

FITAI: An AI-Powered Fitness and Nutrition Platform Using Design Thinking Methodology

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Abstract

Modern sedentary lifestyles, excessive work pressure, and rapid urbanization have significantly impaired the physical and mental well-being of individuals worldwide. Although public awareness of fitness and nutrition has grown substantially, a large segment of the population fails to maintain consistent health routines due to the absence of personalized guidance and the high cost of professional services. Generic online fitness plans rarely account for critical individual differences such as age, gender, body composition, health conditions, and personal goals. This paper presents FITAI, an intelligent web-based fitness and nutrition platform accessible at <https://fitai-batch14.lovable.app>, developed by a student team at R R Institute of Technology through the five-stage Design Thinking methodology: Empathize, Define, Ideate, Prototype, and Test. The system leverages artificial intelligence to analyze user-specific inputs—including physical parameters, lifestyle habits, dietary preferences, and fitness objectives—and subsequently generates personalized workout routines, customized nutrition meal plans, a food scanner for caloric analysis, BMI tracking, progress monitoring, and an AI health assistant chatbot. Implemented using HTML, CSS, JavaScript, and the Lovable AI development platform with Supabase for backend data management, FITAI demonstrated strong usability outcomes during testing, including intuitive navigation, a minimal learning curve, culturally relevant Indian meal suggestions, and accurate AI-driven fitness recommendations. The results confirm that FITAI is a scalable, cost-effective, and practically deployable solution for modern health and wellness challenges, offering significant potential for real-world adoption across diverse user demographics.

Keywords- Artificial Intelligence, Fitness Platform, Nutrition Recommendation, Design Thinking, Personalized Health, Food Scanner, BMI Analysis, Web Application, FITAI

1. Introduction

The global prevalence of lifestyle-related diseases has reached alarming proportions in the twenty-first century. Sedentary occupational habits, prolonged screen time, consumption of processed foods, and chronic stress collectively contribute to rising incidences of obesity, type-2 diabetes, cardiovascular disease, and metabolic disorders. The World Health Organization estimates that physical inactivity is the fourth leading risk factor for global mortality, responsible for approximately 3.2 million deaths annually [6]. Despite heightened public awareness, translating knowledge into sustained behavioural

change remains a formidable challenge for most individuals.

A fundamental obstacle is the mismatch between available fitness resources and individual user needs. The majority of online platforms and mobile applications deliver static, population-averaged workout plans and dietary charts that disregard critical personal variables such as age, gender, body mass index (BMI), pre-existing medical conditions, and fitness objectives. Professional trainers and registered dietitians offer effective individualized guidance; however, their consultations are financially prohibitive for a substantial proportion of the

population, particularly in developing economies such as India.

Artificial intelligence has emerged as a transformative enabler in the digital health domain, offering the capacity to process complex multivariate user data and generate meaningful, personalized health recommendations at negligible marginal cost [2]. Concurrently, Design Thinking—a structured, iterative, human-centered problem-solving methodology—has been widely adopted in engineering education to cultivate empathy-driven innovation [7]. Prior work on AI fitness platforms such as FitMate [4], generative AI-based fitness trackers like FitTrack [3], and integrated platforms like MetaRookies [1] further demonstrates the growing demand for intelligent, personalized health solutions.

This paper presents FITAI, an AI-Powered Fitness and Nutrition Platform developed by a student team (Batch 14) at R R Institute of Technology, Bengaluru, under the Innovation and Design Thinking course (1BIDTL158). The platform is publicly accessible at <https://fitai-batch14.lovable.app> and delivers a comprehensive suite of personalized health services including workout plan generation, nutrition meal planning, food scanning with caloric analysis, BMI calculation, progress tracking, and an AI health assistant. The platform was designed and validated using the five canonical Design Thinking stages, ensuring genuine alignment with identified user needs.

The remainder of this paper is organized as follows: Section 2 reviews related work. Section 3 describes the materials and methods. Section 4 presents results and discussion. Section 5 concludes with future directions. Section 6 lists references. Section 7 presents platform screenshots.

2. Related Work

Research in AI-assisted health platforms spans multiple domains, from intelligent nutrition recommendation to real-time physical coaching. The five studies reviewed below directly inform the design rationale and positioning of FITAI.

MetaRookies [1], presented at a recent IEEE conference, proposed an AI-powered platform integrating intelligent fitness and nutrition recommendations with real-time posture correction

using computer vision. This work establishes that combining physiological guidance with real-time biomechanical feedback can substantially enhance exercise safety and effectiveness. While FITAI does not currently incorporate posture correction, MetaRookies informs a key future enhancement direction.

Prasad et al. [2] conducted a comprehensive review of AI-driven personalized nutrition applications, demonstrating that data-driven platforms integrating dietary intake tracking and health parameter analysis through sophisticated algorithms can significantly improve user engagement and dietary compliance. Their work highlights the role of gamification, chatbots, and voice assistants in promoting user involvement. FITAI addresses these findings by integrating an AI nutrition module that generates culturally relevant Indian meal plans with explicit caloric and macronutrient breakdowns.

Sanapala et al. [3] presented FitTrack at the 2025 IEEE ICCPCT conference, a generative AI-based fitness website providing personalized exercise and food advice. Their platform demonstrated that prioritizing accessibility and simplicity in interface design substantially supports user motivation. FITAI extends this approach by additionally incorporating a food scanner, BMI dashboard, and conversational AI health assistant.

FitMate [4], presented at the 2024 IEEE ICTBIG conference, introduced an AI chatbot providing workout recommendations, diet plans, and health guidance. FITAI builds upon this concept by embedding conversational AI within a broader platform that also delivers structured weekly workout plans and detailed meal programming.

Bergevi [5], in a thesis study from Uppsala University, employed a qualitative Action Design Research approach investigating human-centered AI in fitness and nutrition applications. The study identified user trust, adaptability, and guided decision-making as critical design imperatives. These findings directly shaped FITAI's design philosophy: recommendations are presented as editable guidance rather than prescriptive mandates, and profile updates recalibrate recommendations as user goals evolve.

3. Materials and Methods

The development of FITAI strictly followed the five canonical stages of the Stanford Design Thinking framework [7][8]. The team comprised five members: Sudha MS (mentor/guide), Ujwal Kumar Mahato, Udayashree S, Sanjit Kumar Thakur, and Meghna K, operating as Batch 14 under academic supervision at R R Institute of Technology.

3.1 Empathize Stage

The empathize stage involved structured observation and informal interviews with individuals across varied age groups, occupational backgrounds, and fitness levels. Key findings included:

- Users consistently struggle to adhere to generic workout plans that do not account for their specific body type, fitness level, or available equipment.
- Dietary confusion is widespread, with users uncertain about caloric requirements, macronutrient ratios, and culturally appropriate food choices.
- Motivation and consistency are severely affected by the absence of progress tracking and personalized feedback mechanisms.
- The cost of professional gym memberships, personal trainers, and dietician consultations renders guidance inaccessible to the majority of college students and young professionals.
- Existing online platforms present information in fragmented, non-integrated formats, forcing users to consult multiple applications separately.

These observations, consistent with user pain points documented in related platforms [3][4][5], validated the need for an integrated, affordable, and personalized digital fitness solution.

3.2 Define Stage

Synthesizing empathy findings, the team formulated the following precise problem statement: "Users require a personalized, intelligent, and affordable digital platform that provides customized fitness and nutrition guidance based on individual health parameters, goals, and lifestyle habits." Four principal design constraints were identified: (1) universal device accessibility without specialized hardware, (2) simplicity of interface, (3) scalability, and (4) cost-effectiveness

3.3 Ideate Stage

The ideation phase employed structured brainstorming sessions evaluating mobile applications, wearable-integrated systems, online coaching platforms, and AI-driven web applications. An AI-powered web-based platform was selected as optimal: it eliminates platform fragmentation across iOS and Android, requires no specialized hardware, integrates fitness, nutrition, food analysis, and conversational AI in one interface, and enables a small student team to produce a feature-rich application within an academic timeline.

3.4 Prototype Development

The FITAI prototype was developed as a full-stack web application using HTML5, CSS3, and JavaScript for the frontend, the Lovable AI platform [10] for AI-assisted code generation and intelligent recommendation logic, and Supabase [9] as the backend for user authentication and data storage. The system architecture comprises six integrated modules:

- User Authentication Module: Secure registration and login via Supabase authentication.
- Profile & Data Input Module: Four-step onboarding collecting personal info, body metrics, fitness goals, and health notes.
- AI Workout Planning Module: Structured weekly workout routines tailored to goal and fitness level, with sets, reps, rest duration, and caloric expenditure.
- AI Nutrition Module: Daily meal plans segmented by breakfast, lunch, dinner, and snacks, calibrated to caloric targets with Indian dietary alignment [2].
- Food Scanner Module: Photograph upload or name-based search returning caloric content, macronutrients, and goal aware AI recommendations.
- AI Chat Assistant and Progress Tracking: Conversational health assistant plus visual dashboards for BMI, calorie intake, workout logs, and weight trends.

3.5 Testing and Validation

The prototype underwent two rounds of user testing with student participants. Following human-centered

AI design principles [5], iterative improvements were implemented including dashboard reorganization, enhanced caloric visualization, expanded food database, and refined recommendation language. Final validation confirmed the platform met all defined objectives.

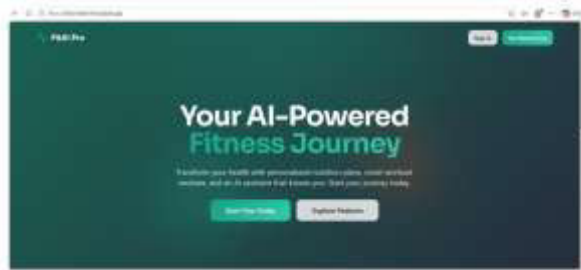


Fig. 1: FITAI landing page — users are welcomed with a bold call-to-action to start their AI-powered fitness journey.



Fig. 2: Secure authentication screen — users sign in or create a new account to begin accessing personalized health features.

4. Results and Discussion (Size 10)

4.1 Implementation Results

The FITAI platform was successfully deployed at <https://fitai-batch14.lovable.app>. User registration and the four-step profile onboarding operated without errors. The system computed BMI scores and categorized users per WHO standards: a BMI of 18.5 (Healthy) was recorded for a test user (60 kg, 180 cm, muscle gain goal) with a daily caloric target of 2,827 kcal.

4.2 AI Workout Recommendation Results

The AI workout module generated structured seven-day schedules: Monday (Upper Body & Core, Strength, 35 min, 250 kcal), Tuesday (Lower Body, Strength, 40 min, 300 kcal), Wednesday (Active Recovery & Flexibility, 30 min, 100 kcal), Thursday

(HIIT Cardio, 25 min, 350 kcal), Friday (Full Body Strength, Mixed, 45 min, 320 kcal), Saturday (Core & Cardio, 30 min, 280 kcal), and Sunday (Rest Day, Flexibility, 20 min, 50 kcal). The weekly goal of 5 workouts targeting 2,000+ kcal burn at an average of 40 min/day is consistent with current exercise science guidelines and comparable in personalization quality to FitTrack [3] and FitMate [4].

4.3 AI Nutrition Recommendation Results

The nutrition module generated a vegetarian meal plan with 2,827 daily calories, 247g protein, 318g carbohydrates, and 63g fat. The plan included Masala Oats with Vegetables (280 kcal), Mixed Fruit Bowl (150 kcal), and Green Tea (5 kcal) for breakfast; Dal Tadka with Brown Rice (450 kcal), Mixed Vegetable Sabzi (120 kcal), and Cucumber Raita (80 kcal) for lunch; Paneer Tikka (300 kcal), Roti—2 pieces (200 kcal), and Palak Sabzi (100 kcal) for dinner; and Roasted Chana (120kcal) and Mixed Nuts (180 kcal) as snacks. The food scanner identified Boiled Corn on the Cob from a photograph, returning 175 kcal, 6g protein, 40g carbs, 2g fat, with a goal-aligned AI recommendation. The cultural alignment of meal choices validated the design principles from Prasad et al. [2].

4.4 Usability and User Experience

Usability evaluation aligned with the human-centered AI principles of Bergevi [5]. Navigation was rated straightforward by all participants. The dashboard's unified display of BMI, daily caloric target, goal, and real-time caloric intake progress was valued for informational density. Most users completed full onboarding independently within five minutes. The AI Chat Assistant effectively responded to contextual queries including "Is paneer good for muscle gain?", "How many calories should I eat?", and "Best exercises for weight loss?"—consistent with the conversational AI fitness companion approach of FitMate [4].

4. Performance and Limitations

System performance was consistently satisfactory with fast load times and reliable AI response generation. Limitations include: (1) internet dependency for AI processing; (2) recommendation accuracy sensitivity to user-provided data; (3) absence of wearable device integration; and (4) lack of real-time posture correction as demonstrated by

MetaRookies [1], representing a priority future enhancement.

4.6 Comparative Analysis

FITAI extends FitTrack [3] with integrated food scanning and conversational AI. Relative to FitMate [4], it delivers structured weekly plans beyond chatbot guidance. Unlike MetaRookies [1], it lacks posture correction but offers a more comprehensive nutrition ecosystem. Human-centered design principles from Bergevi [5] are evident in FITAI's transparent, adjustable recommendation interface. AI-driven nutrition platform characteristics from Prasad et al. [2]—culturally relevant meals, chatbot engagement, preventative health orientation—are all present in FITAI's design.

7. Platform Screenshots and Interface Results

The following figures present the complete user interface of the FITAI platform as captured during live testing at <https://fitai-batch14.lovable.app>. The screenshots document the end-to-end user journey from the landing page through onboarding, dashboard, nutrition planning, food scanning, workout scheduling, AI chat assistance, and progress tracking, demonstrating the functional completeness and visual quality of the implemented system.



Fig 3: AI-generated Nutrition Plan — a complete vegetarian meal plan (2827 kcal, 247g protein, 318g carbs, 63g fat) with Indian friendly breakfast, lunch, dinner, and snack suggestions tailored for muscle gain

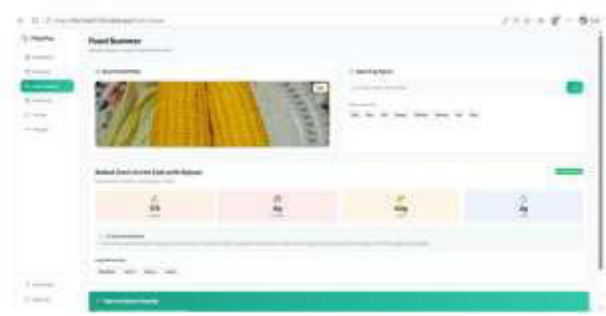


Fig. 4: Food Scanner result — AI identifies boiled corn on the cob and returns 175 kcal, 6g protein, 40g carbs, 2g fat along with a goal-aware AI recommendation for muscle gain.



Fig.8: Progress Tracking dashboard —monitors current weight, total workouts completed, calories burned, weight progress chart, 7-day calorie intake graph, and recent food and workout logs.

5. Conclusion

This paper presented FITAI, an AI-powered fitness and nutrition platform developed by a five-member student team at RR Institute of Technology through the structured application of Design Thinking methodology [7][8]. The platform, publicly accessible at <https://fitai-batch14.lovable.app>, successfully addresses the critical gap between widespread user demand for personalized health guidance and the limited availability of affordable, accessible, and integrated digital solutions. By leveraging the Lovable AI platform [10] and Supabase [9], FITAI delivers a comprehensive ecosystem encompassing personalized workout plan generation, calorie-targeted meal planning, food scanning, BMI tracking, progress visualization, and conversational AI health assistance.

Comparative analysis confirms that FITAI addresses previously identified gaps: it extends FitTrack [3] and FitMate [4] with integrated nutrition and food scanning, aligns with the AI nutrition platform principles of Prasad et al. [2], follows the human-centered design imperatives of Bergevi [5], and lays

the groundwork for future posture correction capabilities inspired by MetaRookies [1].

Future development priorities include: computer vision-based posture correction inspired by MetaRookies [1]; wearable device integration for real-time biometric data; machine learning models that continuously refine recommendations; offline-capable PWA architecture; expansion of the food scanner database; multi-language support; and clinical dietary protocols for medical dietary management. FITAI affirms that the synergy of human-centered design methodology and modern AI technologies can produce scalable, impactful, and democratized digital health solutions..

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