

# AI FITNESS COACH: SMART POSTURE CORRECTION & WORKOUT ASSISTANT

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## **Abstract:**

The AI Gym Coach project is an innovative web-based application that leverages Artificial Intelligence (AI) to monitor and guide users through physical workouts in real time. The primary goal is to provide an intuitive and user-friendly interface that enables users to perform exercises effectively while receiving immediate and detailed performance feedback. The system accurately counts exercise repetitions, offers real-time posture correction, and provides insights into pose execution speed, contributing to a more structured, safe, and efficient workout routine. To facilitate realtime activity recognition, a robust AI model was developed using Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) architectures. The model was trained on a custom dataset comprising videos of properly executed exercises recorded during the data collection phase. This dataset enabled the system to learn and recognize various movement patterns essential for accurate classification and feedback. The system utilizes MediaPipe, developed by Google, in combination with OpenCV to perform real-time pose estimation and video processing. This integration allows for the precise extraction of 33 skeletal key points from the user's body, enabling the application to assess pose accuracy, movement smoothness, and repetition count with high reliability. These body landmarks are analyzed continuously to detect deviations from ideal form and to trigger appropriate correctional feedback. In addition to motion tracking, AI Gym Coach is designed to improve user engagement and motivation through personalized feedback and progress tracking features. The application allows users to monitor their performance over time, fostering a sense of achievement and encouraging consistency.

## *Keywords:*

*Artificial Intelligence, Personal Trainer, Posture Correction, Exercise Recognition, Recurrent Neural Networks, Long Short-Term Memory, Computer Vision, Pose Estimation, Mediapipe, Real-Time Feedback, Virtual Fitness Coach, Human Activity Recognition, Workout Assistance, Deep Learning, Smart Fitness System*