**Fitnessstan**

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**Final Approval**

This is to certify that we have read the report submitted by ***Zain Ul Abideen (35515)*, *Obaid Ullah (35739), Huzaifa Khan (35726)*** for the partial fulfillment of the requirements for the degree of the Bachelors of Science in Computer Science (BSSE). It is our judgment that this report is of sufficient standard to warrant its acceptance by Riphah International University, Islamabad for the degree of Bachelors of Science in Computer Science (BsCs).

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**Declaration**

We hereby declare that this document “**Fitnesstan**” neither as a whole nor as a part has been copied out from any source. It is further declared that we have done this project with the accompanied report entirely on the basis of our personal efforts, under the proficient guidance of our teachers, especially our supervisor **Muhammad Islam Abbasi**. If any part of the system is proved to be copied out from any source or found to be reproduction of any project from anywhere else, we shall stand by the consequences.

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**Dedication**

This work is devoted to Almighty Allah, the Most Merciful and the Most Beneficent, who granted us the knowledge, perseverance, and strength to complete this work. We also wish to extend our deepest gratitude to our parents for their unyielding love, support, and prayers along the journey. We finally dedicate this to our supervisor, “Muhammad Islam Abbasi”, with whose valuable guidance, mentorship, and encouragement we are able to make this project into reality.

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**Abstract**

In today's fast-paced world, people work tirelessly with dedication but often neglect their health and fitness, leading to a steady rise in the number of unhealthy individuals. Addressing this concern, we aim to develop a comprehensive platform, available as both a website and a mobile application, to help users manage their daily exercise and food intake effectively.

Existing apps and websites in Pakistan often fall short in providing personalized food recommendations tailored to users’ needs. While some platforms suggest exercise routines, they rarely focus on balanced nutrition or calorie management, which are essential for maintaining overall health. Moreover, these platforms lack customization based on user preferences, leaving a gap in truly effective fitness solutions.

Our solution, Fitnessstan, bridges this gap by offering personalized food and exercise recommendations. Using Flutter technology, we developed a user-friendly app that integrates an AI model to suggest appropriate calorie intake and workouts based on individual requirements. For users preferring web access, we also created a responsive website using React.js.

Fitnesstan is designed to empower users with tailored guidance, promoting healthier lifestyles through a combination of technology, innovation, and convenience. With this platform, we strive to make fitness accessible and achievable for everyone.

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**Chapter 1:**

**Introduction**

**Chapter 1: Introduction**

**Fitnesstan** is a web-based and app-based platform designed to provide a holistic solution for fitness enthusiasts, including individuals with diabetes. In today’s world, achieving a healthy lifestyle can be challenging, especially for beginners who lack personal guidance on balancing exercise and nutrition. Neglecting either aspect often leads to unsatisfactory progress or health risks. Existing platforms fail to offer comprehensive and personalized solutions, particularly for users with specific health needs.

Fitnesstan addresses these challenges by integrating artificial intelligence to deliver customized workout and dietary plans tailored to each user’s unique health metrics, goals, and preferences. The platform specifically supports diabetic patients by incorporating features that help manage their condition through personalized exercise and nutrition guidance. This seamless integration of fitness and health ensures safe and effective progress for all users.

With features like progress tracking and adaptive recommendations, Fitnesstan ensures long-term results and user satisfaction. Whether its weight loss, muscle gain, or managing conditions like diabetes, Fitnesstan empowers individuals to take control of their health journey while promoting a culture of sustainable fitness and well-being.

* 1. **Goals and Objectives**
     1. **Goals**

1. The platform in which Provide a personalized and user-friendly fitness platform for enthusiasts.
2. To facilitate users achieve and maintain their fitness goals through AI-powered workout and dietary recommendations.
   * 1. **Objectives**
3. To offer fitness workout plans as per users' fitness levels, preferences, and health metrics.
4. To provide dietary recommendations personalized to the specific needs of diabetic patients and general users, respectively.
5. To enable users to track progress and result analysis in measurable improvements over time.
   1. **Scope of the Project**

The scopes of the **“Fitnesstan”** are as following

1. Our website will be developed on java stack development and our app will be developed on Flutter.
2. We will develop a website and app that will provide platform for diabetic patient and for those people who loss, gain and maintain their weight.
3. User will upload their information without any hesitation because we are securing his information.
4. User will get personalized diet plan on the basis of his information.
5. Problem will be solved with Machine learning techniques.

The platform would also be accessible, interactive and user-friendly, and simplified for Users.

**Chapter 2:**

**Literature Review**

**Chapter 2: Literature Review**

* 1. **Introduction**

**Fitnesstan** is a web-based and app-based platform designed to provide a holistic solution for fitness enthusiasts, including individuals with diabetes. In today’s world, achieving a healthy lifestyle can be challenging, especially for beginners who lack personal guidance on balancing exercise and nutrition. Neglecting either aspect often leads to unsatisfactory progress or health risks. Existing platforms fail to offer comprehensive and personalized solutions, particularly for users with specific health needs.

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* 1. **Background and Problem Elaboration**

While the industry of fitness is rapidly expanding, on many platforms users, especially first-time users, end up stuck in their goals due to the fact that most do not properly guide one both through exercise and nutrition. Most of them only give workout plans without connecting the critical role of nutrition for achieving fitness goals. This leads to less useful results, bad recovery, and potential health risks.

Also, many of these applications do not support different types of constraints, such as diabetes, and provide no full, personalized recommendations. There is also disconnection between guidance provided on exercise and nutrition, making the whole experience disjointed and giving the user no tools needed to be successful in the long term.

Fitnesstan offers a remedy to that problem by introducing AI-based online services combining customized workout routines, suggested diets, and monitoring to create one all-inclusive solution where every user will have the right resources for a holistic fitness journey.

* 1. **Detailed Literature Review**
     + - 1. **Definition**

Fitness refers to a state of health and well-being that allows an individual to perform daily tasks with energy and minimal fatigue. It has physical, mental, and emotional factors to it and, thus, outlines the importance of good regular exercise and lifestyle habits.

A diet, on the other hand, is a short-term measure that incorporates certain food-related restrictions designed to fit the requirements for achieving objectives like weight loss or improvement in the state of being healthy. Many diets are temporary and specific to the client's need.

On the other hand, a nutrition plan is generally a long-term approach or an eating regimen designed to maintain the body's necessary macronutrient and micronutrient inputs by proper consumption to achieve certain health and fitness goals.

* + - * 1. **Related Research Work 1**
        2. **Related Research Work 2**
  1. **Literature Review Summary Table**

**Table 2.1:** Summary of Research Paper

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Document** | **Domain** | **Algorithm** |
| 1 | AI Fitness Trainer Applications | Fitness Tracking and Personalization | BlazePose for pose detection, CNN for image analysis, RNN for sequence data |
| 2 | Virtual Fitness Trainer Using AI | Virtual Coaching and Training | MediaPipe for motion tracking, Recurrent Neural Networks (RNN) |
| 3 | Personalized Nutrition and Fitness Platforms | Diet and Exercise Personalization | Machine Learning for meal planning, Decision Trees for analysis |
| 4 | AI-Based Quantification of Fitness Activities | Real-Time Exercise and Health Monitoring | BlazePose for pose estimation, Random Forest for movement tracking |
| 5 | Fitness Trainer Application Using Artificial Intelligence | Fitness and Health Solutions for Diabetics | Linear Regression for calorie estimation, SVM for dietary recommendations |
| 6 | Virtual Personal Trainer Platforms | Personalized Fitness Guidance | BlazePose for motion capture, Decision Trees for user customi AI Fitness Trainer Applications zation |
| 7 | AI-Based Workout Recognition Systems | Real-Time Motion and Workout Recognition | CNN for video analysis, Naive Bayes for feedback analysis |
| 8 | AI Fitness Systems for Progressive Workouts | Progress Tracking and Exercise Recommendations | K-Nearest Neighbors (KNN), Deep Neural Networks (DNN) |
| 9 | Virtual Fitness Trainer Platforms for Cardio | Specific Activity Recognition | MediaPipe for activity tracking, SVM for cardio analysis |
| 10 | Advanced AI Fitness Platforms | Integrated Fitness and Nutrition | Random Forest for data analysis, Linear Regression for diet optimization |

* 1. **Problem Statement**

The fitness industry faces a major issue where many beginners in the fitness industry are dedicated to workouts but lack awareness of the vital role nutrition plays in achieving their goals. This neglect of proper diet not only slows their progress but also puts their health at risk, leading to deficiencies, poor recovery, and potentially serious conditions that undermine their fitness journey.

**Chapter 3:**

**Requirements and Design**

**Chapter 3: Requirements and Design**

The requirements of the Fitnesstan application are split into functional and non-functional aspects. These requirements define how the system will function to meet the expectations of users. Functional requirements describe the features of the system that will make it possible for users, trainers, and administrators to interact with it. Non-functional requirements help ensure scalability, reliability, and security. Each of the roles in the system Trainer, User/Customer, and Admin has specific functionalities tailored for their needs.

1. **Requirements**
2. **Functional Requirements**

The functional requirements for the Fitnesstan platform come under three roles: User/Customer, Trainer, and Admin. Each of them is described with a view to smooth interaction with the system to enable efficiency and deliver an improved user experience**.**

* 1. **User/Customer Functionalities:**

|  |  |
| --- | --- |
| **S.no** | **Functionality Description** |
| 1 | Safely registers and logs in using personal credentials. |
| 2 | Input personal information, like age, weight, height, and fitness objectives, to compute BMI. |
| 3 | Personalized workout plan based on level of fitness and goals. |
| 4 | Diet recommendations that are specifically tailored to the needs of diabetics. |
| 5 | Monitoring of progress - calories burned, workouts performed, and nutritional intake. |
| 6 | Weekly updates and alerts on progress and fitness plan. |

* 1. **Trainer Functionalities:**

|  |  |
| --- | --- |
| **S.no** | **Functionality Description** |
| 1 | Manage and monitor the assigned users' progress in fitness and diet. |
| 2 | Customize workout and diet plans for individual users. |
| 3 | Provide feedback and recommendations on users' progress. |
| 4 | Access analytics and reports to measure user performances and changes. |

* 1. **Admin Functionalities:**

|  |  |
| --- | --- |
| **ID** | **Functionality Description** |
| 1 | Manages user and trainer accounts by adding, updating, or deleting accounts. |
| 2 | Monitor the platform’s overall performance and usage statistics. |
| 3 | Provide data security and impose privacy policies. |
| 4 | Manage system configurations and updates and Database management. |
| 5 | Resolve technical issues and provide platform support. |

1. **Non-Functional Requirements**
2. **Performance:** The application should respond to the user's inputs within 1 second to provide a smooth experience.
3. **Scalability:** The system must be able to support concurrent use by different users without considerable performance degradation.
4. **Security:** All user data, personal and health-related, should be encrypted for confidentiality and integrity.
5. **Usability:** The interface must be intuitive and accessible to users with different technical
6. **Reliability:** The platform should maintain at least 99% uptime to ensure that the application is always available.
7. **Compatibility:** The application should seamlessly run on both Android and iOS devices and be accessible through web browsers
8. **Hardware and Software Requirements**
   1. **Hardware Requirement**
9. A server with at least 16GB RAM, 500GB SSD, and a quad-core processor to manage user requests, data storage, and the hosting of applications
10. Testing devices, including smartphones running Android (version 8.0 or above) and iOS (version 12.0 or above), PCs, and tablets, to validate the application’s functionality and compatibility across platforms.
11. User-end devices must meet the minimum specifications of Android 8.0 or iOS 12.0 and above to ensure a smooth application experience.
    1. **Software Requirement**
12. **Flutter:** It is used for cross-platform mobile application development, which allows smooth functionality on both Android and iOS devices.
13. **React.js:** It is a JavaScript library used for creating responsive and dynamic web interfaces.
14. **Spring Boot and Java:** These are used for back-end development to ensure scalable and robust server-side functionality.
15. **Python:** It is used for AI/ML tasks such as generating personalized fitness and dietary recommendations.
16. **MongoDB:** It is a NoSQL database for managing user data, activity logs, and app-related information.
17. **Bootstrap:** Used for creating beautiful and responsive user interfaces.
18. VS Code: Primary IDE for coding and debugging.
19. **PostgreSQL:** Relational database for structured data storage and management.
20. **Git:** A version control system to collaborate on development and manage source code.
21. **Proposed Methodology**

The development of Fitnesstan is focused on creating a platform that integrates AI-based fitness and nutrition recommendations to address the challenges faced by fitness enthusiasts. The methodology begins with collecting and processing relevant data, including fitness routines, dietary plans, and health metrics, to ensure the platform provides accurate and personalized recommendations. The system leverages advanced algorithms like BlazePose for workout tracking and AI models for diet optimization.

The web interface, developed by using React.js, and mobile application, created with Flutter, give people smooth access to their plans for fitness, dietary recommendation, and their progress. However, the back-end, based on Spring Boot, Node.js, and supported through Python AI functionality, ensures robust processing of data and secure interactions by the user. Interaction among the users, trainer, and admin panel also gets supported through these combinations.

We aim to fill current gaps on fitness platforms through features that include personalized exercise routines, dietary recommendations, and tracking one's progress. As such, the platform should be created with usability and scalability along with data security to allow for engagement and reliability among users. The result of this project is going to be a solid, user-friendly application empowering the achievement of fitness goals for its users through personalized, AI-driven guidance. The toolset will also support trainers and admins with progress tracking and customization of recommendations.

1. **System Architecture**
2. **Use Cases**
3. **Fully-Dressed Use Cases**
4. **Methodology Diagram**
5. **Database Schema Diagram**