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NBA Accredited

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FitGeek: Modelling ML Based Recommendation System For Fitness And Wellness

Submitted in partial fulfillment of the degree of
Bachelor of Engineering (Sem-8) in

INFORMATION TECHNOLOGY

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1. Project Conception and Initiation

1.1 Abstract

At FitGeek, we're not just another fitness website – we're a dynamic wellness platform designed to empower you on your journey toward optimal health and vitality. Our approach is all about tailoring solutions to fit your unique needs, preferences, and goals. Whether you're aiming to lose weight, build muscle, or improve overall well-being, we're here to guide you every step of the way. With our commitment to providing the latest research and best practices in healthcare, we ensure that you're always equipped with the knowledge to make informed decisions. FitGeek isn't just a stop on your wellness journey; it's a lifestyle that embraces both physical and mental health, helping you lead a happier, healthier life.

1.2 Objectives

- **To Offer Instructional Exercises with Animations along with personalized workout plans:** To provide exercises with clear instructions, animated demonstrations and with timer.
- **To Enable Remote Access to Exercises and hydration calculator:** To facilitate remote access to exercises via web and also a hydration calculator to keep track of the users water intake in a day.
- **To determine the stress level of the user:** Stress levels are assessed utilizing the Perceived Stress Scale, a standardized tool that categorizes individuals into low, moderate, or high stress categories based on their self-reported perceptions of stressors.
- **Tailored Diet Recommendations:** Diet recommendations are provided based on users' unique body statistics, goals, and health considerations.

1.3 Literature Review

SR. NO	TITLE	KEY FINDINGS	YEAR
1.	(Base Paper) Strength Training: A Fitness Application for Indoor Based Exercise Recognition and Comfort Analysis	<ul style="list-style-type: none">• Device monitors weight and user activities by using IMU using algorithm of LDA and SVM• Several challenges were identified such as Accuracy limitations in exercise recognition algorithms, Challenges in comfort analysis, Discrepancies between predicted and actual user comfort levels.	2020

1.3 Literature Review

SR. NO	TITLE	KEY FINDINGS	YEAR
2.	Preventing Data Manipulation and Enhancing the Security of data in Fitness Mobile Application	<ul style="list-style-type: none">Factors influencing fitness video communication on Bilibili include theme, subtitles, duration, fan base, uploader gender, and nationality.Several challenges were identified, such as Complexity in implementing robust security measures, Potential performance impacts, User resistance to stringent security measures	2022

1.3 Literature Review

SR. NO	TITLE	KEY FINDINGS	YEAR
3.	Design and implementation of fitness management website	<ul style="list-style-type: none">• It focuses on the adoption of blockchain for verifying academic credentials, particularly diplomas.• Several challenges were identified, including User interface design challenges, Accessibility concerns, Integration issues with various technologies, Security vulnerabilities with personal health data	2022

1.3 Literature Review

SR. NO	TITLE	KEY FINDINGS	YEAR
4.	The iFit: An Integrated Physical Fitness Testing System to Evaluate the Degree of Physical Fitness of the Elderly	<ul style="list-style-type: none">• IoT architecture for public fitness equipment improves physical fitness by providing efficient exercise and personalized prescriptions.• Several challenges were identified such as concerns about the accuracy and reliability of the fitness testing system, potential discomfort for elderly users, ethical considerations regarding privacy and consent.	2020

1.3 Literature Review

SR. NO	TITLE	KEY FINDINGS	YEAR
5.	Prediction of New Media Communication of Fitness Culture and Its Influence Factors	<ul style="list-style-type: none">Automatic indoor exercise and comfort analysis system with 95.3% accuracy for activity recognition and 99.4% accuracy for repetition count. Automatic indoor exercise recognition and comfort analysis system may be expensive and have accuracy issues depending on the quality of devices and the user's technique.	2017

1.4 Problem Definition

- There is a crucial need for education campaigns to raise awareness about the importance of seeking reliable fitness information and the potential risks associated with following unverified advice.
- Local fitness groups and subsidized programs can play a role in providing cost-effective options for individuals to access proper guidance. Collaboration between governments, healthcare organizations, and fitness professionals can contribute to community initiatives that promote accurate information and inclusivity.
- Without proper supervision, individuals may push themselves beyond their limits, risking overexertion. This can lead to burnout, increased susceptibility to injuries, and a negative impact on overall well-being
- Access to proper fitness guidance is economically unfeasible for many individuals.

1.5 Scope

- **Enhanced Fitness Progress:** AI-powered recommendations adapt as users progress, ensuring optimal workout plans having 3 levels i.e. Beginner, Intermediate, Expert.
- **Calorie Intake Tracker and Analysis:** Implement algorithms for analyzing calorie intake against individual.
- **Personalized Diet Plans:** Incorporate nutritional analysis to ensure users receive balanced and tailored dietary recommendations.
- **Hydration Calculator:** Develop a hydration calculator that calculates daily water intake needs based on user profiles, activity levels, and in intervals.
- **Stress Level Assessment:** HealthGeek assesses stress levels through a Perceived Stress Score (0-13 Low Stress, 14-26 Moderate, 26+ High), derived from responses to 10 distinct questions..

1.5 Scope

- **Mental Health Practices:** Integrate mental health practices, including mindfulness and meditation exercises and offer guided sessions and resources (professional help if needed) to improve mental well being based on Low, Moderate, High levels of stress.
- **User Engagement and Tracking:** Implement tracking features to monitor users' adherence to recommendations and progress towards wellness goals.

1.6 Technology stack

Frontend : WEB X.O

- HTML : for structure
- CSS : for styling
- JavaScript : for interactive elements
- Bootstrap : CSS framework for responsive and attractive designs

Backend:

- Django : framework for web application development
- Python : for backend logic

1.6 Technology stack

Libraries: Data Analysis

- Pandas
- NumPy
- Matplotlib

For Machine Learning related features:

- **Scikit-learn:** For building disease prediction models.
- **TensorFlow or PyTorch:** Building recommendation and machine learning models.
- **Streamlit:** For Machine Learning models.

1.6 Technology stack

ML Algorithms:

- **K-Nearest Neighbours:** for classification and regression tasks of the diet recommender.
- **Support Vector Machine:** For classifying individuals into one of two classes i.e diabetic or non-diabetic, in the diabetes predictor.
- **Content-Based Filtering:** For exercise recommendation system (suggesting workout plan based on 3 levels and 5 different parts to train).
- **Natural Language Processing:** To determine the stress levels of the user based on the inputs provided.
- **Logistic Regression:** To predict stress levels categorised into different classes(e.g. low, moderate, high).

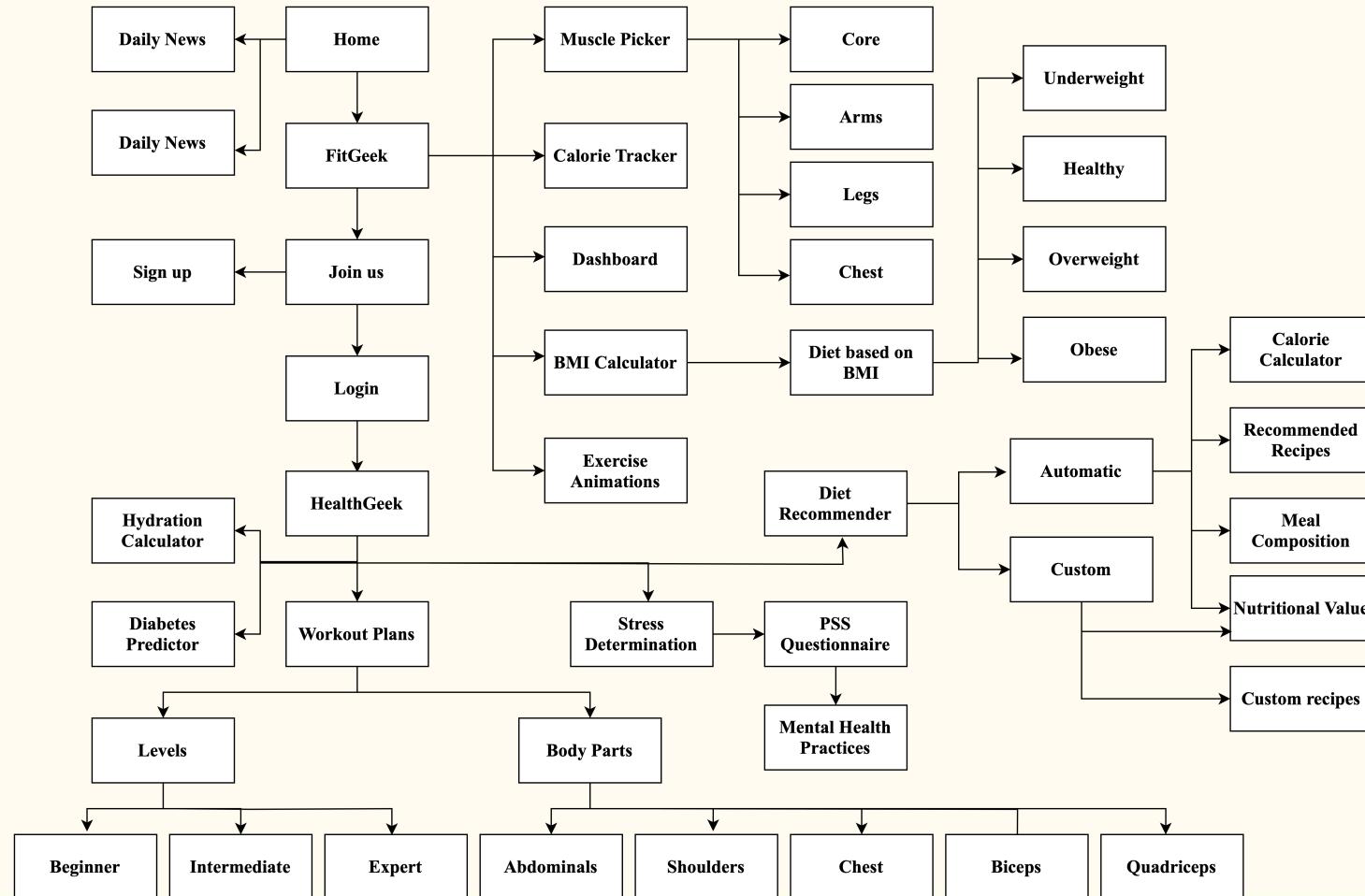
1.7 Benefits for Environment & Society

FitGeek's innovative approach to wellness not only addresses individual well-being but also contributes to environmental and societal benefits. They are:

- **Promoting a Healthier Society:** FitGeek's accessible and affordable wellness solutions contribute to improved overall health, benefiting society as a whole.
- **Inclusivity and Affordability:** FitGeek ensures economic inclusivity, making fitness resources available to individuals from diverse backgrounds.
- **Community Building:** FitGeek fosters a vibrant community, promoting social interactions, motivation, and support for individuals on their fitness journeys.
- **Remote Access to Exercises:** Enabling remote access to exercises enhances convenience and reduces the environmental impact associated with commuting to fitness centers.
- **Integration of Mental Health Practices:** The holistic approach includes mental health practices, contributing to destigmatizing mental health and enhancing overall well-being.

2. Project Design

2.1 Proposed System

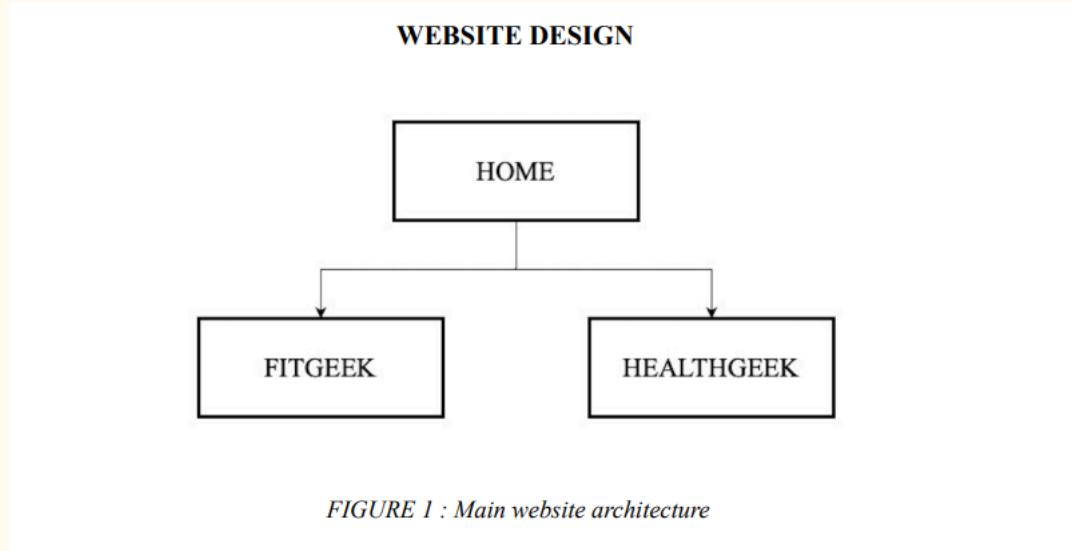


2.1 Proposed System

- FitGeek, an advanced wellness platform, utilizes cutting-edge technology for personalized and cost-effective fitness guidance, addressing both physical and mental wellness. The scalable architecture ensures seamless experiences across devices with a user-friendly interface, robust backend server.
- FitGeek's intuitive dashboard, developed with modern web technologies, provides personalized workout plans, nutrition dietary options, mental health practices, and progress tracking tools.
- Frontend development leverages HTML, CSS, and Bootstrap for sleek and visually appealing interfaces, while also using Django framework for development. Visual Studio Code (VS Code) is chosen as the primary code editor for its popularity, robust features, and seamless integration capabilities, enhancing the team's workflow for streamlined and effective development.

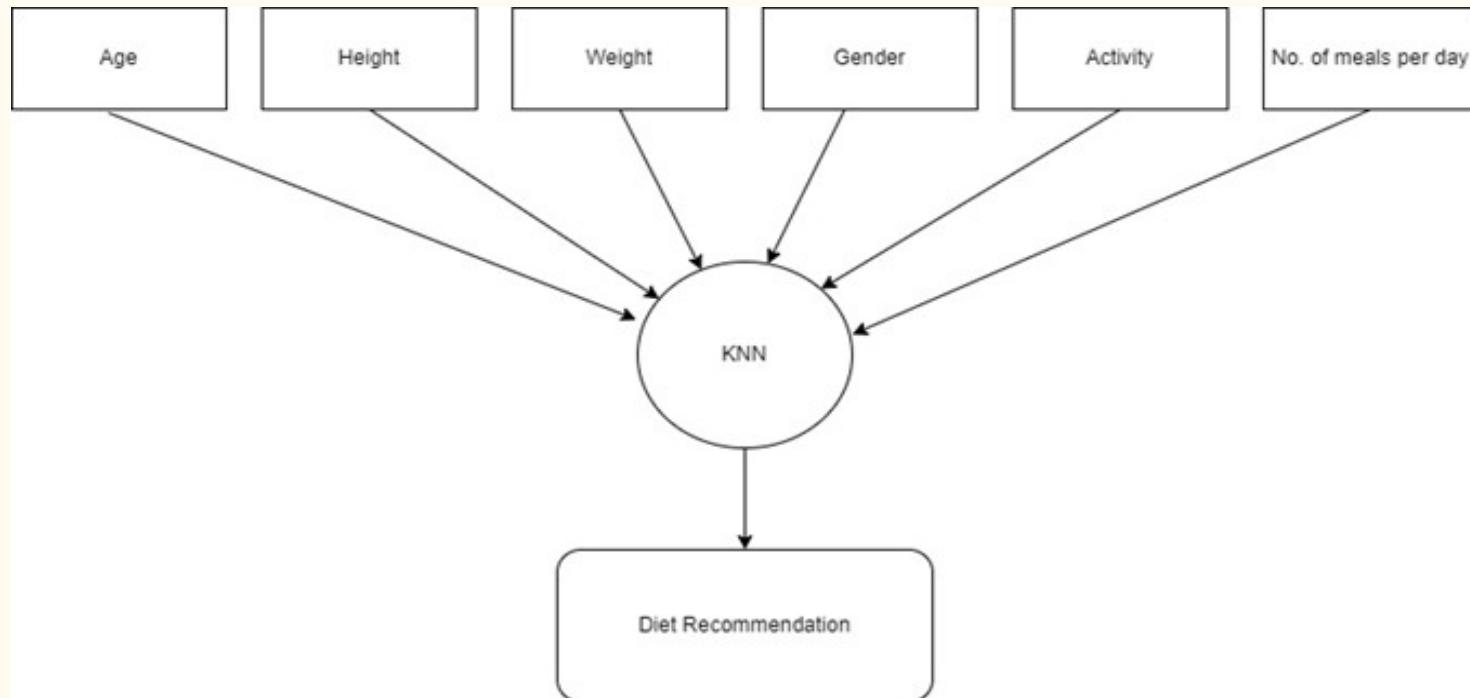
2.2 Design (Flow Of Modules)

- The main website architecture



2.2 Design Flow (Diet recommendation system)

K-Nearest Neighbors for Diet Recommendation System



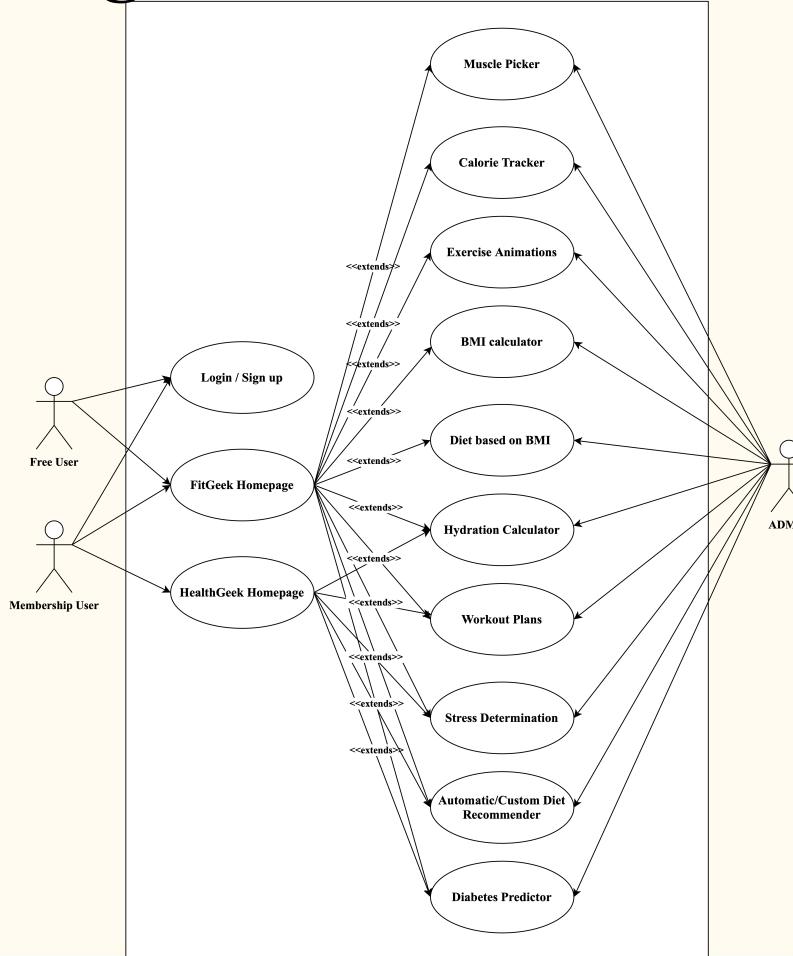
2.2 Design (Flow Of Modules)

FitGeek's sophisticated design integrates two domains: FitGeek and HealthGeek.

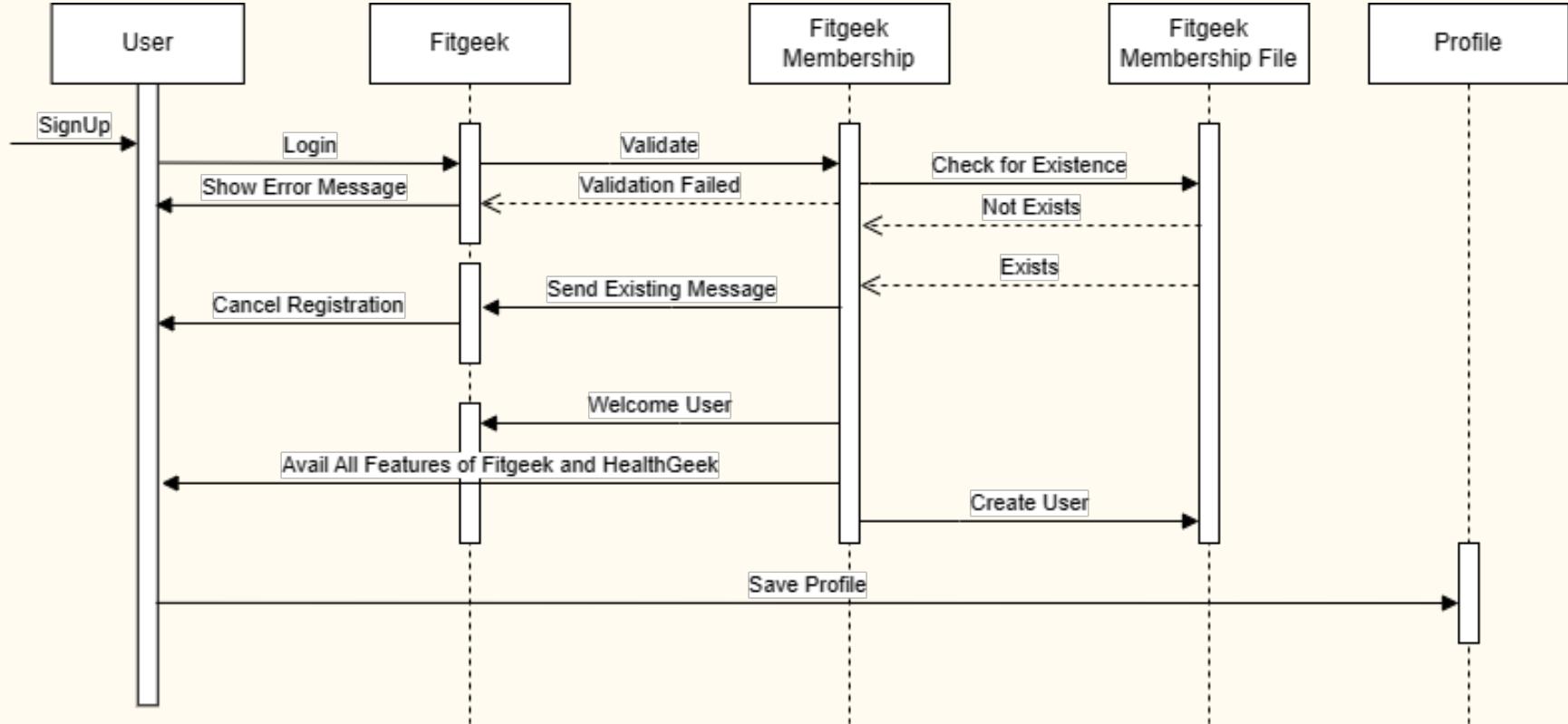
- **FitGeek** offers modules like an Exercise Recommender, Calorie Tracker, Muscle Picker, and BMI Calculator, Diet, Trainers, Appointments.
- **HealthGeek** includes a Hydration Calculator, Diet Recommender, Stress Level Predictor, Workout Plan and Diabetes Predictor.

Seamless cross-domain integration and a secure layer ensure personalized wellness solutions.

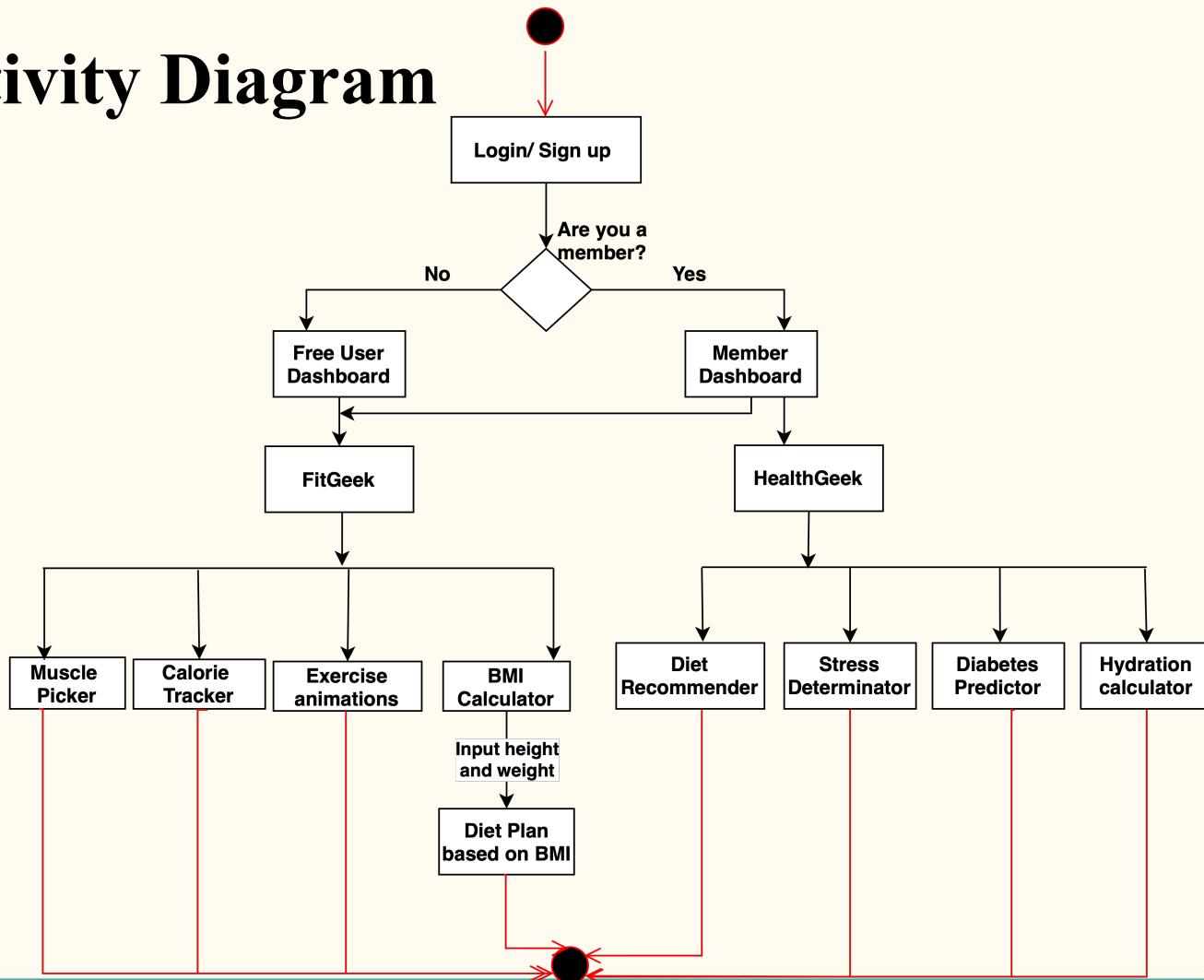
2.3 Use Case Diagram



2.3 Sequence Diagram



2.4 Activity Diagram



3. Implementation

3.1 Implementation Status

- Following features have been completed:

Home

Fitgeek:

- Muscle picker
- Appointments
- Diet
- Dashboard
- Calorie Tracker
- Exercises tab
- BMI calculator

Healthgeek:

- Diet Recommendation system (Automatic and Custom)
- Exercise Recommendation System (Workout Plan)
- Stress level determination
- Hydration Calculator

4. Result

Health With FitGeek

Enhancing the way of life



Homepage

About HealthGeek

Automatic and Custom Diet Recommender

Automatic Diet Recommendation allows you to tailor your dietary plan effortlessly. Simply input your age, height, weight, gender, and activity level. Then, choose your weight loss plan or select to maintain your current weight. Customize your meal frequency and set nutritional parameters such as calories, fat content, and protein intake. Optionally, specify ingredients to include in the recommendations. With the click of a button, generate personalized diet recommendations that align with your goals and preferences.

About HealthGeek

Automatic Diet Recommendation

Modify the values and click the Generate button to use

Age

20

Height(cm)

150

Weight(kg)

56

Gender

Male

Female

Activity

Light exercise

Extra active (very active & physical job)

Choose your weight loss plan:

Maintain weight

Meals per day

3

4

5

Generate

BMI CALCULATOR

Body Mass Index (BMI)

24.00 kg/m²

Healthy BMI range: 18.5 kg/m² - 25 kg/m².

CALORIES CALCULATOR

The results show a number of daily calorie estimates that can be used as a guideline for how many calories to consume each day to maintain, lose, or gain weight at a chosen rate.

Maintain weight

1700 Calories/day

↓ -0 kg/week

Mild weight loss

1530 Calories/day

↓ -0.25 kg/week

Weight loss

1360 Calories/day

↓ -0.5 kg/week

Extreme weight loss

1020 Calories/day

↓ -1 kg/week

DIET RECOMMENDATOR

Recommended recipes:

BREAKFAST

Modern Venison Roast

Poisson En Papillote, Victorian Style

Chicken & Vegetable Pot Pie

Tuna Potato Spicy Scratch

Maltese Baked Tuna

LUNCH

Halibut With White Beans in Tomato-Rosemary Broth

Salmon With Coriander Dahl

Chicken & Vegetable Pot Pie

Stewed Swordfish

Grilled Tuna With White Bean and Charred Onion Salad

DINNER

Homemade Tofu - Regular or Momendoufu

Yushi Dofu - Okinawa Yushi Tofu - Oboro Dofu

Chicken Stew

Spicy Baked Soy Bean Snack

Soybean & Fennel Salad

✓ Recommendation Generated Successfully!

Choose your meal composition:

Choose your breakfast:

Modern Venison Roast

Choose your lunch:

Halibut With White Beans in Tomato-Rosemary Broth

Choose your dinner:

Homemade Tofu - Regular or Momendoufu

Total Calories in Recipes vs Maintain weight Calories:

Atomatic Diet Recommendation

About Perceived Stress Scale (PSS)

A more precise measure of personal stress can be determined by using a variety of instruments that have been designed to help measure individual stress levels. The first of these is called the Perceived Stress Scale.

The Perceived Stress Scale (PSS) is a classic stress assessment instrument. The tool, while originally developed in 1983, remains a popular choice for helping us understand how different situations affect our feelings and our perceived stress. The questions in this scale ask about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way; rather indicate the alternative that seems like a reasonable estimate.

Perceived Stress Scale (PSS) Determination App

For each question, choose from the following alternatives:

0 - never

1 - almost never

2 - sometimes

3 - fairly often

4 - very often

Answer the following questions to determine your perceived stress level.

In the last month, how often have you been upset because of something that happened unexpectedly?



In the last month, how often have you felt that you were unable to control the important things in your life?



In the last month, how often have you felt nervous and stressed?

In the last month, how often have you felt that you were on top of things? 2

In the last month, how often have you been angered because of things that happened that were outside of your control? 3

In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? 1

Your total PSS score is: 20

Your stress level is: Moderate stress

Mental Health Practices to Manage Stress:

- In addition to the practices for low stress, consider seeking professional help or counseling.
- Prioritize tasks and practice time management.
- Limit exposure to stressful situations or triggers.
- Take breaks and engage in stress-relieving activities throughout the day.

Note: It's always better to seek professional help if you're experiencing high levels of stress.

Stress Level Determination

5. Conclusion and Future Scope

5.1 Conclusion & Future Scope

In wrapping up, FitGeek is really leading the charge in this whole health and wellness revolution, showing us just how much technology can do for our well-being. With its personalized fitness plans, cool interactive tools, and supportive community vibe, FitGeek is giving people the power to take control of their health like never before. It's like having your own personal coach right in your pocket, making getting fit easier, more fun, and safer for folks all around the world. Plus, with those fancy algorithms and loads of helpful content, FitGeek has created this awesome all-in-one place where anyone can start their wellness journey with total confidence.

5.1 Conclusion & Future Scope

Looking ahead, at FitGeek, we're thrilled about enhancing our algorithms for more personalized fitness plans. We're also looking to add more health metrics and collaborative features with wearables, and partnering with healthcare providers for preventive health. Expanding content to cover new wellness trends and exploring immersive tech like AR for better workouts are in the pipeline. Our focus on accuracy, user-centric design, and data security makes us a leader in health tech, dedicated to improving lives with holistic solutions.

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Abstract: FitGeek is revolutionizing wellness by making well-being accessible to all through personalized solutions driven by cutting-edge technology. At its core, FitGeek tailors fitness related plans like diet or exercises using machine learning, catering to individual preferences and goals while fostering a vibrant community of enthusiasts and experts. Prioritizing accessibility and affordability, the platform offers clear, animated exercises and user-friendly guidance. Additionally, FitGeek ensures users stay informed with healthcare updates and provides remote access to exercises. Integrating disease predictors, personalized diet suggestions, stress estimation tool, and mental health practices, FitGeek stands as a lifelong partner in the pursuit of holistic well-being, aiming to make fitness an achievable and enjoyable journey for everyone.

Thank You

