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FITNESS TRACKER (BMI CALCULATOR) WEB APPLICATION

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ABSTRACT
In the modern digital era, maintaining a healthy lifestyle has become increasingly important due to the rising prevalence of obesity and lifestyle-related diseases. The Body Mass Index (BMI) is widely used as a simple and effective tool to assess an individual's health status based on height and weight. However, traditional BMI calculators often lack interactivity, data storage, and personalized tracking, which limits their effectiveness in long-term health monitoring. To address these limitations, this study presents the development of a Fitness Tracker (BMI Calculator) web application that combines BMI computation with secure login, personalized dashboards, and historical trend visualization. The system is built using HTML, CSS, and JavaScript for the frontend and Python Flask for the backend, with SQLite/MySQL databases for storing user data. Chart.js integration further enhances usability by providing interactive visualizations of BMI history. By enabling users to calculate, store, and track BMI over time, the application fosters continuous engagement and awareness of health status. This research highlights how digital platforms can support preventive healthcare and promote healthy lifestyle practices. The project also sets the foundation for future enhancements, including integration with wearable devices, AI-driven health recommendations, and cloud-based fitness management systems.

Keywords:
Fitness Tracker, BMI, HTML, CSS, MySQL, SQLite, Python Flask.

INTRODUCTION

Obesity and overweight have emerged as global health concerns, increasing the risk of chronic diseases such as diabetes, cardiovascular disorders, and hypertension. Body Mass Index (BMI) remains the most widely used indicator for assessing weight status because of its simplicity and reliability (NHLBI, n.d.). However, traditional BMI calculators are static, lacking features such as user data storage, interactivity, and historical tracking, which limits their role in continuous health monitoring. Recent studies have highlighted the potential of digital health applications to overcome these limitations by providing BMI calculation, ideal weight estimation, and even nutrition consultation through interactive platforms (Ardiansyah & Avianto, 2024) [1]. The Body Mass Index (BMI), calculated by dividing weight in kilograms by the square of height in meters (kg/m^2), is a widely used metric for categorizing weight status due to its simplicity and practicality (Weir, 2025) [2]. However, traditional BMI tools are often static, requiring manual input and lacking features for secure data storage, interactivity, or trend tracking, which hinders long-term user engagement. Recent innovation in embedded systems, such as a microcontroller-based automatic BMI calculator utilizing a weighing mechanism and ultrasonic sensor, demonstrates how hardware can automate BMI measurement for real-time display (Chandrasekhar, 2023) [3].
Body Mass Index (BMI) continues to be a widely recognized metric for assessing weight status and associated health risks, owing to its simplicity and ease of calculation. Recent trends have seen a rise in web-based health calculators for more accessible and personalized health monitoring (Guo et al., 2025) [4]. However, many traditional tools remain static and lack features such as user authentication, data persistence, and interactive trend

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visualization. To address these limitations, this paper introduces a Fitness Tracker (BMI Calculator) web application developed using HTML, CSS, and JavaScript for the frontend, with Python Flask, SQLite/MySQL for backend logic and storage, and Chart.js for dynamic visualization. The application enables secure user login, BMI computation, historical record tracking, and graphical display of BMI trends—making it both technically robust and user-friendly. Body Mass Index (BMI) remains one of the most widely used and standardized methods for assessing body fat and related health risks due to its simplicity and effectiveness (Al-Goblan et al., 2019) [5]. Despite its limitations, it continues to serve as a key tool for monitoring obesity, cardiovascular risk, and metabolic disorders. To address this gap, the present work proposes a Fitness Tracker (BMI Calculator) web application that integrates modern web technologies with persistent data storage and dynamic visualization. The system enables user authentication, BMI computation, historical record maintenance, and interactive charts, thereby improving both accessibility and long-term health monitoring.

LITERATURE REVIEW

Burhan Uddin Ismail et al. (2012) [6] proposed a microcontroller-based automated BMI calculator with an LCD display that calculates BMI using a load cell for weight and an ultrasonic sensor for height. The system eliminates manual input errors by automating data collection and uses a microcontroller to process and display results instantly. Their design is compact, user-friendly, and suitable for use in hospitals, clinics, gyms, and public spaces. This innovation shows how embedded systems can enhance health monitoring by making BMI calculation more accurate, efficient, and accessible. Rathod et al. (2021) [7] developed a BMI Calculator Android App to assess child malnutrition. The app uses both Indian and American standards to give quick BMI results and health suggestions. It replaces manual methods with a fast, accurate, and user-friendly mobile solution, making it ideal for schools and health workers. Kannan et al. (n.d.) [8] developed a mechanised BMI calculator using a PIC16F877A microcontroller, load cell, and ultrasonic sensor to automate the measurement of weight and height. This system eliminates manual errors by accurately converting physical measurements into BMI using embedded electronics. The result is shown on an LCD display, offering a fast and reliable solution to assess body weight status. The project highlights the device's applications in hospitals, gyms, and public places, promoting a healthy lifestyle through early obesity detection. Shutova et al. (2022) [9] developed a mobile application as a digital diagnostic tool to assess various health indices, including BMI, cardiovascular endurance, and physical activity levels among university students. The app digitized several physiological formulas and was tested on 279 students at Plekhanov Russian University. The results revealed optimal BMI but low physical activity and weakened cardiovascular indicators, especially among male students. The study emphasizes the role of digital tools in promoting awareness, encouraging participation in sports, and enhancing physical education through interactive and personalized feedback. Mohajan and Mohajan (2023) [10] discuss the ubiquity and practicality of the Body Mass Index (BMI) as a popular anthropometric measure for categorizing weight status—underweight, overweight, and obesity—across diverse populations. They highlight that BMI is favored due to its simplicity, affordable implementation, and non-invasive nature, as well as its strong correlation with morbidity and mortality outcomes regardless of demographic factors. The authors also critique the limitations of BMI, noting that it may be less accurate for certain subgroups due to gender, age, ethnicity, and reliance on self-reported measurements. Young (2018) [11] shares how technology, In a personal reflection on BMI tracking, such as smart scales and mobile apps, has intensified self-monitoring of body weight. Despite consistent dieting and weight loss, his BMI remained above the "healthy" threshold, highlighting the psychological stress BMI calculators can induce. The article critiques over-reliance on BMI as a health measure, especially when it doesn't reflect individual variations in body composition. This insight supports the need for holistic health tools that go beyond BMI to assess physical well-being more accurately. Adewuyi et al. (2021) [12] proposed an IoT-based BMI calculator using an Arduino Uno, ESP8266 Wi-Fi module, load cell, and ultrasonic sensor, which connects to the Blynk App for real-time cloud access. Unlike manual methods that are slow and error-prone, their system achieved 99.10% accuracy and faster BMI calculation. This approach supports remote monitoring and promotes health tracking through smart, automated measurement. Flint (2023) [13] critically analyzed the NHS England BMI calculator, revealing a persistent error in how it categorizes physical activity levels and calculates daily calorie recommendations. The calculator's activity classifications did not align with UK national guidelines, potentially leading overweight users to consume more calories than appropriate. This error, left uncorrected for years, raises serious public health concerns about misinformation and its impact on obesity management. Adewuyi et al. (2024) [14] developed an IoT-enabled BMI calculator that leverages an Arduino Uno, ESP8266 Wi Fi module, load cell, and HC SR05 ultrasonic height sensor integrated with the Blynk app for real time cloud-based BMI monitoring. This innovative

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system demonstrated 99.10 % accuracy and improved speed compared to manual BMI computation, showcasing the power of connected health devices for efficient, precise, and accessible body composition tracking. Filho et al. (2019) [15] introduced SelfS2, a BMI calculator app designed to improve women's self-image by tracking both real and perceived body weight. The app promotes mental well-being through daily motivation and uses BMI data visualization to support body acceptance. Usability tests confirmed that users could easily navigate the app, making it a helpful tool for combining physical and mental health awareness.

Authors	Title	Methods	Limitations
Burhan Uddin Ismail et al. (2012) [6]	Microcontroller-based automated BMI calculator	Uses load cell and ultrasonic sensor with microcontroller and LCD for BMI calculation	No cloud or network connectivity
Rathod et al. (2021) [7]	BMI Calculator Android App for Child Malnutrition	Android app using Indian and American standards for BMI and health advice	Limited to mobile software; no hardware sensors
Kannan et al. (n.d.) [8]	Mechanised BMI Calculator using PIC16F877A	PIC microcontroller-based system with load cell and ultrasonic sensor for BMI output on LCD	No internet or IoT support
Shutova et al. (2022) [9]	Health Diagnostic Mobile App for Students	Mobile app with digitized BMI and health indices, tested on 279 students	No physical sensors; limited to university population
Mohajan, D., & Mohajan, H. K. (2023) [10]	Body Mass Index (BMI) is a popular anthropometric tool to measure obesity among adults	Literature review of BMI applications, its categorization system, and its relationship to health outcomes.	Less accuracy for certain subgroups due to gender, age, ethnicity, and dependence on self-reported height and weight measurements
Young (2018) [11]	Reflection on BMI Tracking	Personal narrative using smart scales and apps	Subjective experience; not a technical system
Adewuyi et al. (2021) [12]	IoT-based BMI Calculator	Arduino + ESP8266 with load cell and ultrasonic sensor connected to Blynk App	Requires internet for real-time monitoring
Flint (2023) [13]	Critique of NHS BMI Calculator	Critical analysis of misclassification in NHS BMI tool	No implementation; focused on identifying flaws
Adewuyi et al. (2024) [14]	Enhanced IoT-enabled BMI System	Arduino-based with Wi-Fi module, sensors, and Blynk cloud integration	Hardware reliance; no offline access
Filho et al. (2019) [15]	SelfS2 BMI App for Women	Mobile app promoting self-image and BMI visualization	Focuses on perception, not detailed physical data

Table 1: BMI Calculator Literature Review Table

METHODOLOGY

The proposed Fitness Tracker (BMI Calculator) is a web-based health application that combines a responsive frontend with a secure backend to provide accurate BMI calculations, history tracking, and visualizations. The system addresses the limitations of existing static BMI tools by introducing user authentication, persistent data storage, and interactive chart-based progress monitoring. The figure 1 illustrates the work Flow for the Proposed System.

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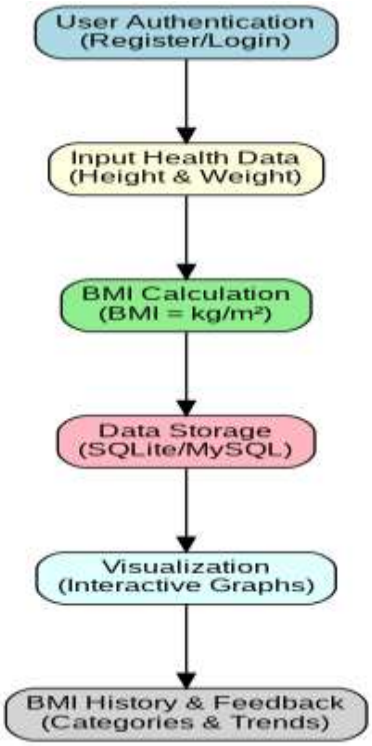

Figure1: Work Flow for the Proposed System.

FRONTEND

The frontend is built using HTML, CSS, and JavaScript, which provide structure, styling, and interactivity.

- HTML is used to design forms for registration, login, and BMI input.
- CSS styles the pages to ensure responsiveness and a visually appealing layout across devices.
- JavaScript validates user inputs and integrates with Chart.js to display BMI history graphically.

BACKEND

The backend is implemented using the Python Flask framework, which handles the application's logic and communication between the user interface and database.

- Flask manages routing (e.g., /register, /login, /dashboard, /profile), enabling different user functions.
- It processes BMI calculations with the standard formula:
- BMI = weight (kg) / [height (m)]² and classifies results into categories: Underweight, Normal, Overweight, and Obese.
- Flask-Bcrypt ensures password security through hashing.
- Session management secures user authentication and maintains personalized dashboards.

DATABASE

The system uses SQLite as the default relational database (with scope to extend to MySQL for scalability). The database contains:

- User Table - stores id, username, and password_hash.
- BMI Records Table - stores height, weight, bmi, category, timestamp, linked to each user via a foreign key.

This relational design ensures that each user's BMI history is securely stored and retrievable for visualization.

EXPERIMENTAL RESULTS AND DISCUSSION

The Fitness Tracker (BMI Calculator) web application was successfully implemented and tested to evaluate its functionality, usability, and performance. The system provides a seamless user experience through its

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core modules, including user registration, login authentication, BMI calculation, historical record storage, and visualization of health trends using interactive charts. Each module was tested to ensure accuracy of BMI computation, secure data handling, and responsiveness of the interface across different devices. The results demonstrate that the application meets its primary objective of enabling users to calculate, track, and analyze their BMI over time, thereby promoting consistent health monitoring and awareness. The Figure 2 shows the Home page of the Fitness Tracker web application, Figure 3 shows the Registration page of the Fitness Tracker web application, Figure 4 shows Login page of the Fitness Tracker web application, Figure 5(a): BMI Calculator input interface allowing users to enter height and weight for BMI computation. Figure 5(b): BMI Calculator output interface displaying calculated BMI and corresponding weight category. Figure 6(a): User profile interface displaying BMI progress over time with a trend graph. Figure 6(b): User profile interface showing detailed BMI history with corresponding categories.

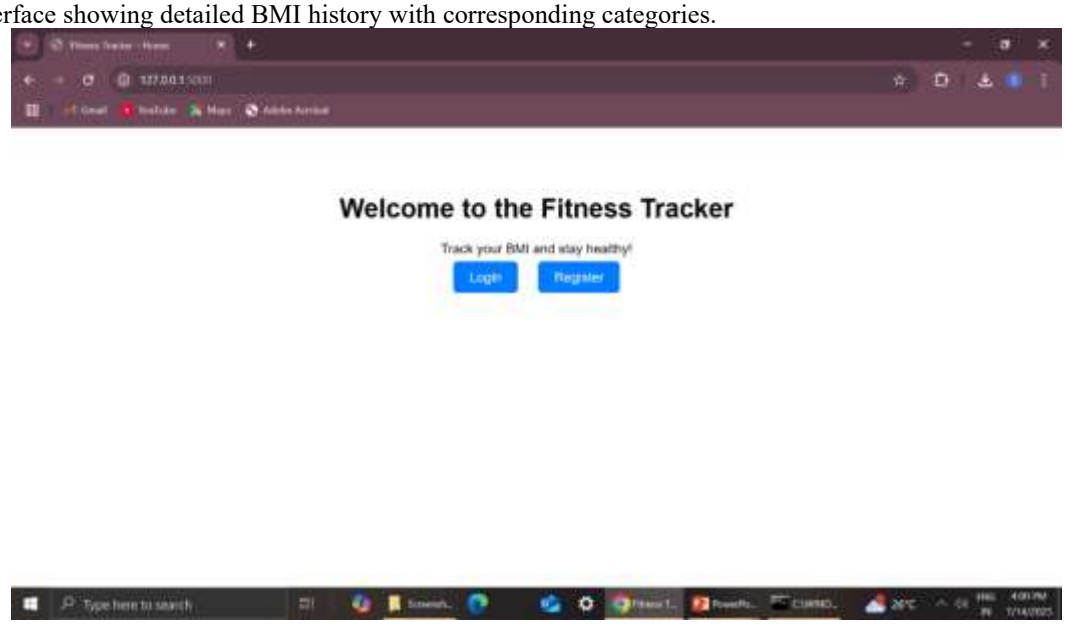

Figure 2: Home page of the Fitness Tracker web application

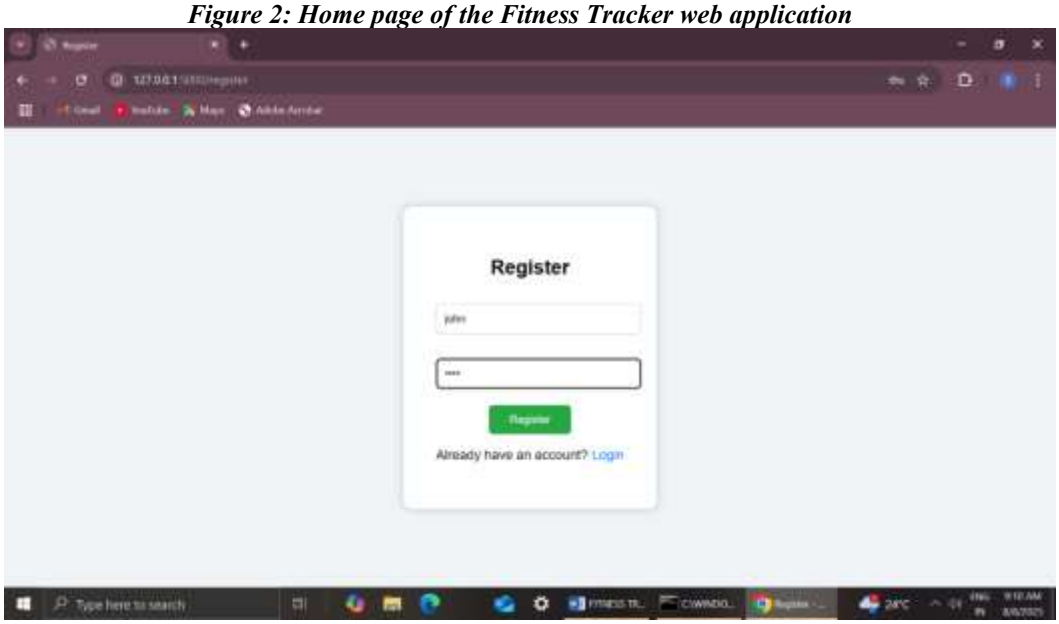

Figure 3: Registration page of the Fitness Tracker web application

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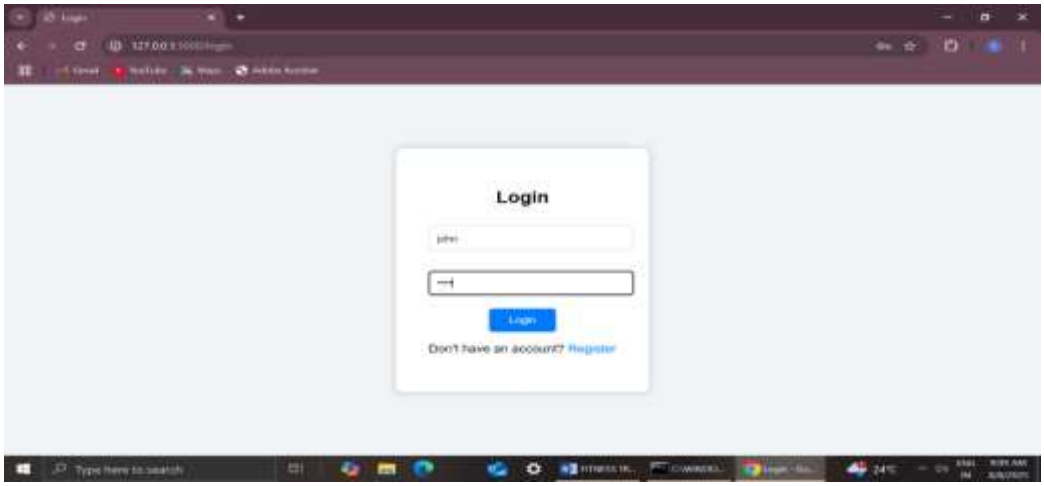

Figure 4: Login page of the Fitness Tracker web application

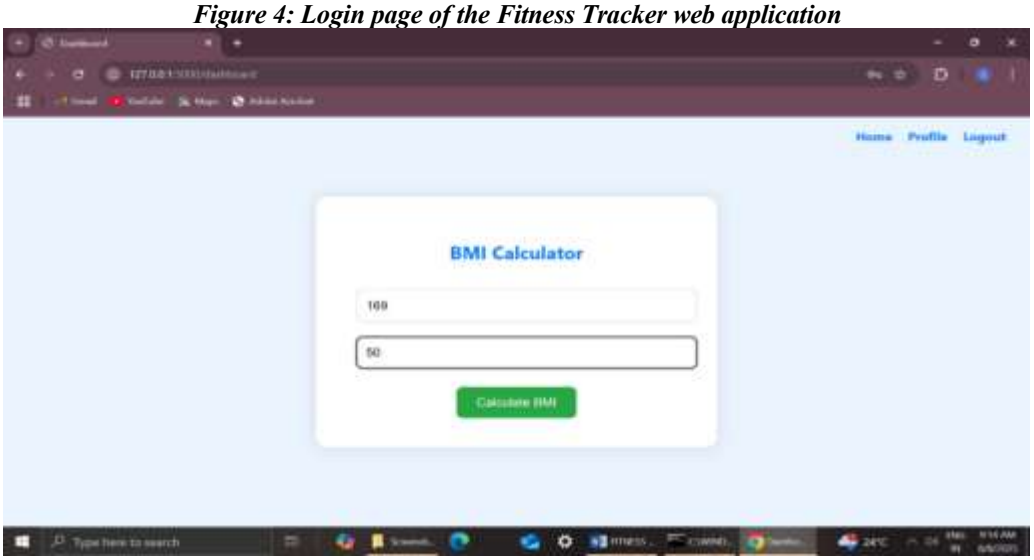

Figure 5(a): BMI Calculator input interface allowing users to enter height and weight for BMI computation.

Figure 5(b): BMI Calculator output interface displaying calculated BMI and corresponding weight category.

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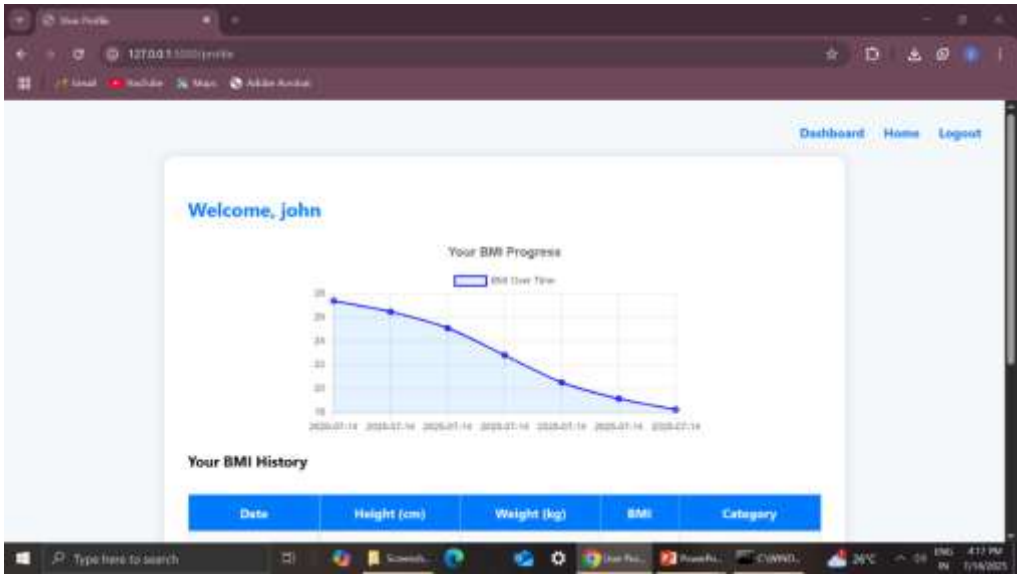

Figure 6(a): User profile interface displaying BMI progress over time with a trend graph.

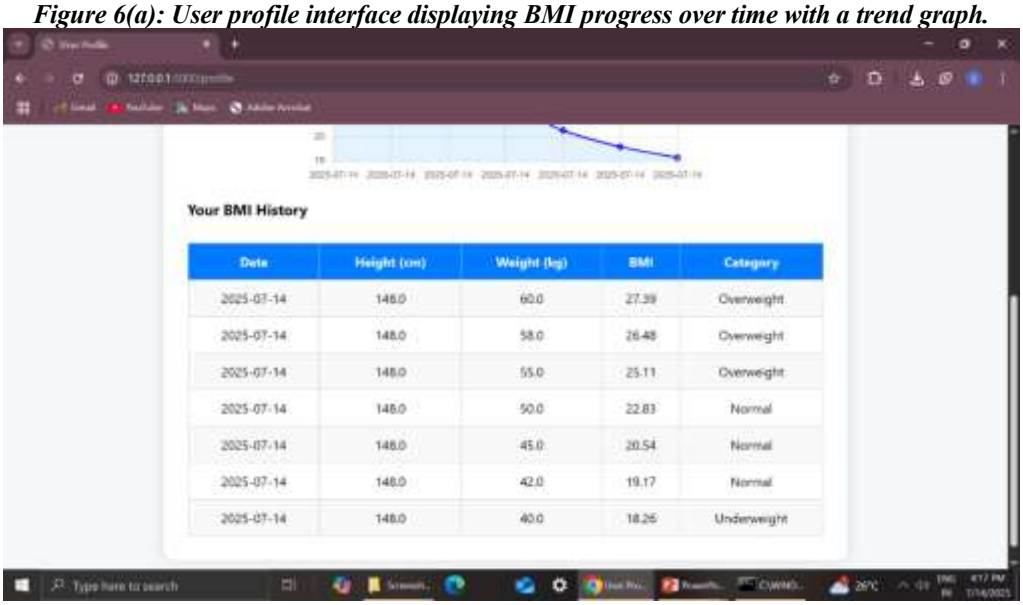

Figure 6(b): User profile interface showing detailed BMI history with corresponding categories.

CONCLUSION

The Fitness Tracker (BMI Calculator) web application successfully addresses the need for an interactive, user-friendly, and reliable health monitoring tool. Unlike traditional calculators, the system not only computes BMI but also stores historical data, provides secure user login, and visualizes progress through interactive charts. This integrated approach empowers users to monitor their fitness trends over time, encouraging consistent engagement and awareness of their health status. Developed with modern web technologies such as HTML, CSS, JavaScript, Python Flask, and relational databases, the application demonstrates scalability, security, and ease of use. While the reliance on BMI as a sole indicator has inherent limitations, the system provides a strong foundation for digital health tracking. Future enhancements, such as wearable device integration, AI-based health recommendations, and cloud support, can expand its functionality into a comprehensive wellness platform. In conclusion, the Fitness Tracker (BMI Calculator) is more than a simple computational tool—it is a step toward a holistic digital health ecosystem. By bridging technology with preventive healthcare, it contributes to fostering healthier lifestyles and creating opportunities for future innovations in digital wellness solutions. In future work the Fitness Tracker (BMI Calculator) can be expanded

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with wearable device integration, AI-driven health recommendations, and real-time activity tracking. Future enhancements like multi-user dashboards, cloud hosting, and multi-language support will transform it into a comprehensive digital wellness platform.

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