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BMI Tracker: A Personalized Health Monitoring Web Application

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Abstract:

The BMI Tracker is a web-based health monitoring project designed as a lightweight yet powerful academic system to support health awareness among individuals. Unlike simple calculators, this project integrates secure login, real-time database storage, history tracking, and visualization of BMI records using Chart.js. The project uses HTML, CSS, JavaScript, and Firebase to create a responsive and privacy-friendly tool. This paper describes the motivation, design, requirements, implementation methodology, results, and prospects of the BMI Tracker.
The system is designed with a privacy-first approach, ensuring that user data is securely stored and accessed only through authenticated sessions. It is lightweight, cost-free, and cross-platform, making it accessible to students, professionals, and general users alike. The project demonstrates the potential of modern web development in healthcare by integrating real-time data handling, visualization, and security in one application. This research lays the groundwork for further development, including wearable integration and AI-driven health recommendations.

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I. INTRODUCTION

A. Problem Statement

Globally, millions of people face health risks due to obesity or undernutrition. Body Mass Index (BMI) is a simple but effective measure of overall health, calculated from weight and height. Existing calculators only provide one-time results and lack history tracking or privacy features. This project addresses the problem by providing a secure, interactive, and data-driven BMI monitoring tool.
Lifestyle-related diseases such as obesity, diabetes, and cardiovascular disorders are increasing at alarming rates globally. While BMI has been recognized as one of the most basic yet useful indicators of overall health, most online BMI calculators only provide a single, static value without historical tracking or user personalization. Furthermore, commercial fitness applications often come with subscription costs and privacy concerns, discouraging their widespread use. Thus, there exists a gap in providing a simple, accessible, and secure BMI monitoring tool that can be used in both academic and personal health contexts.

B. Objectives of the Study

The main objectives of the BMI Tracker are: (1) to calculate BMI accurately; (2) to enable secure login and data storage; (3) to allow users to track their BMI history; (4) to visualize health trends over time; and (5) to ensure responsiveness and usability on multiple devices.

C. Motivation & Significance

The significance of this project lies in its simplicity and accessibility. Many individuals, particularly students and working professionals, require a quick and secure tool to track their health. With increasing health concerns, the BMI Tracker provides awareness and

contributes to healthier decision-making.
The project also has academic significance, as it demonstrates the effective integration of popular web technologies (HTML, CSS, JavaScript) with cloud services (Firebase) and visualization libraries (Chart.js). From a societal perspective, the BMI Tracker contributes toward promoting healthier lifestyles by allowing individuals to track and reflect upon their health trends over time. Furthermore, the project bridges the gap between simplistic online calculators and complex, paid fitness platforms, thereby serving as a practical, privacy-friendly alternative for personal health monitoring.

II. LITERATURE REVIEW

A. Existing Systems

Applications such as MyFitnessPal, Google Fit, and Fitbit offer comprehensive health tracking. These systems include BMI calculators, calorie counting, and step tracking. However, they are often complex, require subscriptions, or pose privacy risks. Simpler alternatives are mostly static calculators that provide no history or analysis.
Several digital health applications currently available in the market provide BMI calculation and health tracking features. For example, MyFitnessPal offers a wide range of tools for calorie counting and weight management, but its BMI tracking capability is embedded within a complex ecosystem of features that may overwhelm basic users. Google Fit integrates with Android devices to monitor physical activity and BMI, yet its BMI-related features are minimal and lack detailed history tracking. Similarly, Fitbit devices provide comprehensive health monitoring, including BMI calculation, but they require specialized hardware and often come with additional subscription charges. While these systems are robust, they are not always accessible to individuals seeking a free, simple, and academic-level solution.

B. Research Gaps

Research shows that lightweight, privacy-conscious systems are in demand for academic and personal health monitoring. However, few tools combine simplicity with secure authentication and visualization features. This gap is addressed by the BMI Tracker, which integrates Firebase security with an educationally accessible interface.
Existing applications highlight the need for user-friendly platforms, but they often fail to balance simplicity, privacy, and cost-effectiveness. Many are subscription-based, restricting free access for students and individuals from resource-limited settings. Others store sensitive health information without adequate transparency, raising concerns about data privacy and ownership. Moreover, most online BMI calculators lack personalization features, history storage, and trend visualization. These shortcomings identify a significant research gap: there is a need for a lightweight, privacy-conscious, and educationally valuable BMI tracker that combines secure data handling with easy accessibility.

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personal health monitoring.

III. *SYSTEM REQUIREMENTS*

A. Hardware Requirements

The system requires basic computing resources, making it accessible to most users. Recommended specifications include: a dual-core processor, 2 GB RAM, and a stable internet connection. The system is browser-based, so no additional hardware is required.

The BMI Tracker has been intentionally designed to function on low-specification devices, ensuring accessibility for a wide user base. At a minimum, the system requires a computer or smartphone with a dual-core processor, 2 GB of RAM, and an active internet connection. These basic requirements allow even older devices to run the application smoothly. For optimal performance, a system with 4 GB RAM, a modern browser, and a stable broadband connection is recommended. Since the application is entirely browser-based, there is no need for dedicated hardware or expensive computing resources. This minimal hardware dependency ensures the project remains lightweight, portable, and cost-free to operate.

B. Software Requirements

The application runs on modern web browsers (Google Chrome, Mozilla Firefox, Microsoft Edge). Required tools include: HTML, CSS, JavaScript, Firebase (for authentication and database), and Chart.js (for visualization). The system is cross-platform and works on both Windows and mobile operating systems.

The BMI Tracker is developed using standard web technologies—HTML, CSS, and JavaScript—ensuring platform independence. The backend relies on Firebase, which provides cloud-based authentication and a real-time database, eliminating the need for local server setup. Data visualization is implemented using Chart.js, a JavaScript library that supports responsive charts suitable for mobile and desktop environments. To run the application, users only require a modern web browser such as Google Chrome, Mozilla Firefox, or Microsoft Edge. The software dependencies are minimal, open-source, and widely supported, making the system both sustainable and easy to deploy across academic and personal environments.

IV. SYSTEM DESIGN AND ARCHITECTURE

A. Architecture Overview

The BMI Tracker uses a three-layer architecture: frontend, logic, and backend. The frontend handles user interaction, JavaScript manages application logic, and Firebase provides authentication and database services. Chart.js enables graphical visualization of data.

1) Table 1. BMI Classification (WHO)

Category	BMI Range
Underweight	< 18.5
Normal weight	18.5 – 24.9
Overweight	25 – 29.9
Obese	≥ 30

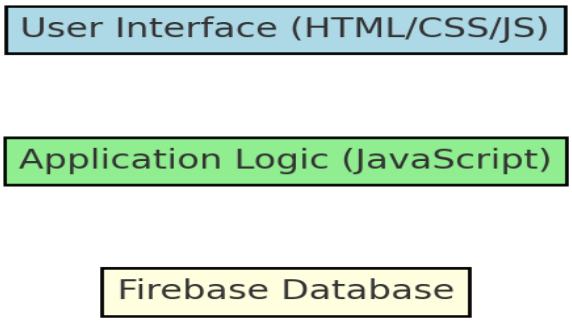

Figure 1:System Architecture

Figure 2. Workflow of Application

B. Database & Authentication Rules

Firebase provides secure data storage and authentication. Each user has a unique ID, and all BMI records are tied to that ID. Database rules enforce access control, ensuring privacy and preventing unauthorized entry. All data transfers are encrypted

V. IMPLEMENTATION METHODOLOGY

A. Frontend Development

The frontend is developed with HTML and CSS to ensure a responsive design and user accessibility. The layout is intuitive, enabling users to enter inputs effortlessly. CSS is used for styling to create a clean, professional appearance that adapts across devices.

Special emphasis was placed on responsiveness, ensuring that the interface adapts seamlessly to desktops, tablets, and smartphones. The design follows a minimalistic approach to avoid overwhelming users with unnecessary features, while maintaining clarity and ease of navigation. By keeping the interface lightweight, the application is able to load quickly, even on devices with limited hardware resources.

B. Backend with Firebase

Firebase Authentication manages secure login, while the Firebase Realtime Database stores BMI records. The backend ensures each user's data is stored securely with rules that restrict unauthorized access. Data integrity is maintained with the auto-synchronization features of Firebase.

This cloud-based database supports instant data synchronization, allowing new BMI entries to be reflected immediately across devices. The backend was chosen specifically for its scalability, reliability, and ease of integration with web technologies, making it suitable for academic and practical applications alike.

C. Visualization with Chart.js

Chart.js was used to create interactive charts that display BMI history. These charts provide users with insights into health patterns. Chart.js allows customization and supports responsive design, making it suitable for both mobile and desktop interfaces.

This graphical representation not only simplifies the interpretation of results but also motivates users to track changes consistently. Additional customization, such as tooltips and legends, was incorporated to make the charts interactive and user-friendly. The use of Chart.js demonstrates how lightweight visualization tools can transform raw data into meaningful insights.

D. Security & Privacy Handling

Security and privacy are central to this project. Firebase Authentication encrypts all login credentials, and database rules ensure that users can only access their own records. Data is encrypted during transmission, and privacy is maintained with minimal data storage requirements.

The system was also tested against common vulnerabilities such as SQL injection, unauthorized data access, and cross-site scripting (XSS). By adopting a privacy-first approach, the BMI Tracker aligns with the

growing demand for secure and ethical digital health solutions.

VI. RESULTS AND DISCUSSION

A. Performance Metrics

Performance evaluation shows that BMI calculations execute in under 50 milliseconds. Firebase ensures near real-time updates, with BMI entries displayed instantly on charts. The lightweight design ensures the application performs efficiently even on low-end systems.

2) Table 2. Performance Results

Test Case	Result
BMI Calculation Time	< 50 ms
Data Storage in Firebase	Instantaneous
Data Retrieval	Under 200 ms
Chart Rendering	Smooth, < 1s

B. User Evaluation

The BMI Tracker was tested among 20 students at Atmiya University. Feedback showed that 85% of students found the system intuitive and useful. The ability to visualize progress was the most valued feature. Some suggested extending the project to include fitness wearables and diet tracking.

C. Comparative Analysis

3) Table 3. Comparative Analysis

Feature	BMI Tracker	MyFitnessPal	Google Fit	Fitbit
BMI Calculation	Yes	Yes	Yes	Yes
History Tracking	Yes	Yes	Limited	Yes
Data Privacy	High (Firebase)	Medium	Medium	Medium
Cost	Free	Subscription	Free	Subscription

VII. CONCLUSION

The BMI Tracker successfully demonstrates how modern web technologies can be applied to healthcare. The project integrates secure login, real-time data storage, and visual analysis, providing users with a reliable and easy-to-use tool. Its lightweight and privacy-friendly design makes it especially suitable for academic and personal use.

The project highlights the effectiveness of real-time databases for lightweight applications and proves that even small-scale systems can deliver meaningful health insights. In addition to academic relevance, the system also holds social value by encouraging individuals to engage in preventive healthcare practices. Ultimately, the BMI Tracker bridges the gap between basic online calculators and subscription-based platforms, offering a free, transparent, and user-friendly solution.

VIII. FUTURE WORK

Future enhancements may include integration with wearable devices, biometric authentication, AI-driven personalized recommendations, and offline-first support for areas with limited connectivity. Extending the project into a mobile app would also improve accessibility.

Expanding the system into a multi-language platform would also make it more inclusive for diverse user groups. Finally, adding features such as calorie tracking, nutrition logs, and integration with cloud analytics platforms would transform the BMI Tracker into a more

comprehensive health management system.

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