A

Mini Project Report

on

Fitness and Activity Manager Using Python

Submitted in partial fulfillment of the requirements for the degree

Second Year Engineering – Computer Science and Engineering Data Science

by

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CERTIFICATE

This to certify that the Mini Project report on **Fitness and Activity Manager Using Python** has been submitted by Monish Mudaliar(22107027) , Siddhesh N Patil(22107019) , Chinmay Pawaskar (22107066) , Atharva Nimkar(22107025) who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science and Engineering Data Science**, during the academic year **2023-2024** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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Abstract

The Mini Project titled "Fitness and Activity Manager Using Python" explores the development of a comprehensive health companion application. It encompasses various aspects such as exercise tracking, aiming to empower users in their fitness journey. The report discusses the challenges individuals face in maintaining a consistent fitness routine and proposes solutions to address them, including activity tracking features. It also delves into the technical specifications, project scheduling, and future scope of the application, highlighting opportunities for incorporating emerging technologies like AI and biometric tracking. Ultimately, the project aims to revolutionize how users engage with their health and fitness goals, offering a user-friendly and adaptable platform for achieving overall well-being.

Chapter 1

Introduction

In today's fast-paced world, maintaining a healthy lifestyle can be challenging. Between work commitments, family responsibilities, and social engagements, finding the time and motivation to prioritize fitness and well-being often takes a backseat. That's where the Fitness and Activity Manager App comes in – your ultimate health companion designed to make achieving your fitness goals easier and more enjoyable than ever before.

Our app is a comprehensive tool that empowers you to take control of your health and fitness journey. Whether you're a seasoned athlete or just starting on your fitness path, our app is tailored to meet your needs and support you every step of the way.

With the Fitness and Activity Manager App, achieving your fitness goals has never been easier or more enjoyable. Whether you're looking to lose weight, get in shape, or simply live a healthier lifestyle, let our app be your guide on your journey to a happier, healthier you.

1.1. Key Features:

1.1.1. Exercise Database:

Provide a comprehensive database of exercises with instructions, images to help users perform exercises correctly and safely.

1.1.2. Workout Calendar:

Provide a calendar view where users can update their workouts and view their activities.

1.1.3. Favorite Workouts:

Allow users to customize their workouts by selecting favorite exercises.

1.2. .**Problem Statement:**

"The current problem lies in inefficient data visualization methods in mHealth apps, hindering users' comprehension of health metrics. We aim to address this challenge by proposing a novel approach that integrates user-centric design principles. Without proper guidance and support, they may find it challenging to set achievable fitness goals, plan workouts, track their activity levels, and make informed decisions about nutrition." Additionally, staying motivated and engaged in their fitness journey can be difficult without a supportive community or access to personalized recommendations and feedback.

These challenges are negatively impacting our user's ability to:

Difficulty in Tracking Progress: Without proper tools and methods for tracking progress, users may struggle to monitor their fitness metrics, such as weight, body measurements, workout performance, and adherence to goals.

Limited Accountability and Motivation: Users may lack accountability and motivation to stick to their fitness routines over time, leading to inconsistency and difficulty in achieving long-term health goals.

Complexity in Nutrition Management: Managing nutrition and making healthy eating choices can be overwhelming for users, especially with conflicting information and dietary preferences to consider.

Isolation and Lack of Support: Many individuals may feel isolated in their fitness journey and lack support from friends, family, or peers, leading to feelings of loneliness and disengagement.

Solution Approach:

To address these challenges, the fitness manager app aims to provide a comprehensive solution that empowers users to take control of their fitness journey and achieve their health goals with confidence. The app will offer workouts, activity tracking, to help users stay motivated, accountable, and engaged in their fitness routines.

By understanding the key challenges and pain points faced by users, the fitness manager app can tailor its features and functionalities to meet their needs effectively and provide a valuable solution that enhances their overall health and well-being.

1.3. Objectives :

1.3.1. Activity Tracking:

Allow users to track their progress towards these goals over time by providing a way to log their daily activity and exercises.

1.3.2. Exercise Library and Demonstrations:

Offer a comprehensive library of exercises with instructions and images demonstrating proper form and technique.

1.4. Scope:

1.4.1. Goal Tracking:

Provide functionality for users to track their progress towards their goals over time by logging the exercises.

Chapter 2

Literature Review

The paper titled "Understanding User Perspectives on Data Visualization in mHealth Apps: A Survey Study" by Yasmeen Anjeer Alshehhi, Mohamed Abdelrak, Ben Joseph Philip, and Alessio Bonti, published on July 12, 2023, explores user needs, challenges, and goals regarding data visualizations in mobile health (mHealth) applications. The authors employed a survey methodology, integrating principles from the design thinking process and the value proposition canvas framework, widely utilized in product development. They collected 56 complete responses and found that users are primarily motivated by curiosity and utility, particularly in tracking progress, when engaging with data visualizations. Bar and pie charts emerged as the preferred visualization types due to their simplicity and ease of use. The study identified key challenges faced by users, including insufficient information display, issues with user interaction such as dragging points and touch interfaces, and crowded charts with excessive data. Overall, the paper highlights the significance of understanding user perspectives in designing effective data visualizations for mHealth apps, aiming to enhance user experience and engagement.**[1]**

The study titled "Testing Different Machine Learning Algorithms for Human Motion Quality Assessment" by Fotos Frangoudes, Maria Matsangidou, Eirini C. Schiza, Kleanthis Neokleous, and Constantinos S. Pattichis, conducted in August 16, 2022, focuses on enhancing the development and usability of assessment tools for Human Motion Quality Assessment (HMQA). Through a systematic literature review spanning from January 2017 to December 2021, the authors gathered insights from 88 publications across healthcare/rehabilitation, sports, and wellness domains. The findings underscore the importance of ML solutions in HMQA for various applications, including personal home-based fitness, rehabilitation, and sports-related activities. The study emphasizes the need for assessments to be easily interpretable by users while mitigating biases stemming from training data. Key considerations highlighted include selecting appropriate input data modalities and output types tailored to the application domain and target population. Additionally, the assessment process should enable real-time analysis, necessitating fast inference times and potential data augmentation techniques for incomplete exercise data. Ensuring user-friendly interpretation of assessments while minimizing biases derived from training data emerges as crucial for the effective deployment of ML solutions in HMQA.**[2]**

The study conducted by Edith Talina Luhanga, Akpa Akpro Elder Hippocrate, Hirohiko Suwa, Yutaka Arakawa, and Keiichi Yasumoto in October 25, 2017, focuses on understanding user expectations for mHealth apps, particularly in the context of group fitness applications. Through a survey methodology, the authors gathered insights on the social support and application design desired by users. The results highlighted the significance of information and emotional support within group fitness applications, emphasizing the importance of addressing common daily challenges among small groups of users. Subsequently, the researchers developed the MyFitnessTeam app based on these requirements and evaluated its efficacy through a 6-week field study involving 23 participants. The findings revealed significant improvements in adherence to physical activity and healthy eating among users. Interestingly, it was observed that men exhibited higher levels of adherence compared to females, while participants with varying baseline fitness levels demonstrated similar adherence levels during the use of MyFitnessTeam. Additionally, the study shed light on the importance of in-group collaboration and interactions for fostering improved user engagement and adherence. Although groups consisting of real-life friends exhibited higher levels of informational support exchange, both groups of friends and groups of strangers displayed low levels of emotional support due to a lack of knowledge on when and how to extend support. Overall, the study underscores the importance of addressing user expectations for social support and application design in mHealth apps to enhance user engagement and adherence to healthy behaviors**.[3]**

Chapter 3

Proposed System

The proposed system is a Fitness and Activity Manager that is able to help the user to keep track of their health. It aims at providing the user help with their healthy journey by keeping track of their progress with a user friendly interface.The frontend is made using Tkinter library from python and the backend uses MySQL for data management and Python to integrate it with GUIs

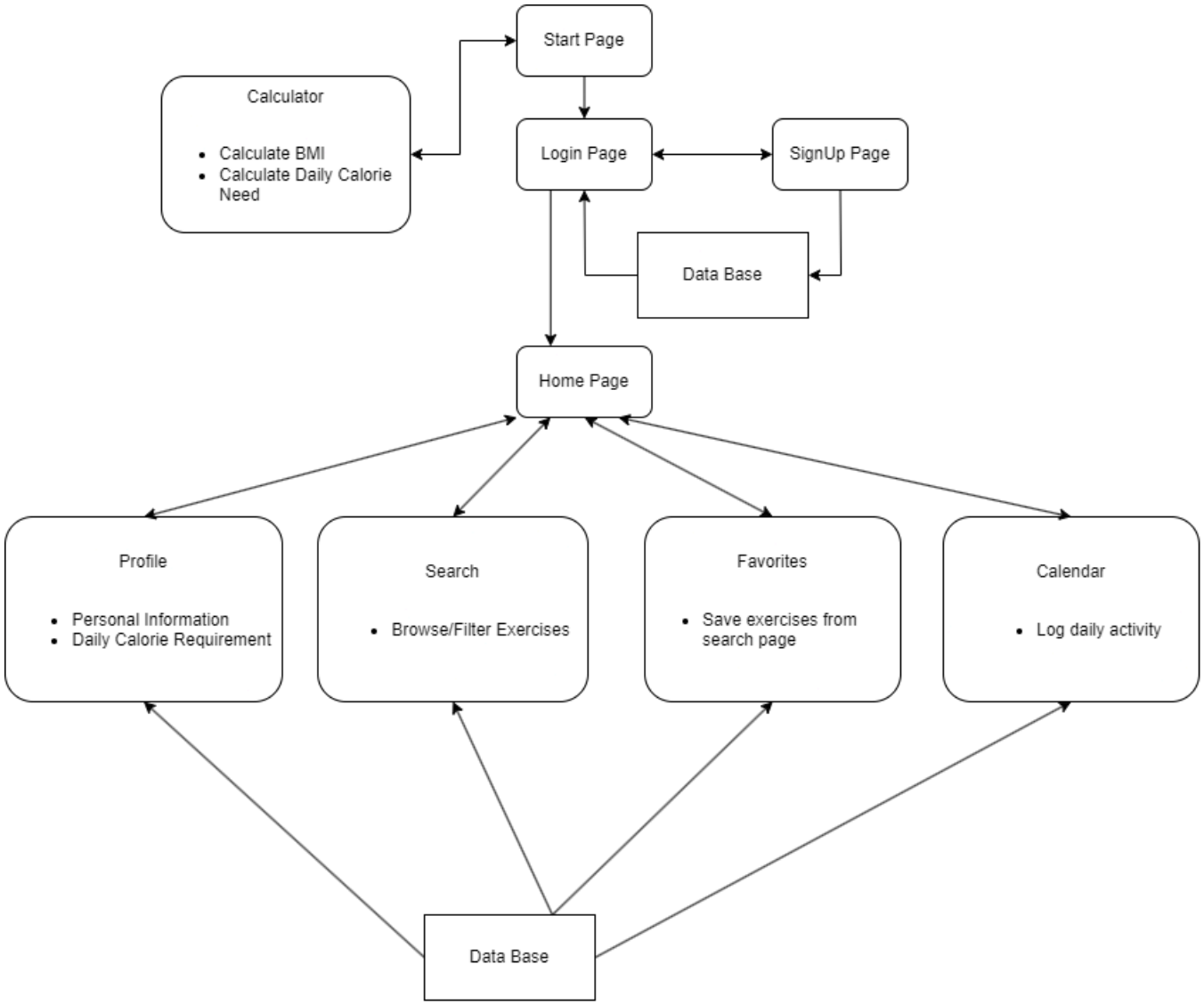

Figure 3.1: System Flow

The Fitness and Activity Manager is a system used by users to improve their health and maintain a healthy lifestyle.The system provides a user friendly interface that helps beginners in their exercise by a set of workout.If user has a certain level of knowledge and wants to create their own routine then he can do so by using the search and filter option.The calendar feature is used to track user's progress and to helps them achieve their set goal.

3.1. **Features & Functionality:**

3.1.1. Filtering:

This feature can be used by users if they want to train a specific muscle of their body and decide the exercise they want to perform.

3.1.2. BMI and Calorie Calculator:

This feature can be used to calculate the Body-Mass Index(BMI) and calories required by the user based on their gender and daily activity level.

3.1.3. Create Routine and Favorite:

Considering that the user knows his/her body well and thinks he/she can manage themselves then this feature can be used to create their own routine and save them in their profile.

Chapter 4

Requirement Analysis

To implement a fitness and activity manager app in Python, you can utilize various technologies and libraries. Here's a list of some commonly used Python technologies for different aspects of the app:

Web Frameworks:

- Flask: Flask is a lightweight and flexible web framework that is well-suited for building RESTful APIs and web applications. It provides the necessary tools for routing, request handling, and response generation.
- Django: Django is a high-level web framework that follows the "batteries-included" philosophy, offering a full-featured toolkit for building web applications quickly and efficiently. It includes built-in support for database modeling, authentication, and templating.

Database Management:

- SQLAlchemy: SQLAlchemy is an SQL toolkit and Object-Relational Mapping (ORM) library for Python. It provides a powerful yet flexible way to interact with relational databases, allowing you to define database models and execute database queries using Python objects.
- Django ORM: If you're using Django, you can leverage its built-in ORM for database management. Django ORM simplifies database interactions by abstracting away the complexity of raw SQL queries and providing a Pythonic interface for working with database tables and records.

RESTful APIs:

- Flask-RESTful: Flask-RESTful is an extension for Flask that simplifies the development of RESTful APIs. It provides tools for defining resources, handling HTTP methods, and serializing/deserializing JSON data.
- Django REST Framework (DRF): DRF is a powerful toolkit for building Web APIs in Django. It includes features such as serialization, authentication, permissions, and viewsets, making it easy to create robust and scalable APIs.

Frontend Development:

- React.js: React.js is a popular JavaScript library for building user interfaces. You can use React.js for building the frontend of your fitness manager app, creating interactive and dynamic UI components.

- Vue.js: Vue.js is another JavaScript framework that is lightweight and easy to learn. It's suitable for building single-page applications (SPAs) and can be integrated with Python backend technologies via RESTful APIs.

Data Visualization:

- Matplotlib: Matplotlib is a plotting library for Python that provides a wide range of 2D plotting functionalities. You can use Matplotlib to create various types of plots, including line plots, bar plots, scatter plots, and histograms, to visualize fitness data and trends.
- Seaborn: Seaborn is a statistical data visualization library based on Matplotlib. It provides a high-level interface for creating attractive and informative statistical graphics, making it suitable for visualizing complex datasets.

Deployment and Hosting:

- Docker: Docker is a platform for containerization that allows you to package your application and its dependencies into lightweight containers. You can use Docker to streamline the deployment process and ensure consistency across different environments.
- Heroku: Heroku is a cloud platform that offers a simple and convenient way to deploy, manage, and scale web applications. You can deploy your fitness manager app to Heroku with minimal configuration and take advantage of its built-in tools for monitoring and scaling.

These are just a few examples of the Python technologies that can be used to implement different aspects of a fitness and activity manager app. Depending on your specific requirements and preferences, you may choose to use other libraries, frameworks, or tools to build and deploy your app.

Chapter 5

Project Design

The design of Fitness and Activity Manager represents a pivotal stem in improving health and lifestyle of users. Focused on providing users with a user-friendly and interactive platform. The application emphasizes users their need for a healthy life and improving their health for a better tomorrow. This chapter delves into the intricate process of designing a Fitness and Activity Manager for exercise description, guidance images and log of exercises.

5.1. System Architecture:

Our System architecture revolves around a centralized database design where all the aspects of our project are connected to the database. Users can login to search exercises based on filters for body parts they want to work on. Users can check their BMI and calorie requirement in profile to maintain a healthy lifestyle. Users can access the exercise they mark as their favorite on a different page and can update them any time they want.Track their progress with the calendar feature where they can enter their performed exercise with date and time stamp.This architecture provides a user-friendly interface for user to maintain a healthy lifestyle.

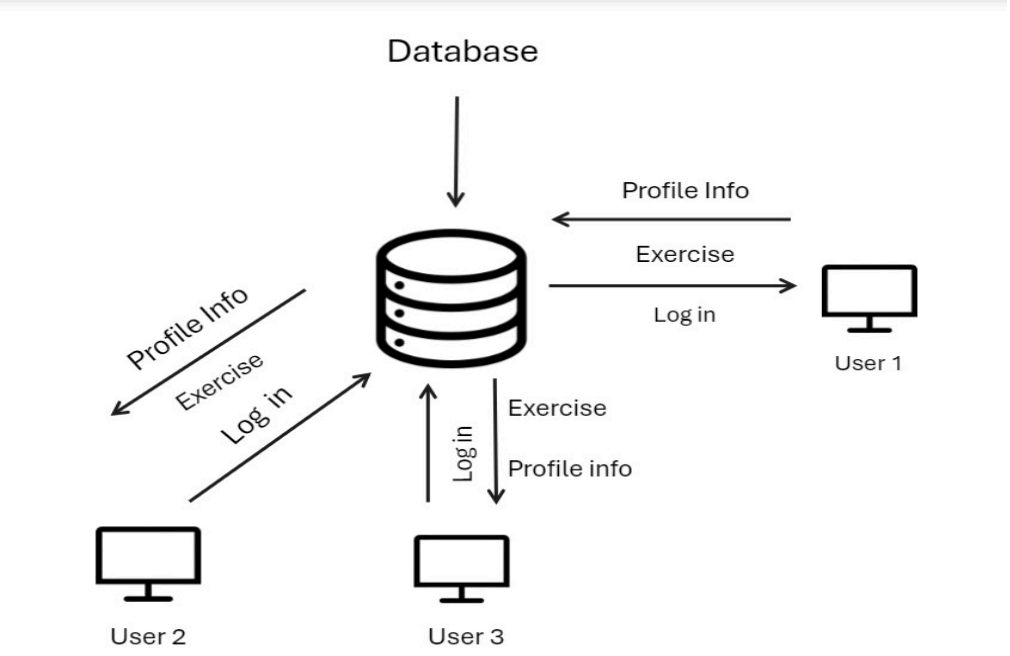

Figure 5.1.1. System Architecture

5.2. Implementation:

The implementation phase of the fitness app involves translating the planned features and design concepts into functional software. This phase encompasses several key steps, including development, testing, and deployment.

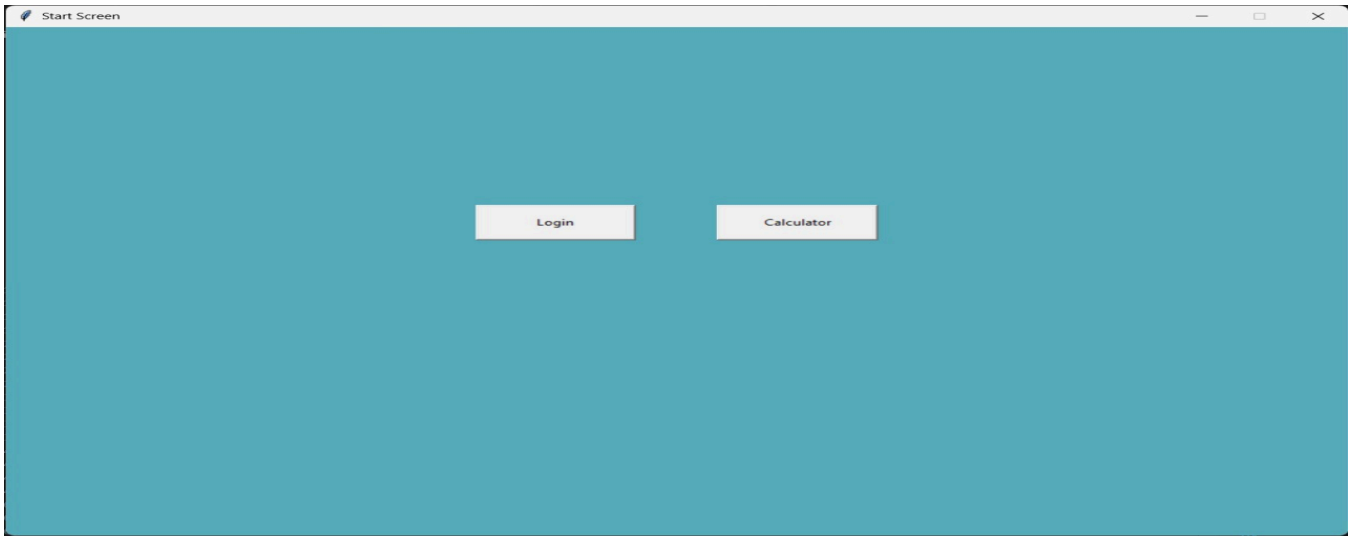

Figure 5.2.1: Start Page

On the start page, users are given two button login and a calculator.

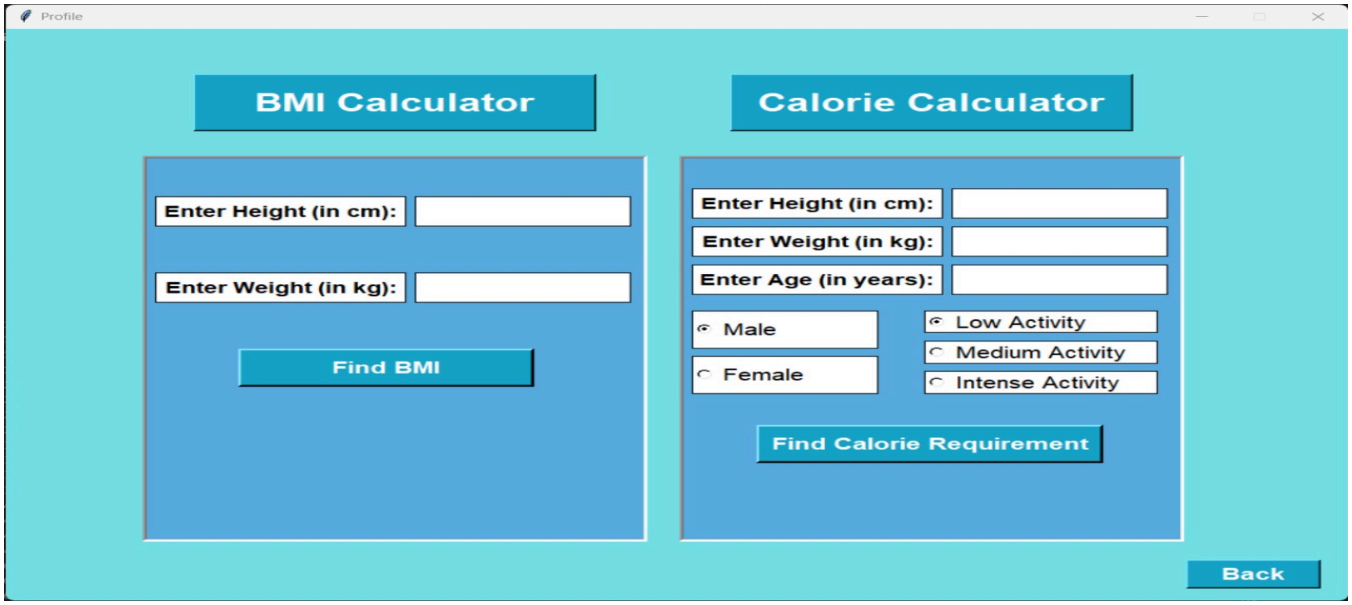

Figure 5.2.2: Calculator

When a user clicks on the calculator button this page pops up.Here users can enter data and calculate their BMI and Calories requirement based on their activity level.

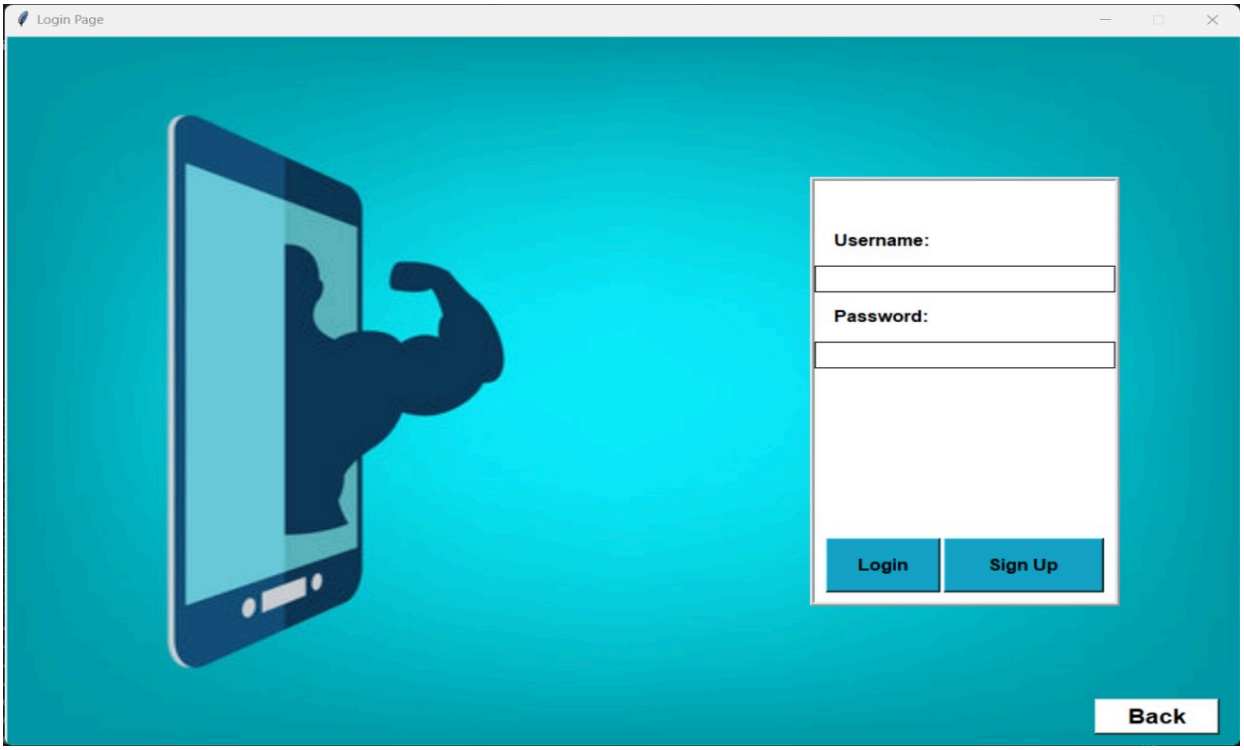

Fig 5.2.3: Login Page

If the user has already created an account then he can enter the credentials and login directly. If not user can click on the signup button

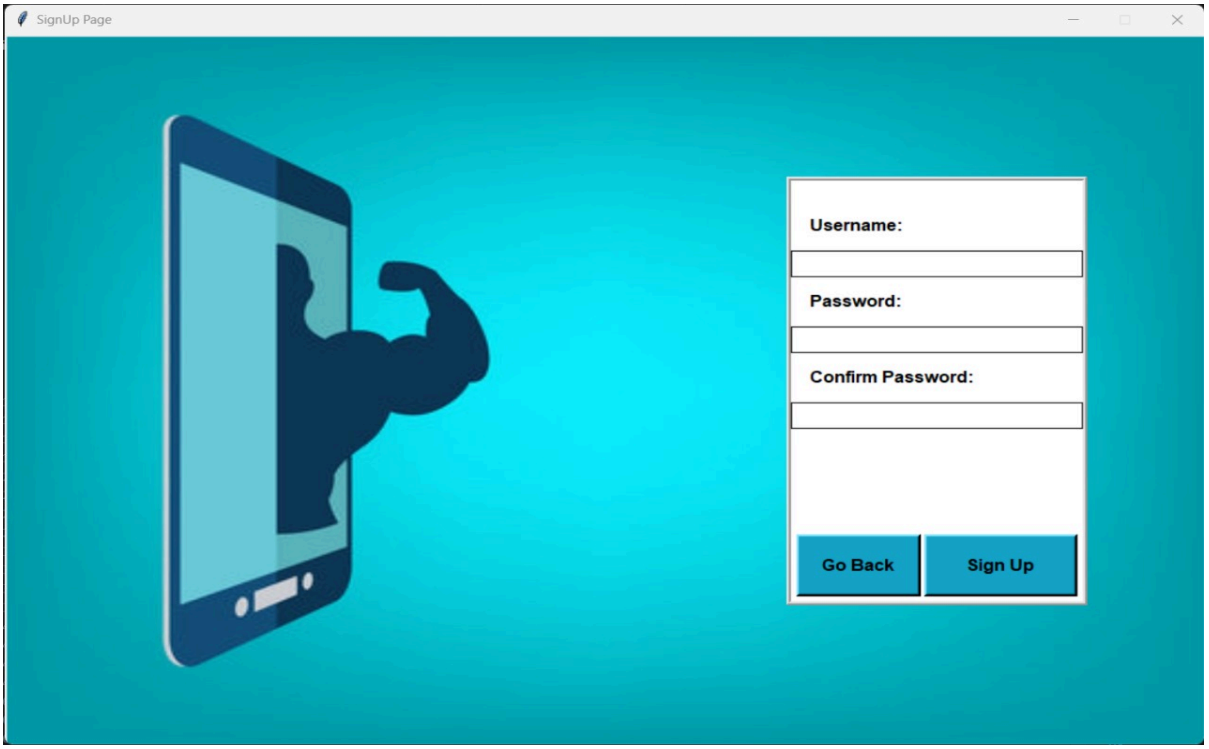

Figure 5.2.4: Signup Page

On selecting the Signup option, here users can create a new account by entering the credentials of their choice.

Figure 5.2.5: Home Page

On login users can navigate through the home page, where users can select what they want to do using different buttons present on the page.

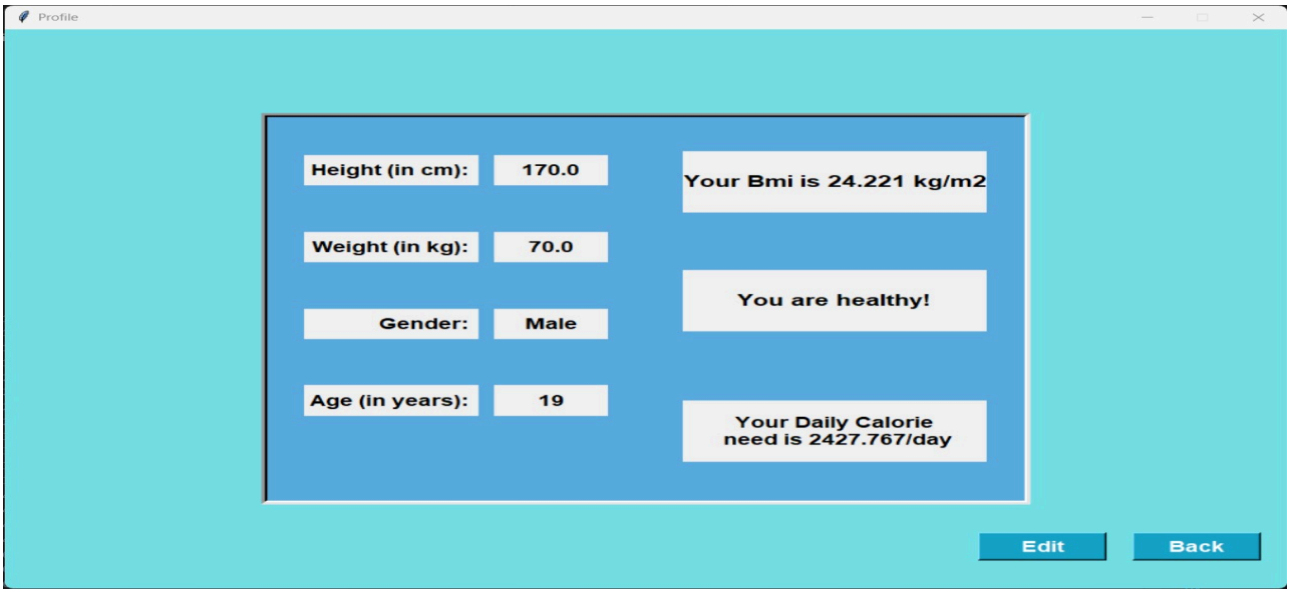

Figure 5.2.6: Profile

On creating a new account the user is required to enter data such as their height, weight, age, gender and activity level to generate their BMI and calorie requirement per day. This data is stored into the database and fetched every time a user logs in. He/She can also edit this data accordingly.

Figure 5.2.7: Search Page

On the search page, users can select the body part they want to work on and the exercise and select the exercise they want to perform for its description and image reference.

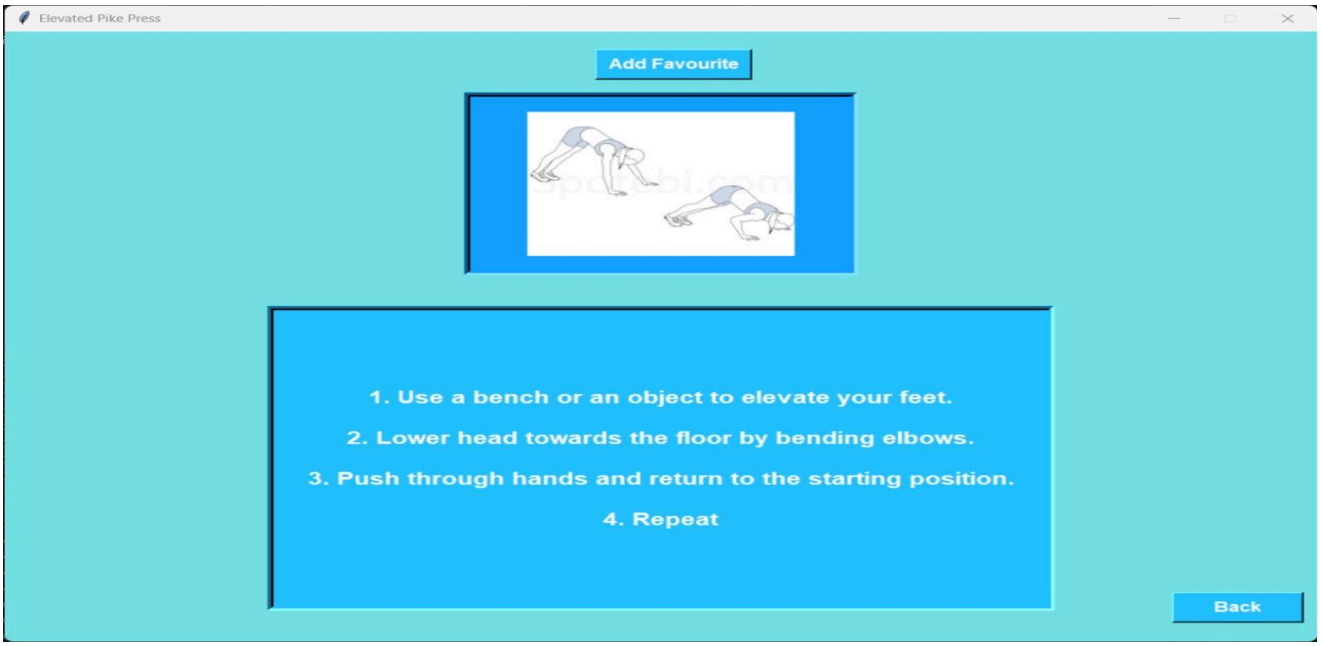

Figure 5.2.8: Selected Exercise

When users select an exercise they want to perform on the search page and click on it the exercise description pops up giving images and instructions to perform exercise.

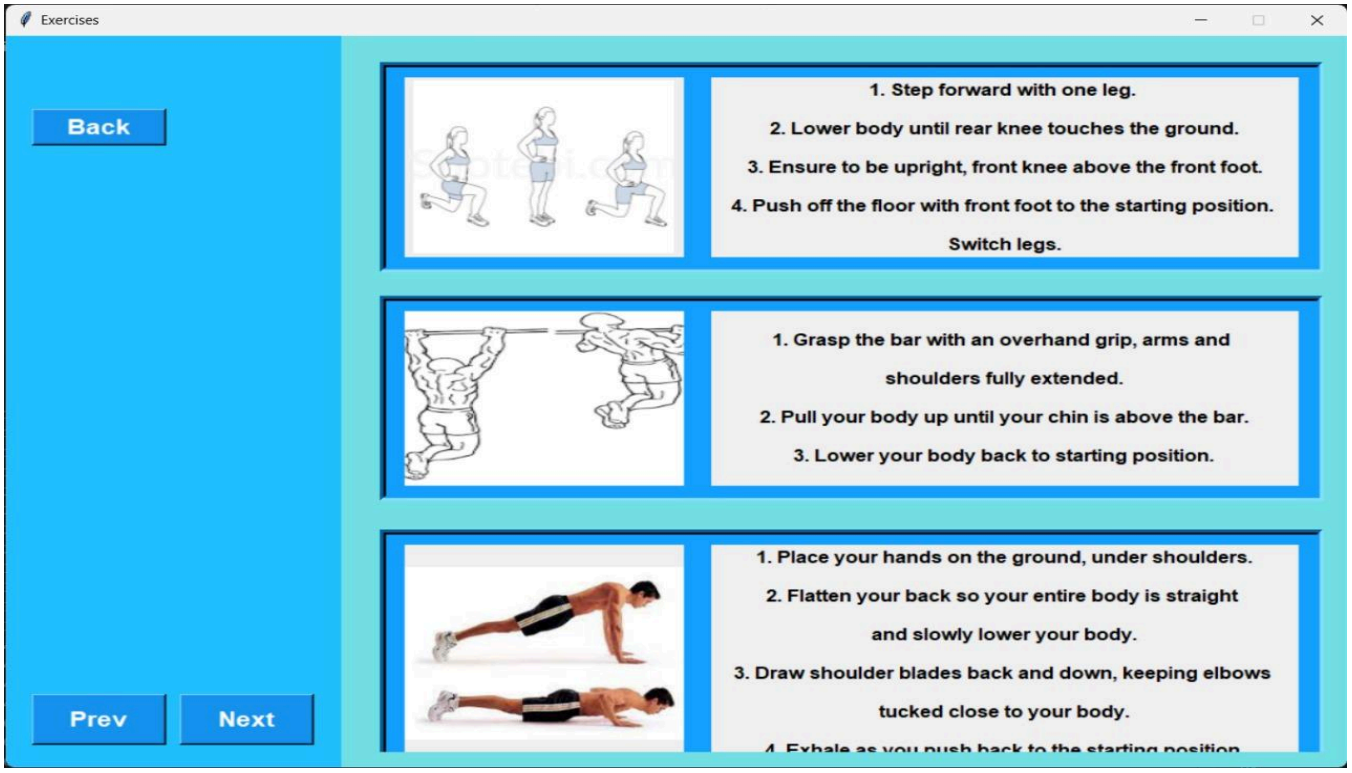

Figure 5.2.9: Favorite Page

When the user clicks on the Add Favorite button on selected exercise it is added to the favorite page for easy access to the user.

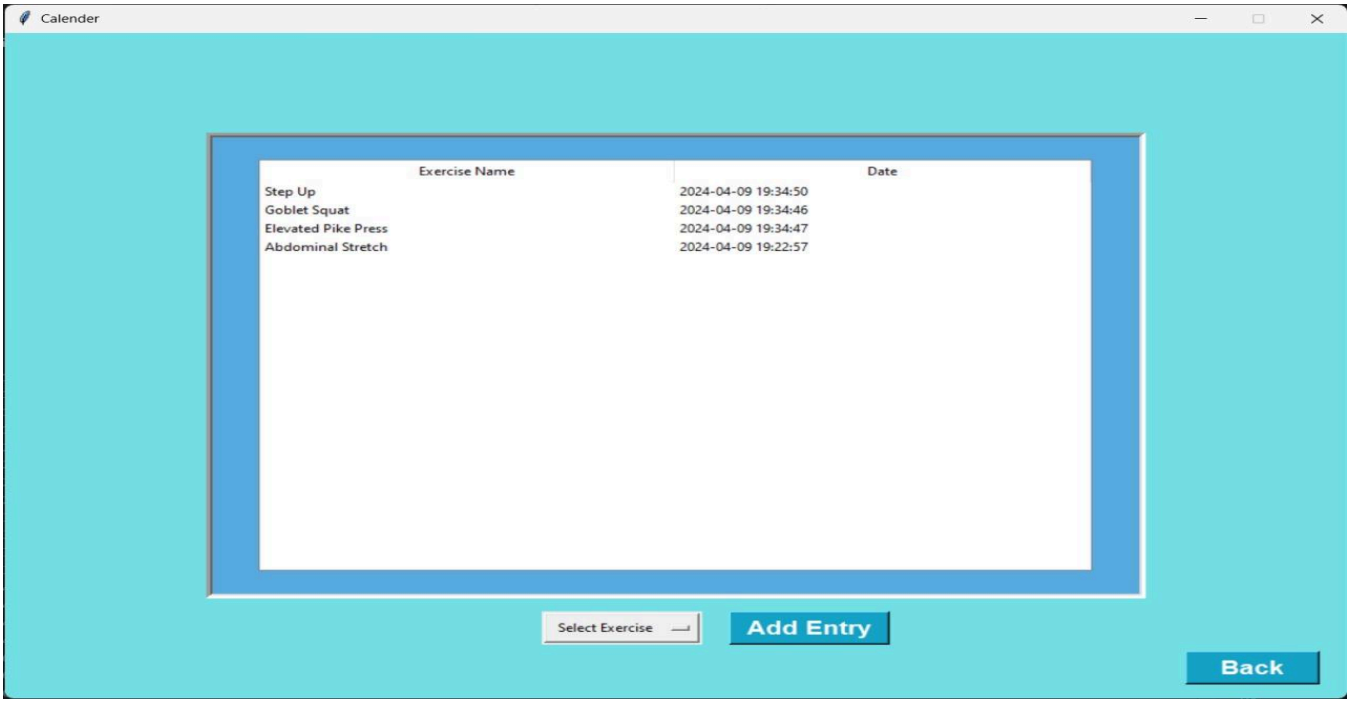

Figure 5.2.10: Calendar

This is the page where users can log their exercise data to keep track of their progress and check which exercise they did on which day.

Chapter 6

Technical Specification

1. Tkinter Library:

Tkinter is a built-in Python library used for creating graphical user interfaces (GUIs). It provides a simple and easy-to-use interface to the Tk GUI toolkit, which is a widely used cross-platform GUI toolkit. Tkinter allows developers to create windows, dialogs, buttons, menus, and other GUI elements to interact with users.

Overall, Tkinter is a versatile and beginner-friendly library for creating GUI applications in Python. While it may not have all the advanced features of other GUI libraries, it is well-suited for small to medium-sized projects and learning GUI programming concepts in Python.

2. Pillow Library:

The Pillow library (Python Imaging Library - PIL Fork) is a popular Python library used for working with images. It provides a wide range of image processing capabilities, including opening, manipulating, and saving various image file formats.

Key features of the Pillow library include:

- Image Loading and Saving: Pillow supports reading and writing images in various file formats, including JPEG, PNG, BMP, GIF, TIFF, and more. It provides functions for opening, saving, and converting between different image formats.
- Image Manipulation: Pillow offers a comprehensive set of image manipulation tools, allowing users to perform various operations on images, such as resizing, cropping, rotating, flipping, and adjusting brightness, contrast, and color balance.
- Image Filtering: Pillow includes a collection of image filters and effects that can be applied to images, such as blurring, sharpening, edge detection, embossing, and more. These filters can enhance or alter the appearance of images for artistic or practical purposes.
- Image Analysis: Pillow includes functions for analyzing image properties and extracting metadata, such as image size, resolution, format, color mode, and EXIF data.
- Integration with NumPy: Pillow seamlessly integrates with the NumPy library, allowing users to convert between Pillow Image objects and NumPy arrays for efficient image processing and manipulation.

Chapter 7

Project Scheduling

In the initial stages of our project, during the first week of February, Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, and Atharva Nimkar collaborated on preparing paper prototypes for GUI designs and discussing the flow of the project. Moving into the second and third weeks of February, the focus shifted to the design aspect, with Siddhesh N Patil, Chinmay Pawaskar, and Atharva Nimkar working on designing graphical user interfaces (GUIs). By the end of February, Chinmay Pawaskar and Atharva Nimkar were tasked with searching for and reading research papers related to fitness and activity management.

As March began, discussions for database creation took place in the first week, involving Siddhesh N Patil, Chinmay Pawaskar, and Atharva Nimkar. In the subsequent weeks, tasks included adding tables to the database, searching for exercises and their descriptions, and categorizing exercises with respect to body parts. This collaborative effort continued through March, with Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, and Atharva Nimkar working together to progress the project.

Finally, in the first and second weeks of April, Siddhesh N Patil took the lead in adding exercises to the database and integrating it with the GUI. This timeline demonstrates a structured approach to project development, with each member contributing to different stages of the process, ultimately leading to the realization of our fitness and activity management application.

Sr. No	Group Member	Time duration	Work to be done
1	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	1st week of February	Preparing Paper Prototypes for GUI designs and discussion regarding flow of Project
2	Siddhesh N Patil, Chinmay Pawaskar, Atharva Nimkar	2nd week of February	Designing Graphical user Interface(GUIs)
3	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	3rd week of February	Designing Graphical user Interface(GUIs)
4	Chinmay Pawaskar, Atharva Nimkar	By the end of February month	Searching and Reading research papers related to fitness and activity manager
5	Siddhesh N Patil, Chinmay Pawaskar, Atharva Nimkar	1st week of March	Discussion for Database Creation
6	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar	2nd week of March	Adding tables to Database
7	Siddhesh N Patil, Monish Mudaliar, Atharva Nimkar	3rd week of March	Searching for Exercises and their description
8	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	4th week of March	Categorization of exercises with respect to body part
9	Siddhesh N Patil	1sta and 2nd week of April	Adding Exercises to database and integrating it with GUI

Table 7.1: Project Scheduling

GANTT CHART TEMPLATE

Smartsheet Tip → A Gantt chart's visual timeline allows you to see details about each task as well as project dependencies.

PROJECT TITLE	FITNESS AND ACTIVITY MANAGER	INSTUTUTE & DEPARTMENT NAA	AP SHAH INSTITUTE OF TECHNOLOGY(CSE-Data Science)
PROJECT GUIDE	Prof. Aswani Nair	DATE	4/8/24

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (Weeks)	PERCENTAGE OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Group formation and Topic finalization. Identifying the scope and objectives of the Mini Project	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	1/17/24	1/31/24	2	100%
1.2	Identifying the functionalities of the Mini Project	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar,	1/31/24	2/7/24	1	100%
1.3	Discussing the project topic with the help of paper prototype.	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	2/7/24	2/14/24	1	100%
1.4	Designing the Graphical User Interface (GUI)	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	2/14/24	3/6/24	3	100%
1.5	Presentation I	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	3/6/24	3/13/24	1	100%
2	**Project Design and Implementation**					
2.1	Database Design	Siddhesh N Patil, Chinmay Pawaskar, Atharva Nimkar	3/13/24	3/20/24	1	100%
2.2	Database Connectivity of all modules	Siddhesh N Patil	3/20/24	3/27/24	1	100%
2.3	Integration of all modules and Report Writing	Siddhesh N Patil	3/27/24	4/10/24	2	100%
2.4	Presentation II	Siddhesh N Patil, Monish Mudaliar, Chinmay Pawaskar, Atharva Nimkar	4/10/24	4/17/24	2	100%

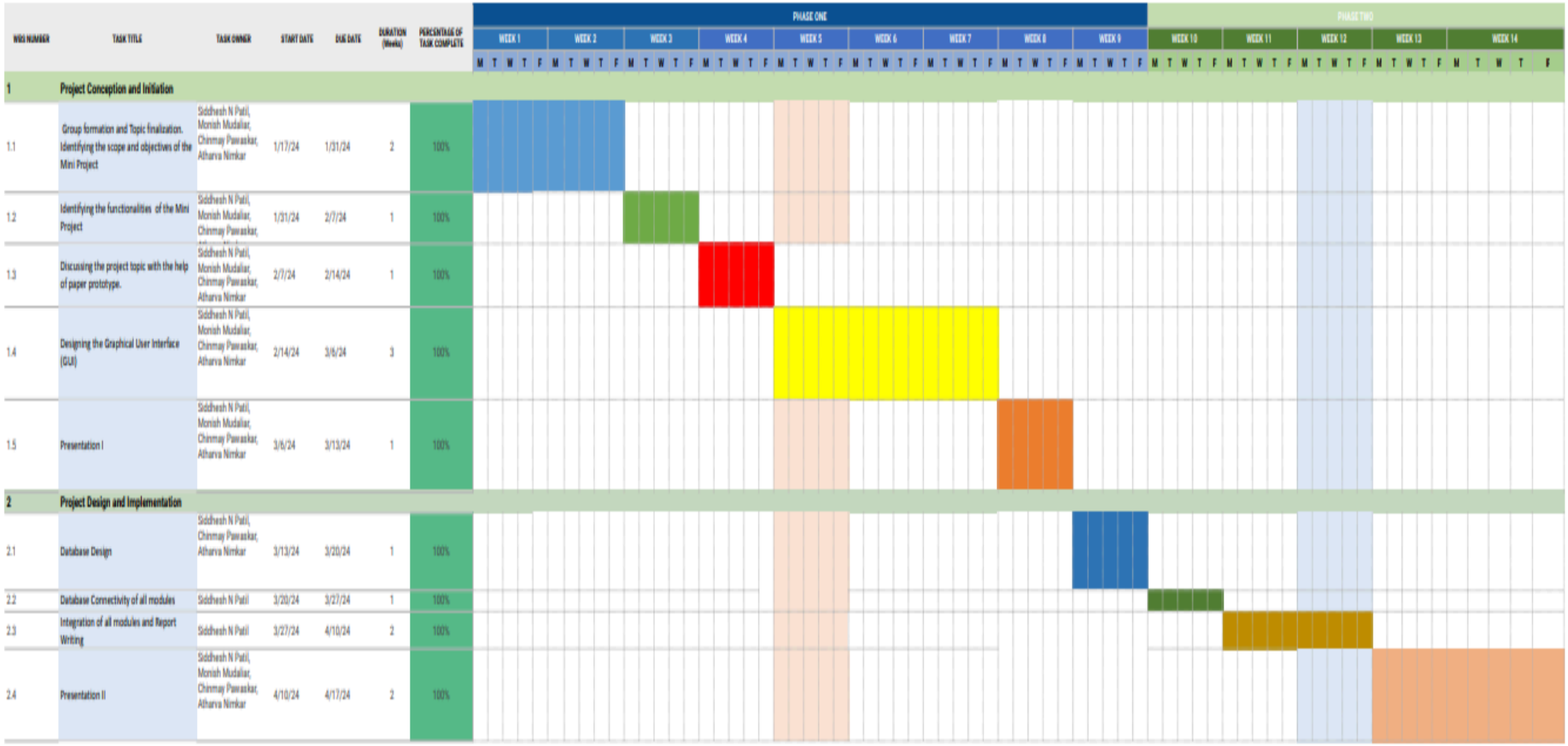

Fig 7.1: Gantt Chart

Chapter 8

Results

The result for a fitness and activity manager project would be a functional and user-friendly application that helps users track their fitness activities, set and achieve goals, and improve their overall health and well-being. Here are some specific outcomes for the project:

1. **User Registration and Profile Creation:** Users are able to create personalized profiles with information such as age, gender, weight, height, and activity level.
2. **Workout Planning and Logging:**Users are able to log their workouts, including exercises performed, date, time.
3. **Activity Tracking:** Users are able to track their progress by entering the day and the muscles they worked on.
4. **Accessibility and Usability:** Easily accessible to users of all abilities and easy to navigate, with intuitive user interfaces.

Overall, the expected result for a fitness and activity manager project is a comprehensive application that empowers users to take control of their health and fitness journey, track their progress, and achieve their wellness goals effectively.

Chapter 9

Conclusion

In conclusion, the development and implementation of a fitness and activity manager app offer significant opportunities to address the growing needs and demands of individuals seeking to lead healthier lifestyles. Through the comprehensive analysis of user requirements, industry trends, and technological advancements, our team has successfully conceptualized a robust and user-centric platform that aims to revolutionize the way users engage with their fitness routines.

As the fitness and wellness landscape continues to evolve, our app stands ready to adapt and innovate, remaining at the forefront of technological advancements and user expectations. By prioritizing user experience, data privacy, and continuous improvement, we are confident that the fitness and activity manager app will become an indispensable companion for individuals seeking to live healthier, more active lives.

In summary, the development of the fitness and activity manager app represents a significant milestone in empowering individuals to take control of their fitness journey and unlock their full potential for health and well-being.

Chapter 10

Future Scope

The future scope of a fitness and activity manager app is expansive, driven by advancements in technology, evolving health and wellness trends, and changing user preferences. Here are some potential future scopes for such an app:

- AI-Powered Personalization: Utilize artificial intelligence (AI) and machine learning algorithms to provide highly personalized recommendations for workouts, nutrition plans, recovery strategies, and overall lifestyle modifications. AI can analyze user data, preferences, and goals to tailor suggestions and adapt to individual needs over time.

- Integration with Emerging Technologies: Embrace emerging technologies such as augmented reality (AR), virtual reality (VR), and mixed reality (MR) to enhance the user experience. This could involve offering immersive workout environments, interactive coaching sessions, and gamified fitness challenges.
- AI-Powered Personalization: Utilize artificial intelligence (AI) and machine learning algorithms to provide highly personalized recommendations for workouts, nutrition plans, recovery strategies, and overall lifestyle modifications. AI can analyze user data, preferences, and goals to tailor suggestions and adapt to individual needs over time.
- Health Monitoring and Biometric Tracking: Expand the app's capabilities to include real-time health monitoring and biometric tracking using wearable devices and sensors. This could include monitoring metrics such as heart rate variability (HRV), blood oxygen levels, respiratory rate, and hydration status to provide insights into users' health and performance.
- Environmental Factors Tracking: Allow users to track environmental factors such as air quality, temperature, humidity, and UV index during outdoor activities. This information can help users make informed decisions about when and where to exercise, as well as optimize performance and recovery.

In conclusion, the future of fitness and activity manager apps is bright and promising, with endless possibilities for innovation and growth. As technology continues to advance and our understanding of health and wellness deepens, these apps will play an increasingly integral role in helping individuals lead healthier, more active lifestyles.

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