Biomimic AI Pose Estimation Gym Tracker

GROUP NO. [05]

Project Synopsis

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1.**Name of the Project**

Biomimic AI Pose Estimation Gym Tracker

- **Project Overview**
  The Biomimic AI Pose Estimation Gym Tracker is an AI-powered fitness monitoring system that uses pose estimation techniques to track, evaluate, and correct a user's exercise form in real-time. The system mimics the evaluation style of a human trainer, detecting body posture through a camera and giving instant feedback for improved safety and performance.

  2**. Objectives**:
  -To monitor gym exercises using AI-based pose estimation.
  -To ensure correct posture and technique, reducing injury risk.
  -To track workout progress (sets, reps, calories burned, form score).
  -To provide instant audio/visual feedback for form correction.
  -To store historical performance data for analysis and improvement.

3. **Roles in the System**

- **User Role** (Gym Member):

-Register and log in to the system.

-Perform exercises while being tracked by the camera.

-View real-time form correction alerts and guidance.

-Access workout history, performance score, and progress reports.

- **Admin Role** (Trainer/Gym Manager):

-Manage user accounts and profiles.

-Add, update, login details.

-Monitor user performance statistics.

-View analytics to recommend personalized workout plans.

-Maintain system settings and calibration for pose estimation accuracy.

4. **Software Requirements:**

-Operating System: Windows / Linux / macOS

-Programming Language: Python

-Frontend: React Native , React.js

-Backend: Python

-MediaPipe / OpenPose /Blazepose(for pose estimation)

-OpenCV (for image processing)

-TensorFlow / PyTorch (for AI model handling)

-Flask / Django (for web interface, if applicable)

-Database: MySQL / SQLite

5. **Hardware Requirements**:

-Processor: Intel i5 or higher

-RAM: 8 GB or higher

-Storage: Minimum 256 GB SSD

-Camera: HD Webcam (720p or 1080p)

-GPU: NVIDIA GPU (for faster AI processing, optional but recommended)

-Internet Connection: For cloud-based data storage (if applicable)

6. **Advantages**:

-Real-time feedback for exercise posture.

-Reduces injury risk by detecting wrong movements.

-Personal trainer-like experience without human supervision.

-Tracks progress and stores history for self-assessment.

-Can be used anywhere (home or gym).

7. **Disadvantages**:

-Requires a good camera angle for accurate detection.

-Needs adequate lighting for pose tracking.

-Accuracy depends on AI model training quality.

-Requires decent hardware for smooth real-time tracking.

8. **Goal of the Project**:

To create an AI-powered gym trainer that enhances workout efficiency, prevents injuries, and provides affordable personal training assistance using pose estimation technology.

9. **Future Enhancements**:

-Integration with wearable devices (smartwatches, fitness bands).

-Voice-guided coaching in multiple languages.

-AI-driven personalized workout plans based on fitness goals.

-Cloud-based progress sharing with trainers and peers.

-Support for multi-person tracking for group workouts.

-VR/AR integration for immersive training experience.