Ghousia College of Engineering

Department of Information Science and Engineering

Project Synopsis

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Project title : AI-Powered Fitness Assistant

Signature of Project coordinator   **Signature of HOD**

ABSTRACT

In today's digitally driven world, health and fitness have become a key focus area. However, finding personalized and efficient fitness guidance often requires professional trainers or expensive subscriptions. The FitnessAI project aims to bridge this gap by leveraging artificial intelligence to provide customized fitness recommendations to users. This web-based application integrates deep learning models and computer vision to track physical exercises in real-time, provide feedback, and suggest personalized workout routines. By using a webcam and pose estimation techniques, the application evaluates user performance and promotes consistent workout habits. The system is lightweight, user-friendly, and scalable for future enhancements. FitAI is an AI-powered fitness assistant that generates personalized workout and diet plans based on user needs. Using Gemini AI 2.0 Flash, it provides intelligent fitness recommendations and allows users to download their plans as PDFs.

Fitness apps have become increasingly popular in recent years, with people looking for ways to track and improve their physical health. These apps provide a convenient and easy way to monitor daily activity levels, set fitness goals, and track progress over time. With the rise of smartphone usage, fitness apps have become more accessible, and the development of these apps has grown rapidly. In particular, the Android operating system has become a popular platform for fitness app development due to its widespread usage and customizable nature. This has led to a diverse range of fitness apps available for Android users, catering to a variety of interests and fitness levels. will provide an overview of fitness apps in Android and their benefits for users.

EXISTING SYSTEM

Current fitness tracking and recommendation systems rely heavily on:
- Manual data entry through fitness apps.
- Subscription-based platforms with static exercise videos.
- Wearable devices (e.g., smartwatches, Fitbits) to monitor user activity.
- Professional trainers for personalized coaching.
- Limitations of Existing Systems:
- Lack of real-time feedback for form correction.
- Expensive or inaccessible for many users.

- Generalized recommendations without customization.

- Dependence on additional hardware.

- These limitations leave a gap for users looking for affordable, intelligent, and accessible fitness solutions.

PROPOSED SYSTEM

Our proposed system for a fitness app aims to provide users with personalized fitness and nutrition plans to help them achieve their fitness goals. The app will allow users to register and create their profiles with basic information like age, height, weight, gender, and fitness goals. Based on this information, the app will provide personalized workout plans to the customer's physical condition and preferences using this information.Users will be able to choose from a range of exercises, create custom workout routines, and track their progress. The app will also provide a food log feature, allowing users to track their calorie intake and receive recommendations for healthier food options and meal plans. Progress tracking features will be included, such as weight, body measurements, and fitness levels, allowing users to set goals and monitor their progress toward achieving them. With these features, we believe that our proposed fitness app system will provide users with the tools they need to achieve their fitness goals and lead healthier lifestyles.

The proposed FitnessAI system introduces an AI-based real-time fitness advisor that:
- Uses MediaPipe and OpenCV for body pose detection and tracking.
- Analyzes user performance through key point detection.
- Counts repetitions and gives corrective feedback based on posture.
- Adapts exercises based on user proficiency and workout history.
- Real-time camera input tracking.
- AI-based pose estimation and form correction.
- Repetition counter for squats, curls, and other exercises.
- Web-based deployment using Streamlit, allowing easy access via browser.
- This approach provides a cost-effective and efficient way for users to exercise with AI assistance at home.

OBJECTIVES OF THE PROJECT

- Personalized Workout Plans – AI-generated routines tailored to fitness goals.
- Customized Diet Plans – Meal plans based on user preferences and dietary needs
- PDF Export – Downloadable PDF format for easy access.
- AI-Powered Suggestions – Uses Gemini AI 2.0 Flash for accurate recommendations.
- Modern UI – Built with ShadCN, ensuring a sleek and user-friendly experience.
- To develop an AI-based fitness advisor system using pose estimation.
- To provide real-time posture detection and correction without wearables.
- To count workout repetitions with high accuracy.
- To offer personalized workout suggestions.
- To design a lightweight, user-friendly, and interactive web interface.
- To reduce dependency on professional trainers for basic exercises.

METHODOLOGIES

Next.js 15 – Server-side rendering and seamless UI/UX.

TypeScript – Type safety and maintainability.

ShadCN – Modern UI components.

Gemini AI 2.0 Flash – AI model for fitness recommendations.

The system follows the below architecture and technologies:

a. Pose Estimation:

Utilizes MediaPipe Pose (a Google framework) to detect 33 key landmarks on the human body in real-time.

b. Image Processing:

Uses OpenCV for webcam input, frame processing, and visual feedback.

c. Repetition Counting Logic:

Calculates joint angles (e.g., elbow, knee) to determine motion stages.

Maintains state transitions (e.g., up → down → up) to count repetitions.

d. Web Application:

Streamlit is used to build and deploy the interactive web interface.

Allows seamless webcam access and real-time feedback display.

e. AI Integration:

Applies basic mathematical models for angle-based correction.

Can be scaled to integrate deep learning for improved accuracy.

f. Deployment:

Cross-platform deployment using cloud or local systems.

No dependency on heavy devices or GPU.

EXPECTED OUTCOMES

The operation of logic, interface interaction, user experience and other aspects of the design needs to be taken into consideration. However, for users, the most intuitive feeling is UI APP, the most useful is the interface interaction. After all, media interface interaction level directly affects the athletes' exercise motivation and enthusiasm, thereby affecting the app and the effect of exercise; and for the designers, interaction level reflects the concept and advantages of the interface best, which indicates the designer's thinking and visible interface design function. So in order to realize the optimization of extracurricular sports fitness app, the most fundamental way is to achieve reasonable and reliable interactive interface, to meet the real needs of users

- Upon successful implementation, the project is expected to achieve the following outcomes:
- An interactive web application that offers fitness recommendations.
- Accurate real-time tracking of body movements and repetition counting.
- Personalized feedback and exercise correction using AI.
- Improved user engagement through visual analytics and progress tracking.
- A base platform for future expansion into diet planning, voice assistance, and mobile support.
- This system will empower users to maintain fitness routines without external dependency, making health accessible and affordable.

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