**Title: FitAI**

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##### **Background and Motivation:**

Fitness and nutrition are key to improving health, longevity, and quality of life. However, many people struggle with building effective workout routines or following sustainable diet plans tailored to their personal needs. Existing apps often provide generic recommendations that don’t adapt to user-specific goals, fitness levels, or constraints.

This project aims to leverage AI—combining data-driven exercise programming with nutrition planning—to create an intelligent assistant that generates personalized training and diet schedules.

##### **Problem Statement (short):**

Develop an AI-driven application that creates customized fitness training plans and diet recommendations based on user goals, fitness levels, and constraints, while adapting dynamically to user progress.

##### **Source of Data:**

Exercise Type Data: *This dataset provides the foundation for generating specific exercise recommendations:*

* Exercise Data:The Functional Fitness Exercise Database ([Strength to Overcome](https://docs.google.com/spreadsheets/d/1KOZdmm1MEwF3sY1Mwih9WxjlU4-CEdWo/edit?usp=drive_link&ouid=108267886630363272763&rtpof=true&sd=true)) includes detailed exercise descriptions, categories, targeted muscles, difficulty levels, and equipment requirements. This forms the basis for constructing structured, goal-oriented training plans.

User Profile Data: *The user profile serves as the foundation of the AI-driven personalized fitness system. It contains essential personal and health information that allows for highly tailored recommendations:*

* Personal Information: Unique identifiers such as user ID, name, age, gender, and contact details are used to establish and manage individual profiles.
* Health Metrics: Core attributes like height, weight, body mass index (BMI), and body fat percentage provide a baseline for building customized training and diet plans.
* Medical History: Information about past injuries, medical conditions, and allergies ensures that all recommendations are not only effective but also safe for the user.

Gym Log Data*:* *Activity records form a critical component of personalization, capturing details about workouts, lifestyle habits, and recovery:*

* Workout Logs: Comprehensive logs include exercise types (e.g., cardio, strength, mobility), duration, intensity, and specific movements performed.
* Daily Activity Metrics: Everyday measures such as step count, distance traveled, calories burned, and active minutes provide context for overall activity levels.
* Sleep Patterns: Data on sleep duration, quality, and stages contributes to holistic wellness insights and helps in balancing training with recovery.

Nutrition Data: *Nutrition tracking complements activity data to provide a complete picture of health and performance:*

* Dietary Intake Logs: Daily food and water consumption are tracked, broken down into macronutrients (carbs, proteins, fats) and micronutrients (vitamins, minerals).
* Caloric Balance: By comparing intake with expenditure, the system highlights whether users are in surplus or deficit, guiding them toward their fitness goals.

Biometric Data: *Biometric inputs add real-time insights that enhance the personalization of training plans:*

* Heart Rate Monitoring: Continuous tracking of heart rate during exercise helps optimize training intensity and recovery.
* VO₂ Max Tracking: Measurement of maximal oxygen consumption offers a benchmark for cardiovascular endurance and progress monitoring.

##### **Key Attributes:**

* User Demographics: Gender, Age, Experience Level (Beginner / Intermediate / Advanced)
* Fitness Goals: Primary Goal (e.g., muscle gain, fat loss, endurance, mobility)
* Body Condition Metrics: Height, Weight, BMI, Body Fat %, Medical History (injuries, conditions, allergies)
* Nutrition & Diet Attributes: Dietary Preferences/Restrictions (e.g., vegetarian, keto, halal), Daily Caloric Needs & Macro Balance
* Activity Attributes: Workout Logs (exercise type, duration, intensity), Daily Activity (steps, calories burned), Sleep Duration/Quality
* Biometric Metrics: Heart Rate (resting & during exercise)

##### **Data Quality Concerns:**

* Inconsistent naming/labels in fitness datasets.
* Potential lack of personalization in nutrition databases.
* Plan: standardize attributes, supplement with curated resources, and validate recommendations with domain expertise.

##### **Scope and Objectives**

* Personalized fitness programming: AI selects and schedules exercises tailored to the user’s input (goals, fitness level, equipment availability).
* Diet plan generation: Provides meal plans matched to caloric and macronutrient needs, dietary restrictions, and fitness goals.
* Progress adaptation: Adjusts training/diet plans based on feedback and tracked performance.

##### **Objectives:**

* Build a preprocessing pipeline to clean and structure exercise and nutrition datasets.
* Develop AI models to recommend workout plans (classification + optimization).
* Integrate dietary planning with macro/micro tracking.
* Implement backend to handle personalized queries and update dynamically.
* Design intuitive frontend with user dashboard (progress tracking, plan adjustments).

##### **Minimum Components for a Good Project**

* Large Data: Detailed exercise and nutrition datasets.
* Scalability: Must handle concurrent personalized queries.
* Complex Models: Recommendation systems + NLP for plan explanation.
* Computationally Expensive Inference: Optimize for fast schedule/diet generation.

##### **Learning Emphasis**

* Recommendation systems (collaborative filtering, rule-based + ML hybrid).
* Optimization techniques for meal/exercise scheduling.
* Deep learning for adaptive personalization (optional advanced stage).

##### **Application Mock Design**

* Interface 1: User onboarding form (goals, fitness level, dietary needs).
* Interface 2: Dashboard showing workout schedule & daily diet plan.

##### **Research and Development**

* Review AI-driven fitness applications and nutrition tracking systems.
* Explore hybrid recommendation systems (rules + machine learning).
* Investigate NLP-based health coaching assistants.

##### **Milestones**

* Data collection & preprocessing – [10/05]
* Exercise recommendation model development – [10/16]
* Diet recommendation module – [10/28]
* Backend implementation – [11/20]
* Frontend dashboard – [11/28]
* Testing & deployment – [12/05]