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"CAMPUS FITFUEL: AI-BASED PERSONALIZED FITNESS PLANNER FOR STUDENTS"

[*1]Piyusha Chandgude, [2]Prof. Amruta More

[1]*(Student, Department of Artificial Intelligence and Data Science, Ajeenkya DY Patil School of Engineering)* Pune, Maharashtra.

[2]*(Professor, Department of Artificial Intelligence and Data Science, Ajeenkya DY Patil School of Engineering)* Pune, Maharashtra.

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***Corresponding Author: Sara Alameen Mohammed Soliman**
University of Zawia, Faculty of Arts, English Department, Zawia, Libya.
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ABSTRACT

Maintaining physical fitness is a significant challenge for students due to irregular schedules, limited budgets, and diverse cultural food habits. Most existing fitness applications provide generic workout and diet plans that fail to address these individual constraints, resulting in low adherence and ineffective outcomes. This paper presents an AI-based Personalized Fitness Planner designed specifically for students, aiming to deliver practical and customized health recommendations.

The proposed system collects user-specific inputs such as age, fitness goals, lifestyle, and dietary preferences to generate tailored workout routines and budget-conscious meal plans. It integrates a Python-based backend for data processing and validation, a Gradio interface for user interaction, and a large language model via the OpenAI GPT API for generating adaptive recommendations. The application is deployed on a cloud platform, ensuring accessibility and scalability.

The developed solution emphasizes personalization, affordability, and cultural relevance, making it more suitable for student use. The results demonstrate that the system can provide realistic and sustainable fitness guidance. This work highlights the potential of artificial intelligence in enhancing health and wellness applications by addressing user-specific needs effectively.

Index Terms: Artificial Intelligence, Personalized Recommendation Systems, Fitness and Nutrition Planning, Machine Learning, Large Language Models, Human-Centered Computing, Health Informatics, Cloud-Based Applications.

INTRODUCTION

Maintaining a consistent fitness routine is a common challenge among students due to demanding academic schedules, financial limitations, and varying lifestyle habits. While digital fitness applications have gained popularity, most of them offer standardized workout and diet plans that do not adequately reflect individual needs. Such one-size-fits-all approaches often fail to consider important factors such as time availability, cultural dietary preferences, and access to resources, leading to low user engagement and unsustainable outcomes [8].

With the rapid advancement of artificial intelligence, there is an opportunity to develop more adaptive and user-centric fitness solutions. Personalized recommendation systems can analyse user-specific data and generate tailored guidance that aligns with individual constraints and goals. This approach not only enhances relevance but also improves the likelihood of long-term adherence [1], [11].

This work presents an AI-based Personalized Fitness Planner designed specifically for students. The system leverages user inputs, including age, lifestyle, fitness objectives, and dietary preferences, to generate customized workout routines and meal plans. By integrating a user-friendly interface with a robust backend and a large language model, the proposed solution aims to provide practical, affordable, and culturally sensitive fitness recommendations [12], [15]. The overall goal is to support students in adopting healthier habits through a system that is both accessible and adaptable to their daily lives.

LITERATURE REVIEW

Wearable Device Integration in Fitness Systems — Zhang et al., 2024

Zhang et al. explored the integration of wearable devices with AI-based fitness systems to enable real-time monitoring and adaptive recommendations [6]. Their approach utilized sensor data such as heart rate, step count, and activity levels to dynamically adjust workout plans. The study demonstrated improved accuracy and personalization; however, it increased system complexity and required additional hardware, making it less accessible for users with limited resources.

Hybrid Recommendation Techniques in Health Applications — Kumar et al., 2024

Kumar et al. investigated hybrid recommendation techniques that combine collaborative filtering and content-based methods to enhance personalization in health applications [11]. Their findings showed that hybrid systems improve recommendation accuracy by considering both user similarities and individual preferences. Despite their effectiveness, these systems rely on large datasets and continuous interaction, which may not be practical for new or resource-constrained users.

AI-Based Fitness Recommendation Systems — Smith et al., 2023

Smith et al. developed an AI-driven system that generates personalized workout plans based on user data such as fitness level, goals, and behavioural patterns [10]. The study highlighted improved user engagement and adherence through personalized recommendations. However, it primarily focused on physical activity and did not adequately address dietary planning or real-world constraints such as budget and cultural diversity.

Machine Learning Applications in Health and Wellness — Chen et al., 2023

Chen et al. examined the use of machine learning algorithms to analyse health data and recommend lifestyle changes [7]. Their work demonstrated that ML models can effectively identify patterns and provide predictive insights for better health outcomes. However, the system depended heavily on structured datasets and lacked the flexibility to generate dynamic, real-time recommendations tailored to individual users.

Generative AI for Personalized Recommendations — Brown et al., 2023

Brown et al. studied the application of large language models for generating personalized recommendations [12]. The research showed that generative AI can produce context-aware and adaptive outputs without requiring extensive labelled datasets. While this approach offers flexibility, challenges such as maintaining consistency, avoiding incorrect outputs, and designing effective prompts were identified.

AI-Powered Diet and Fitness Planning Systems — Lee, 2022

Lee proposed an AI-based system that integrates machine learning techniques to generate both workout routines and diet plans [9]. The system considers user attributes such as age, weight, and fitness goals to deliver personalized recommendations. Although effective, it did not incorporate constraints like affordability, time limitations, and accessibility, which are essential for practical adoption among students.

Recommender Systems in Healthcare — Gupta et al., 2022

Gupta et al. analysed the role of recommender systems in healthcare, emphasizing their ability to improve user engagement and promote long-term behavioural change [8]. The study also highlighted challenges related to data privacy, ethical concerns, and secure handling of sensitive user information, which remain critical issues in AI-based health applications.

Research Gap

Despite notable advancements, existing systems still face limitations in terms of accessibility, practicality, and adaptability. Many approaches depend on large datasets, wearable devices, or complex infrastructures, making them less suitable for students with limited resources. Additionally, insufficient attention has been given to factors such as budget constraints, cultural food preferences, and lifestyle variability.

The proposed system addresses these gaps by combining AI-driven personalization with real-world constraints, offering a lightweight, affordable, and student-centric solution that promotes sustainable fitness practices.

KEY INSIGHTS

Personalization plays a crucial role in improving user engagement and adherence in fitness applications, as generic plans often fail to meet individual needs [10]. Advanced recommendation systems, including hybrid and AI-based approaches, enhance accuracy by analysing user behaviour and preferences; however, they typically require large datasets and continuous interaction [11]. Traditional machine learning models are effective for prediction but lack the flexibility needed for dynamic, real-time recommendations [7].

Recent advancements in generative AI have enabled the creation of adaptive and context-aware fitness and diet plans without heavy dependence on structured datasets [12]. Despite these improvements, most existing systems do not adequately consider practical constraints such as budget limitations, cultural food habits, and accessibility, which are especially important for students [1], [9]. Additionally, while integration with wearable devices improves personalization, it increases system complexity and cost [6].

Furthermore, concerns related to data privacy, security, and ethical use of user information remain significant challenges in AI-based health systems [8]. Therefore, there is a clear need for a lightweight, affordable, and student-centric solution that effectively combines personalization with real-world practicality.

Fig. 1. Campus fitfuel landing page.

METHODOLOGY

The proposed system follows a structured yet flexible approach to generate personalized fitness and diet recommendations for students. The methodology focuses on combining user input, rule-based processing, and AI-driven generation to ensure practical and adaptive outputs.

Initially, the system collects user-specific information through an interactive interface.

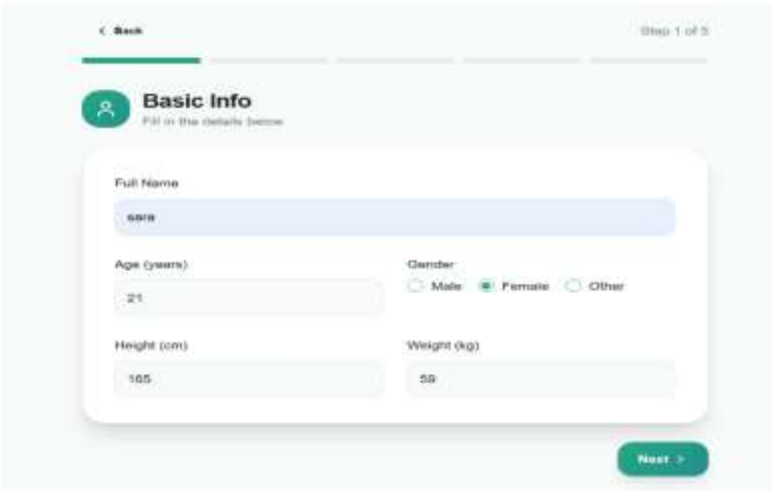

Fig. 2. Basic Information.

This includes basic details such as age, gender, height, weight, fitness goals (e.g., weight loss, muscle gain, maintenance), dietary preferences, budget constraints, and lifestyle factors. This data forms the foundation for personalization.

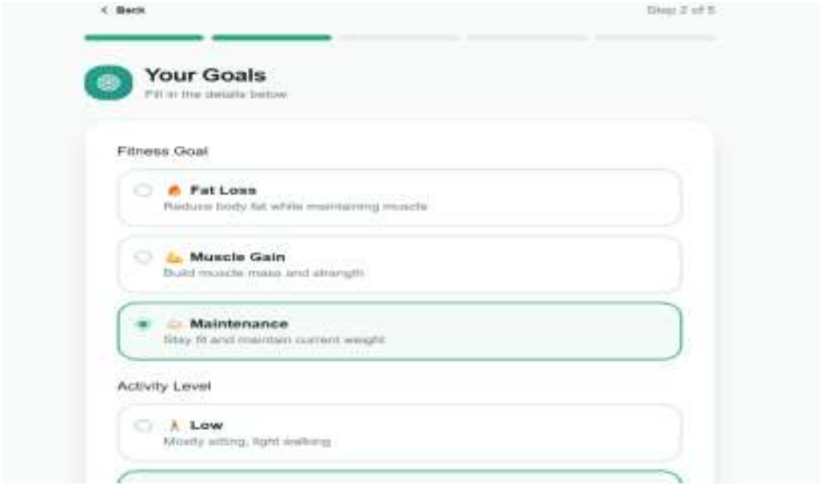

Fig. 3. Goals to achieve.

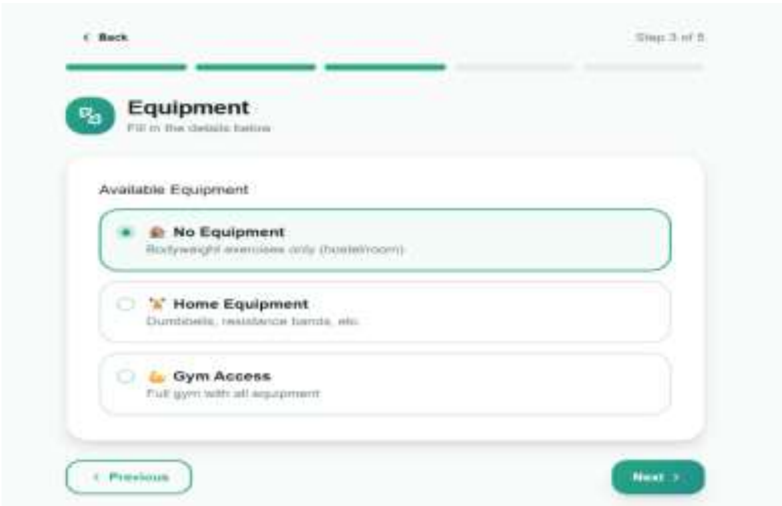

Fig. 4. Equipments available.

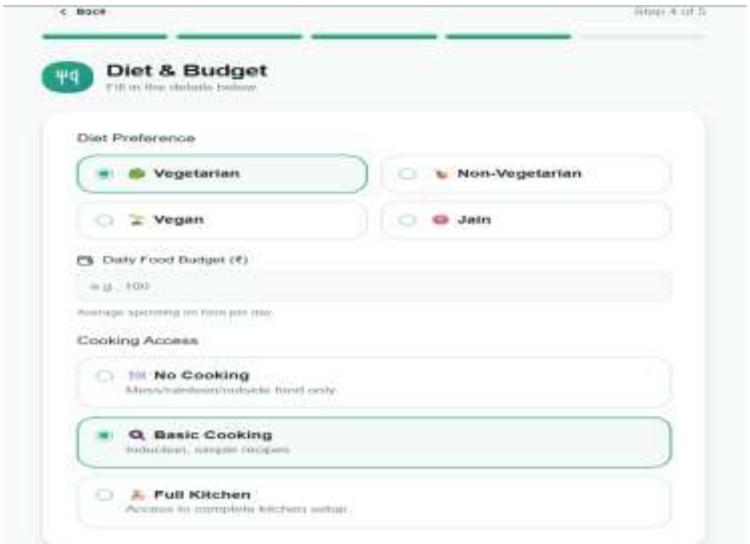

Fig. 5. Diet and budget.

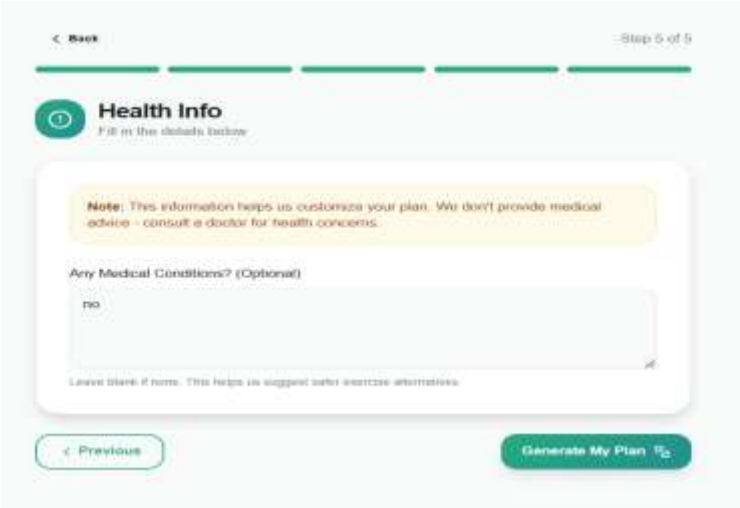

Fig. 6. Medical details.

Once the input is received, the backend system performs data validation to ensure accuracy and completeness. It then computes key health indicators, such as Body Mass Index (BMI), to assess the user's current fitness level. Based on these parameters, the system categorizes the user into appropriate fitness groups, which helps guide the recommendation process.

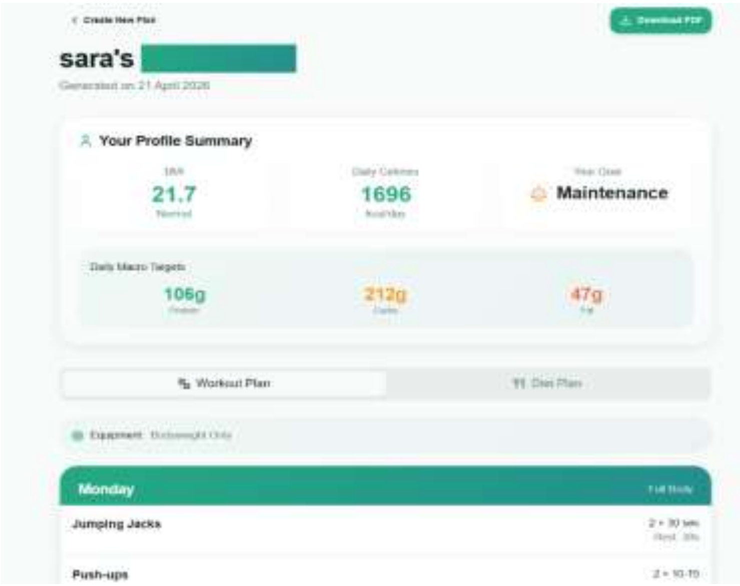

Fig. 7. Profile summary and workout plan.

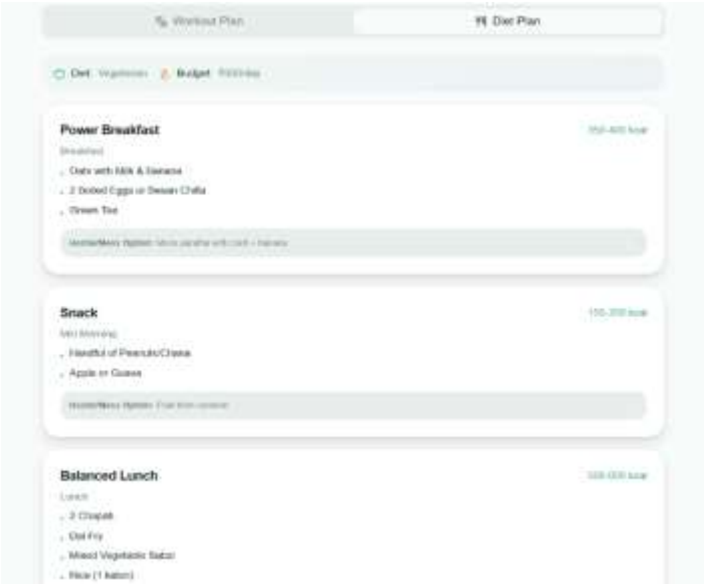

Fig. 8. Diet plan.

The core of the methodology lies in the integration of a generative AI model. A carefully designed prompt is constructed using the validated user data and contextual rules. This prompt is passed to the OpenAI GPT-based model, which generates personalized workout routines and diet plans. The use of prompt engineering ensures that the recommendations are relevant, structured, and aligned with user constraints such as time availability, budget, and cultural food habits.

To enhance practicality, a rule-based layer is incorporated alongside the AI model. This layer ensures that the generated recommendations remain feasible by filtering unrealistic suggestions and aligning outputs with available resources. For example, workouts are adapted for home, hostel, or gym environments, and diet plans are adjusted based on affordability and regional food preferences.

Finally, the generated recommendations are presented to the user through a Gradio-based interface, allowing easy interaction and clear visualization of results. The system is deployed on a cloud platform, ensuring accessibility across devices without requiring complex setup.

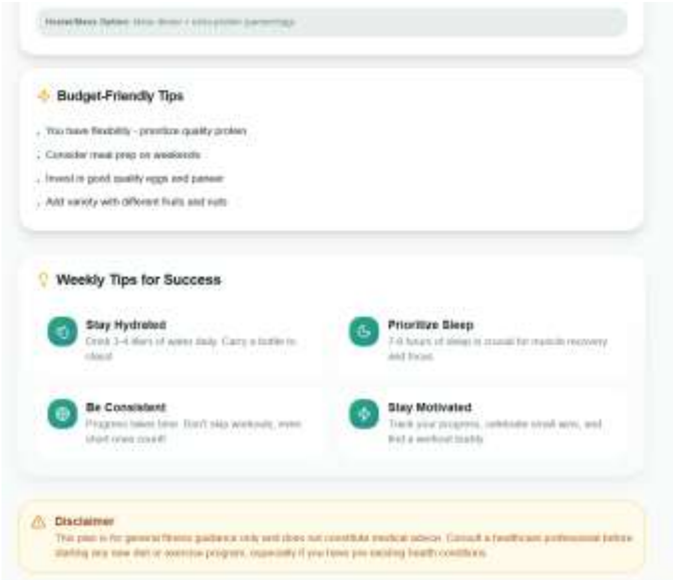

Fig. 9. Various tips.

Overall, the methodology emphasizes simplicity, adaptability, and user-centric design, enabling the system to deliver personalized fitness guidance that is both practical and sustainable for students.

3.1. Proposed Framework

The proposed AI-based Personalized Fitness Planner is designed as a modular and scalable system that integrates user input processing, rule-based logic, and generative AI to produce customized workout and diet recommendations. The framework ensures that outputs are not only personalized but also practical, affordable, and aligned with student lifestyles.

System Architecture Overview

The framework consists of four main components:

1. User Input Layer (Frontend)
2. Data Processing & Validation Layer (Backend)
3. AI-Based Recommendation Engine
4. Output & Feedback Layer

These components work sequentially to transform raw user inputs into meaningful and actionable fitness plans**.**

User Input Acquisition

The system collects structured input data from users through an interactive interface. The input vector can be represented as**:**

$$\boldsymbol{U = \{a, g, h, w, f_g, d_p, b, l\}}$$

Where:

a= Age

g= Gender

h= Height

w= Weight

f_g= Fitness Goal (fat loss / muscle gain / maintenance)

d_p= Dietary Preference

b= Budget

l= Lifestyle constraints

This multidimensional input enables comprehensive personalization.

Data Processing and Health Assessment

After input collection, the system performs validation and computes key health metrics. One primary metric used is Body Mass Index (BMI):

BMI=height (m)2/weight (kg)

Based on BMI values, users are categorized into fitness levels:

Underweight: $BMI < 18.5$

Normal: $18.5 \leq BMI < 24.9$

Overweight: $25 \leq BMI < 29.9$

Obese: $BMI \geq 30$

This classification helps guide recommendation intensity and diet structure[9].

Rule-Based Filtering Layer

Before invoking the AI model, a rule-based system applies constraints to ensure feasibility. This layer enforces conditions such as:

$$\boldsymbol{R = f(U, C)}$$

Where:

R= Refined input

C= Constraints (budget, time, food availability, environment)

Examples:

Budget limits → restrict expensive food items

Lifestyle → adjust workout duration

Environment → select home/gym exercises

This ensures that recommendations remain realistic and executable [11].

AI-Based Recommendation Engine

The refined input is converted into a structured prompt and passed to a Generative AI model (GPT) [12]. The process can be represented as:

$$O = AI(P(U, R))$$

Where:

P= Prompt construction function

AI= Generative model

O= Output recommendations

The model generates:

Personalized workout plans

Customized diet plans

Weekly schedules and guidance

Prompt engineering ensures that outputs are:

Context-aware

Structured

Aligned with user goals

Output Generation and Delivery

The generated output is formatted and presented through the frontend interface. The output includes:

Workout routines (home/gym-based)

Diet plans (budget-friendly, culturally relevant)

Weekly schedules and portion guidance

The system ensures readability and usability by organizing outputs into clear sections.

Deployment and Accessibility

The framework is deployed on a cloud platform, enabling:

Cross-device accessibility

Real-time interaction

Scalable performance

The lightweight design ensures minimal computational requirements, making it suitable for student use.

Key Features of Proposed Framework

Hybrid approach: Rule-based + Generative AI

Real-time personalized recommendations

Low-cost and accessible solution

Adaptable to diverse user constraints

Scalable for future enhancements (wearables, tracking)

DISCUSSION AND ANALYSIS

The proposed AI-based Personalized Fitness Planner demonstrates the effectiveness of combining rule-based logic with generative AI to deliver practical and user-centric recommendations. Unlike traditional fitness applications that rely on predefined templates, the system dynamically generates workout and diet plans tailored to individual user inputs. This adaptability significantly enhances the relevance of recommendations and improves the likelihood of user adherence [10].

From an analytical perspective, the integration of user-specific parameters such as BMI, fitness goals, lifestyle constraints, and budget allows the system to produce more realistic and achievable plans. The rule-based filtering layer plays a critical role in ensuring that the outputs remain feasible, preventing the generation of impractical suggestions. This hybrid approach successfully balances personalization with real-world applicability [11].

The use of a generative AI model further strengthens the system by enabling context-aware and flexible recommendation generation. Unlike traditional machine learning models that require large datasets and predefined training, the generative approach can produce meaningful outputs based on structured prompts [12]. This makes the system lightweight and easier to deploy, especially in environments with limited resources.

However, certain limitations were observed during the development and evaluation of the system. The quality of recommendations is highly dependent on the design of prompts and the accuracy of user inputs. Inconsistent or incomplete inputs may lead to less optimal results. Additionally, while the system provides general fitness and diet guidance, it does not replace professional medical advice, and care must be taken when interpreting recommendations for users with specific health conditions.

Another important aspect is system scalability and real-time performance. The deployment on a cloud platform ensures accessibility and responsiveness, but reliance on external APIs may introduce latency or dependency-related challenges. Furthermore, ethical considerations such as data privacy and secure handling of user information remain critical, particularly in health-related applications [8].

Overall, the analysis indicates that the proposed system effectively addresses key limitations of existing fitness applications by offering personalized, affordable, and practical solutions. It highlights the potential of integrating generative AI with simple rule-based mechanisms to create scalable and impactful health technologies, particularly for student communities.

CONCLUSION

The proposed AI-based Personalized Fitness Planner effectively addresses the limitations of traditional fitness applications by providing customized workout and diet recommendations tailored to student needs. By incorporating user-specific parameters such as lifestyle, budget, and cultural preferences, the system ensures that the generated plans are practical, accessible, and sustainable.

The integration of rule-based filtering with generative AI enables the system to deliver context-aware and adaptive recommendations without relying on large datasets or complex infrastructure. This hybrid approach enhances both flexibility and usability, making the solution suitable for real-world deployment [11], [12].

Overall, the project demonstrates the potential of artificial intelligence in developing user-centric health applications. It not only improves accessibility to personalized fitness guidance but also encourages consistent and healthier lifestyle practices among students.

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REFERENCES

1. S. Bhandari, S. G. Bansal, S. Santhosh, and I. P. Lakhekar, "AI-powered fitness and diet recommendation system: A personalized approach to health and wellness," *Int. Res. J. Adv. Eng. Manag.*, vol. 3, no. 3, pp. 534–539, Mar. 2025.
2. Z. B. Ter, P. Naveen, and J. Jayapradha, "Generative AI-based meal recommender system," *J. Informatics Web Eng.*, vol. 4, no. 2, pp. 315–338, 2025.
3. M. Patil, R. H. Goudar, and G. S. Hukkeri, "AI for swimming recommendation systems: Exploring current landscape and research opportunities," *Discover Applied Sciences*, vol. 8, 2026.
4. M. J. Lakshmi, A. Pravalika, K. Sonika, and P. Srinadh, "SMARTFIT: AI-powered personalized fitness recommender system," *Int. J. Eng. Res. Sci. Technol.*, vol. 20, no. 2, pp. 1336–1341, 2024.
5. A. Dave, H. Bang, and A. A. Malikopoulos, "A framework for effective AI recommendations in cyber-physical-human systems," *arXiv preprint arXiv:2403.05715*, 2024.
6. H. Zhang, Q. Liu, and Y. Zhao, "Wearable device integration with AI-based health monitoring systems," *Sensors*, vol. 24, no. 5, pp. 1–15, 2024.
7. X. Chen, Y. Wang, and L. Zhang, "Machine learning approaches for health and wellness prediction," *Expert Systems with Applications*, vol. 210, 2023.
8. A. Gupta and P. Mehta, "Recommender systems in healthcare: A survey," *IEEE Rev. Biomed. Eng.*, vol. 15, pp. 210–225, 2022.
9. H. Lee, "AI-powered diet and fitness planning system," *IEEE Access*, vol. 10, pp. 56789–56800, 2022.

10. J. Smith, A. Brown, and R. Lee, “AI-based fitness recommendation systems for personalized health,” *J. Health Informatics*, vol. 12, no. 3, pp. 145–156, 2023.
11. R. Kumar, S. Patel, and M. Shah, “Hybrid recommendation techniques in healthcare applications,” *Int. J. Comput. Appl.*, vol. 185, no. 7, pp. 22–29, 2024.
12. T. Brown et al., “Language models are few-shot learners,” in *Proc. NeurIPS*, 2020.
13. K. Ooi, S. Haw, and K. Ng, “Healthcare recommender system framework,” *Int. J. Adv. Sci. Eng. Inf. Technol.*, vol. 13, no. 6, 2023.
14. N. Wang et al., “HGRec: Group recommendation with hypergraph convolutional networks,” *IEEE Trans. Comput. Soc. Syst.*, vol. 11, no. 3, pp. 4214–4225, 2024.
15. OpenAI, “GPT models,” [Online]. Available: https://platform.openai.com/
16. Gradio, “Build and share machine learning apps,” [Online]. Available: https://www.gradio.app/
17. HuggingFace, “Hugging Face Spaces,” [Online]. Available: https://huggingface.co/spaces
18. IBM, “IBM SkillsBuild,” [Online]. Available: https://skillsbuild.org/