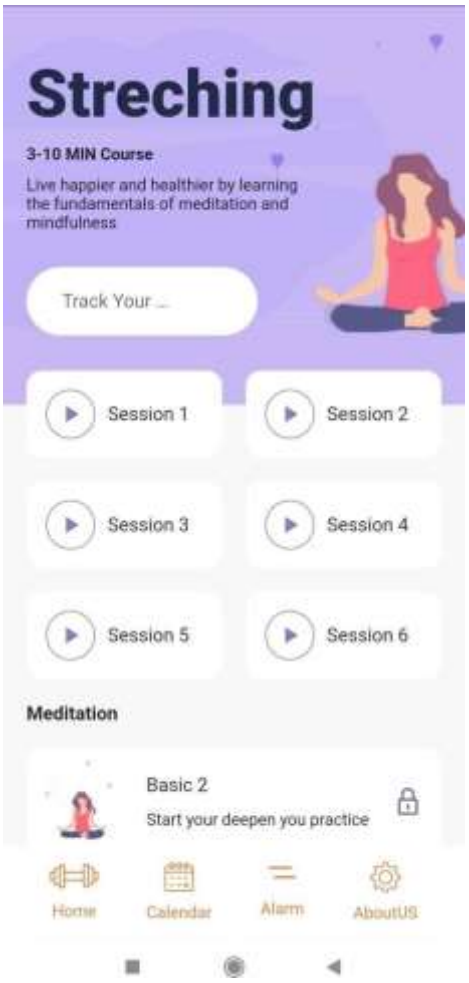

Fig 4.5**:** Stretching Exercises Screen

Gym Exercises

The user interface of the gym exercises page showcases a diverse range of gym workout sessions and exercises, providing users with a visually engaging interface where they can explore and select various exercises targeting different muscle groups, along with clear instructions and animated demonstrations for proper form and technique.

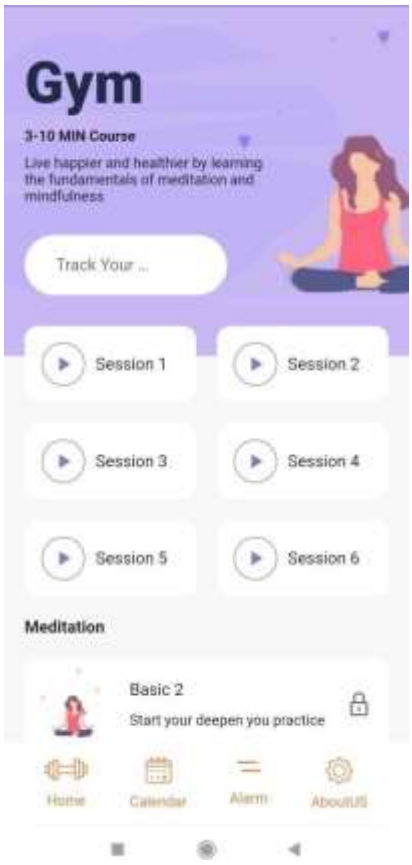

Fig 4.6**:** Gym Exercises Screen

Yoga

The user interface of the Yoga page offers an immersive and serene experience, featuring a collection of yoga sessions and poses that user can explore, accompanied by detailed instructions, calming visuals, and animated demonstrations to guide them through their yoga practice.

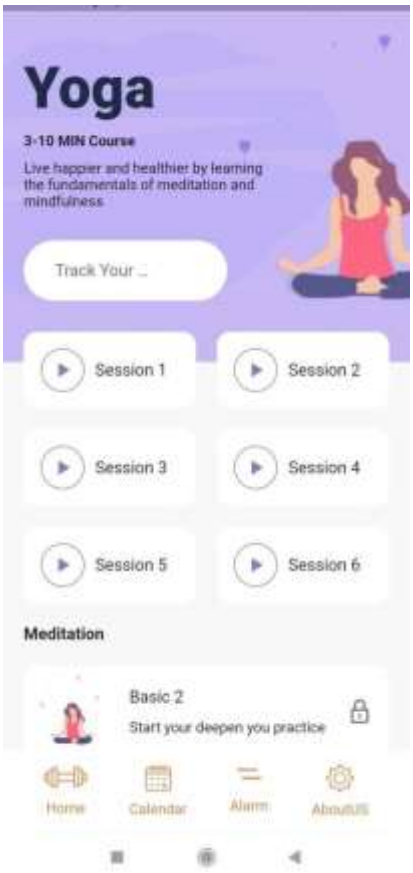

Fig 4.7**:** Yoga Screen

Calendar

The user interface of the Calendar page presents a convenient and intuitive layout where users can schedule and organize their exercise sessions

Fig 4.8**:** Calendar Screen

Set Alarm and Timer

The user interface of the Set Alarm and Timer page provides a user-friendly and efficient way for users to set customizable alarms and timers, enabling them to manage their workout schedules effectively and stay on track with their fitness goals.

Fig 4.9**:** Set Alarm and Timer Screen

About Us

The user interface of the About Us page offers an informative and engaging layout where userscan learn more about the developers, their vision behind the fitness app, and the team's commitment to promoting a healthy and active lifestyle.

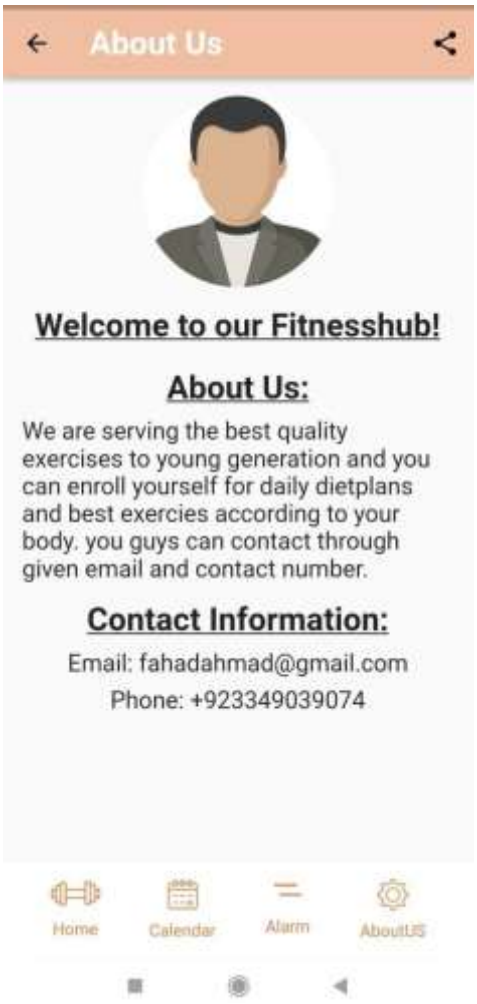

Fig 4.10**:** About Us Screen

CHAPTER 5

Conclusion And Future Work

In this chapter, we conclude the documentation of our fitness Flutter-based mobile application. Throughout this project, we have designed and developed an app with the aim of helping users stay fit and healthy while staying at home. The app provides a range of features such as diet recommendation, stretching exercises, gym exercises, and yoga simulation through animated sessions. Additionally, users can utilize the calendar, alarm, and timer functionalities to set and track their exercises effectively.

The **key points** discussed in this project include the background study, system requirements, architecture, and design, which laid the groundwork for the development of our fitness app arethe following

- Background study, system requirements, architecture, and design were discussed.
- Functional and non-functional requirements were identified as the foundation for app development.
- Use case diagrams and expanded use cases provided an understanding of app functionalities and user interactions.
- The domain model illustrated essential entities and their relationships within the app.
- Sequence diagrams demonstrated the dynamic behavior and interactions between app modules.

In **conclusion**, our fitness app offers a user-friendly and convenient platform for individuals to maintain their fitness routines and adopt a healthy lifestyle. By incorporating diet recommendations, animated exercise sessions, and useful tools like the calendar, alarm, and timer, our app stands out as an all-in-one solution for fitness enthusiasts. With the exercise videos stored in the Firebase database, users can access a wide variety of workout sessions withease.

Future Work

In this chapter, we briefly outline potential avenues for future work and enhancements to consider for our fitness Flutter-based mobile application. While the current version of the app provides a solid foundation for users to stay fit and healthy, there are opportunities to expand andrefine its features.

- **Advanced Exercise Tracking:** Enhance the exercise tracking capabilities by incorporating sensors or wearable devices to monitor users' heart rate, calories burned, and other fitness metrics. This can provide users with more accurate and personalized feedback on their workout sessions.
- **Social Features:** Introduce social networking aspects, allowing users to connect with friends, join fitness communities, and share their progress. This can foster a sense of motivation and support among users, creating a vibrant fitness community within the app.
- **Personalized Recommendations:** Implement machine learning algorithms to analyze users' exercise patterns, preferences, and goals. Leverage this data to provide personalized workout recommendations, tailored diet plans, and exercise schedules basedon individual needs.
- **Continuous Testing and Bug Fixes:** Conduct regular testing and gather user feedback to identify and address any issues or bugs in the app. This will help maintain the app's stability, performance, and user satisfaction.

By pursuing these future enhancements, our fitness app can evolve into a more comprehensive and user-centric platform, catering to a wider range of user needs and preferences. Continual improvement and innovation will ensure that our app remains relevant and impactful in the ever-evolving field of fitness and health technology.

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5. Stretching and Flexibility Plan: https://apps.apple.com/pk/app/stretching-flexibility-plan/id1268260949