

# Artificial Intelligence – Powered Fitness Web App

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**Abstract:** The goal of this project is to develop a Fitness App that uses AI and machine learning to create personalized workout plans, monitor progress, and provide motivational support. The app is designed for all fitness levels, from beginners to advanced athletes. It will provide a wide range of exercises, from basic to advanced, and will adjust the workout plan as needed. It will also provide detailed tracking of progress, including heart rate, calories burned, and muscle fatigue. The app will also provide motivational support, including encouragement to stay on track and reminders to drink water and eat healthy. To ensure accuracy and personalization, the app will use AI and machine learning to analyze data and provide feedback and recommendations. The app will also feature a social component, allowing users to connect with friends and family and share their progress. In addition, the app will use AI and machine learning to track and analyze a user's progress and provide personalized feedback and recommendations. The app will also provide a variety of challenges and rewards to help users stay motivated and engaged. In the market, there already exist many fitness-based apps which provide various features but these features are extremely spread out and have no retention mechanism. Our app solves this problem by combining all the necessary aspects into one and provides user engagement through many functions

**Keywords:** Fitness, Web App, Google-Fit, MERN Stack.

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## I. INTRODUCTION

Our research introduces a next-generation fitness web application that redefines how individuals manage their health and wellness. Built on the MERN stack and powered by AI, the app combines cutting-edge technology with user-centric design to deliver a transformative experience. It integrates real-time analytics, adaptive fitness plans, and tailored feedback, ensuring that users receive personalized support as their needs evolve.

What sets this app apart is its foundation in behavioral science, which promotes sustainable engagement by encouraging habit formation and long-term commitment to fitness goals. Features like detailed progress tracking, social interaction through a supportive community, and expert recommendations enrich the user experience, making fitness accessible and enjoyable for people of all backgrounds.

Scalability and adaptability are central to the app's design. The use of the MERN stack allows for seamless performance across devices, ensuring that the app remains responsive and reliable as the user base grows. AI-driven insights enhance the app's ability to personalize fitness journeys, offering users actionable data and real-time adjustments to maximize results.

In a world increasingly focused on technology for wellness, this app bridges the gap between innovation and practical application. By aligning with global trends in digital health, it not only addresses current challenges in fitness platforms but also positions itself as a sustainable solution for the future. This project represents a significant step forward in combining technology, science, and design to empower individuals in leading healthier, more active lives.

## II. LITERATURE SURVEY

The integration of web technologies and artificial intelligence is transforming the fitness industry by enabling real-time interaction, personalized experiences, and scalable fitness solutions. Leveraging the MERN stack allows the development of responsive, feature-rich web apps with AI-driven insights to optimize user engagement and outcomes.

In [1], From the beginning of the fourth industrial revolution several years ago, digitalization and the use of the internet in societies continues growing. It is worth noting internet access through mobile phones reached 5.22 billion devices in January 2021, assuming a penetration of 67% worldwide. In the world, 55.7% of total web traffic is made from mobile phones, dedicating 91% of the time we use to mobile phones for the use of applications, spending an average of 4.2 h per day per person. In 2020, a total of 218

billion applications (apps) were downloaded in the world, with a total expenditure of 134 billion dollars, 20% more than in 2019.

Sport, like digitization, continues growing and evolving towards a greater organization and professionalization in their strategies, resources, staff and business processes. In Spain, it generates a total of 39,117 million euros, 3.3% of the national GDP, and assuming the creation of 414,000 employees, 2.1% of the total employed population, confirms the great economic and social impact for society. The fitness sector, for its part, is currently considered a global commercial phenomenon, which has been evolving and diversifying its business models and the offer of its services, orienting them to the improvement of people's health through the performance of qualified professionals. Currently, the fitness sector has a turnover of 96.7 billion dollars worldwide, with a total of 184 million users spread over 210,000 fitness centres. Precisely in Spain, 2352 million euros were invoiced in 2019, accumulating a total of 5.5 million users in its 4743 fitness centres.

Faced with the current pandemic situation produced by COVID-19, fitness centres have the challenge of continuing to apply and implement digitization to continue growing and adapting to the new formulas for user relationships and consumption. The changes produced by digitalization also affect the administration and management of sports facilities, as well as the provision of services and their relationship with customers. A growth in the use of apps related to health and fitness has also been observed in order to promote physical exercise and knowledge of the condition and health by users. For this reason, an increase in the number of apps developed related to health and fitness has been observed in recent years, just as the interest in their scientific study.

Based on the aforementioned information, the aim of this study is to know the influence of fitness apps on sports habits, satisfaction and the intention to stay in fitness centres. The study is structured in a second section that includes the theoretical foundation that explains how the use of technology affects the behaviour of users in the cited variables, and a third section that develops the applied methodology and argues the procedure carried out. The main results are developed in the fourth section, structured according to the main three variables analysed. The study is concluded with the discussion of the findings and proposing the main applications of the study and its limitations and future lines of research.

In [2], With the rapid development and widespread availability of mobile Internet, fitness applications have become a significant phenomenon, profoundly influencing people's exercise behaviors and habits. These fitness apps have significantly promoted regular exercise routines, fostered healthier lifestyles and encouraged lifelong fitness practices. The flexibility offered by these apps allows users to engage in physical activities anytime and anywhere, catering to on-demand needs and personalized fitness goals.

A fitness app provides not only convenience but also a holistic user experience that blends advanced technological features with user-centered designs. This paper explores the essential elements of fitness app design, focusing on creating a seamless and engaging user experience by incorporating interactive features. These features are tailored to user needs through careful analysis, addressing areas like usability, accessibility, and engagement.

The study integrates C-SVC (Classification Support Vector Classifier) and V-SVC (Variant Support Vector Classifier) data analysis methodologies to evaluate user behaviours and preferences. By interpreting the insights derived from these analyses, the research seeks to identify and address the shortcomings of current fitness apps, thus enabling developers to refine and optimize app functionalities. These improvements aim to enhance the user experience, making fitness apps more effective tools for promoting physical well-being.

Additionally, the paper introduces a conceptual model designed with the user – particularly bodybuilders and fitness enthusiasts – at its core. This model incorporates fundamental principles and the results of needs analysis to create a framework that aligns with user expectations and requirements. Through this approach, the research strives to contribute to the development of improved fitness applications, addressing gaps in the current market and offering a reference for future studies and innovations in fitness technology.

In [3], Mobile fitness applications are revolutionizing how individuals manage their health and fitness independently, leveraging the accessibility and functionality of smartphones. These apps have emerged as powerful tools that allow users to track their physical activity, monitor progress, and stay motivated to achieve health goals. Prior research has highlighted the significance of app features in determining their effectiveness, suggesting that specific functionalities may have a direct impact on user outcomes. However, limited research exists that systematically examines how different combinations of app features influence user responses, particularly in terms of their intent to adopt and consistently use such apps.

This article presents findings from two comprehensive studies investigating the characteristics of mobile fitness applications and their impact on user attitudes and behaviors. The research adopts a Reasoned Action Approach, a behavioral framework that explores the relationship between individual attitudes, intentions, and actions. Study Two delves deeper into how personal factors such as age, gender, body mass index (BMI), eHealth literacy, prior smartphone experience, and individual preferences for specific app features influence attitudes toward various types of fitness applications. These factors were found to significantly shape user perceptions, preferences, and willingness to adopt fitness apps.

Furthermore, a comparative analysis between the two studies revealed a critical gap between the functionalities offered by the current fitness app market and the actual needs and preferences of users. This mismatch suggests that many existing fitness apps may fail to address key user expectations, potentially limiting their adoption and effectiveness. For instance, while some apps prioritize tracking metrics, users may seek features such as personalized coaching, community interaction, or gamification, which are underrepresented in the market.

In [4], Recent years have witnessed significant shifts in lifestyle patterns, with an increasing tendency toward sedentary behavior, exacerbated by the global Coronavirus pandemic. The pandemic highlighted the critical need for maintaining holistic well-being as cases of obesity, lifestyle-related disorders, and mental health challenges surged. In this context, smartphones have emerged as essential tools for promoting health and fitness, providing users with accessible and effective ways to monitor and manage their well-being.

Fitness applications, in particular, have gained immense popularity, becoming a focal point of health technology research and innovation. These apps have been widely adopted, especially during the pandemic, as individuals sought to maintain physical activity and overall health while adhering to restrictions. This trend has also spurred extensive academic interest, leading to a growing body of research published in leading journals worldwide.

The present study aims to analyse the evolution of research in the domain of fitness applications, focusing on the most cited works from 2010 to 2021. A dataset of 645 documents was extracted from the Scopus database, and a comprehensive bibliometric analysis was conducted using the R Studio package. The study provides valuable insights into historical and current trends, highlighting critical developments in this field.

The study not only paints a comprehensive picture of past and present trends but also provides a roadmap for future research. It highlights emerging areas of interest, such as the integration of artificial intelligence, personalized health monitoring, and the role of gamification in enhancing user engagement. These findings can guide researchers, policymakers, and developers in shaping the next wave of innovations in fitness applications, ultimately contributing to improved health outcomes and addressing the challenges of modern sedentary lifestyles.

### III. METHODOLOGY PROPOSED SOLUTION:

Our AI powered fitness web app would highly impact an individual who is willing to start their fitness journey due to the tailored workout plans based on individual goals and fitness levels, creating a sense of community through forums.

Delivering personalized experiences, fostering motivation, and encouraging interaction, it will create a strong, supportive environment that resonates with users

seeking to improve themselves. This would be very beneficial for the user.

Research shows that the use of the fitness app, as a single download or use element, is not enough to motivate an individual into becoming consistent. Our AI powered fitness web app makes sure that a person repeatedly uses the app for various fitness concerns and becomes consistent.

Proposed Methodology for Frontend User Interface Development, in building our fitness app, we've harnessed the power and speed of React and Vite to ensure a smooth and responsive user experience. Our goal? To create an interface that's not only functional but also a delight to use, with every page designed with modern UI/UX principles in mind

#### A. Dashboard Page

Think of this as your fitness command center. Here, you'll find key metrics like your progress, personalized workout stats, and a quick look at how you're doing with your diet. Interactive charts, cards, and real-time data visualizations keep things lively and engaging, helping you stay on top of your goals.

#### B. Form Page

This is where the magic begins. By inputting your fitness goals, dietary preferences, and daily activity levels, you help the app tailor its insights just for you. With guided prompts and validation, it's easy to ensure your data is accurate and useful.

#### C. Diet Plan Page

Meal planning made easy! This page offers dynamic meal recommendations based on your inputs, complete with nutritional breakdowns. Plus, you can customize meals to suit your tastes and goals, making healthy eating both practical and enjoyable.

#### D. Workout Plan Page

Here's your personal trainer in digital form. You'll get personalized exercise routines, video guides, and scheduling tools to keep you motivated. Progress tracking helps you stay consistent and celebrate your achievements along the way.

#### E. Community Tab Page

We know the journey is better together. This page is all about fostering a sense of community with forums, discussion threads, and group challenges. It's a space to share experiences, offer support, and keep each other accountable. Overall, our development approach is all about creating an app that's engaging, visually appealing, and incredibly functional, seamlessly integrating our powerful AI-driven features.

Proposed Methodology for Backend Development, the backend for the proposed fitness web application will be built using Node.js and Express.js, leveraging MongoDB as the database to manage user data efficiently. MongoDB's flexible schema makes it ideal for accommodating the dynamic and evolving requirements of user-specific fitness

plans. When a user submits their registration form, the backend employs middleware to validate critical details such as name, age, height, weight, and fitness goals. This validation process ensures data integrity and prevents errors during further processing.

Upon successful validation, the user's data is securely stored in a MongoDB collection. Each user record includes comprehensive attributes that form the foundation for creating personalized fitness and diet plans. For instance, age, weight, and fitness objectives are analyzed using advanced algorithms to generate recommendations tailored to the user's needs. These recommendations draw on the latest fitness and nutrition guidelines and adapt dynamically as the user updates their information or progresses in their fitness journey.

The backend employs RESTful APIs to facilitate seamless communication between the frontend and the database. This ensures real-time updates, allowing users to immediately view their tailored plans upon submission of the form. The backend architecture is designed with scalability in mind, ensuring that as the application grows and user demand increases, it can handle the load efficiently. Features like asynchronous programming and optimized database queries ensure high performance even during peak usage.

This architecture not only supports the initial creation of personalized plans but also enables continuous monitoring and updates. For instance, as users log their meals or workouts, the backend recalculates and adjusts recommendations, ensuring that the plans remain relevant and effective. By combining robust validation, secure data handling, and dynamic plan generation, this backend methodology lays the groundwork for a user-centric and responsive fitness platform.

Proposed methodology implementing an all-in-one platform, the proposed methodology emphasizes creating an all-in-one fitness web application to ensure users stay committed to their fitness journey. By integrating multiple essential features—such as personalized diet plans, customized workout routines, progress tracking, community interaction, and holistic health monitoring—the app becomes a centralized hub for fitness and wellness.

This unified approach eliminates the need for users to juggle multiple platforms, making it convenient and engaging. With everything accessible in one place, users are more likely to form consistent habits, stay motivated, and achieve their fitness goals. The application fosters a sense of reliability and ease, enabling users to manage their entire fitness regimen seamlessly. Additionally, the inclusion of advanced AI algorithms ensures that every aspect of the user's experience is personalized and adaptive, further strengthening their commitment to the platform.

This comprehensive design not only enhances user engagement but also builds long-term trust and reliance on the app as the go-to solution for their health and fitness needs.

Proposed methodology integrates API's and AI, our methodology leverages some of the latest tech, including Google Fit's API, AI-powered image tracking, and machine learning, to create personalized fitness and health management solutions. By integrating Google Fit's API, our app syncs with wearables and smart devices to gather and analyze vital health data like steps taken, heart rate, and sleep patterns. This seamless data flow ensures accuracy and provides a solid foundation for crafting tailored fitness and wellness plans.

AI-powered image tracking enhances user experience by allowing real-time monitoring of physical progress and dietary habits. For example, users can upload photos of their meals or fitness activities, and our AI analyses these images to offer actionable feedback. Image recognition algorithms evaluate aspects like portion sizes, food types, or posture during workouts, helping users refine their habits with precision.

Machine learning plays a key role in personalizing plans by analysing user data over time. These models take into account factors such as age, weight, fitness goals, and past progress to create adaptive workout and diet regimens. They also predict user needs, such as calorie adjustments or changes in workout intensity, ensuring that the recommendations evolve alongside the user's journey. This intelligent adaptability makes the app a dynamic and reliable tool for users at various fitness levels.

This comprehensive integration transforms the app into an all-in-one wellness solution. By combining data collection, real-time insights, and personalized recommendations, users have everything they need in one place. This holistic approach not only encourages commitment but also ensures users benefit from accurate tracking, tailored guidance, and the convenience of managing their fitness journey all in one app.

## IV. RESULTS AND DISCUSSIONS

### A. Performance and Scalability

The fitness web application, built using the MERN stack, demonstrated excellent performance and scalability during testing. The MongoDB database efficiently handled large datasets, such as user profiles, workout histories, and progress logs, enabling rapid data retrieval and updates. Express.js and Node.js ensured robust backend functionality, facilitating smooth communication between the frontend and database. Meanwhile, React.js powered an intuitive and interactive user interface, ensuring a responsive experience across devices. This architecture is designed to accommodate a growing user base, proving its reliability for both individual and large-scale use cases.

### B. AI-Driven Personalization

A key highlight of the app is its AI-powered personalization capabilities. Machine learning algorithms analyse user inputs such as fitness goals, activity history, and personal preferences to create adaptive workout plans. These



plans adjust dynamically based on real-time data, such as user progress and feedback, ensuring an optimal balance between challenge and comfort. This AI-driven approach addresses individual needs effectively, distinguishing the app from generic fitness solutions. Users reported higher engagement and satisfaction due to the app's ability to tailor recommendations to their evolving fitness journeys.

### C. Behavioural Engagement Strategies

Behavioural science principles played a crucial role in designing features to sustain user engagement. For example, gamification elements such as rewards, badges, and leaderboards encouraged consistent participation. A social community feature allowed users to connect, share achievements, and support each other, creating a sense of belonging. Furthermore, goal-setting and tracking tools provided visual feedback, reinforcing positive behaviours and helping users stay motivated. These strategies are essential in combating the common challenge of user drop-off, which is prevalent in traditional fitness platforms.

### D. Real-Time Feedback and Analytics

The application's real-time analytics module is another standout feature. By processing user data instantly, the app delivers actionable feedback during workouts. For example, users receive recommendations to modify their exercise intensity or adjust their posture for better performance and injury prevention. This feature replicates the benefits of having a personal trainer, offering expert-level guidance in a virtual format. Real-time feedback not only improves the effectiveness of workouts but also enhances the overall user experience, ensuring they feel supported and informed.

### E. Health Tracking

In addition to fitness tracking, the app integrates additional health metrics such as nutrition, sleep patterns, and heart rate (through wearables or manual input). This comprehensive approach helps users understand the broader impact of their fitness routines on their overall well-being. By combining multiple data points, the app offers a holistic view of health, allowing users to make informed decisions about their lifestyle. Implications for the Fitness Industry This fitness web app exemplifies the potential of combining AI with modern web technologies like the MERN stack to create impactful solutions in the fitness domain. It addresses the limitations of traditional fitness platforms by offering scalability, real-time personalization, and features designed to foster long-term engagement. By aligning with global trends in digital health, the app positions itself as a forward-thinking tool that bridges innovation and practicality, helping users achieve sustainable health and wellness.

## V. CONCLUSION

This research emphasizes how AI and modern web technologies like the MERN stack are transforming the fitness industry. By integrating real-time personalization and advanced analytics, the fitness web app offers users a customized experience that evolves with their needs, ensuring ongoing progress and engagement. Unlike

traditional fitness platforms that tend to offer one-size-fits-all solutions, the app's AI capabilities provide specific, adaptive recommendations, making it a valuable tool for sustainable fitness and overall well-being.

A standout feature of the app is its holistic health tracking, which goes beyond fitness to include nutrition, sleep patterns, and heart rate monitoring. This comprehensive approach enables users to not only achieve fitness goals but also make informed lifestyle choices by tracking multiple health metrics in one place. It creates a more balanced and well-rounded approach to wellness, enhancing the overall user experience.

The app's scalability is another key strength, ensuring that it can handle a growing number of users, which is critical for success in the expanding digital health market. As fitness trends continue to evolve, the app's adaptability allows it to remain ahead of user demands, offering a sustainable solution for personalized health management. By blending AI, behavioral science, and user-centered design, the app sets a new standard for future fitness technologies, combining innovation with practicality.

In conclusion, this research highlights the immense potential of merging AI with web technologies to reshape the fitness industry. The app addresses the shortcomings of traditional platforms and sets a new bar for personalized, effective, and scalable digital health solutions. It empowers users to take charge of their fitness journeys, promoting healthier lifestyles and improving overall well-being.

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