

Project Proposal

Title:

Body Posture Correction System

Domain:

Artificial Intelligence, Computer Vision, Data Engineering, Health & Wellness

Problem Statement:

In this digital age, a significant amount of the population sits for a large part of their day, studying, working, or gaming. Poor sitting and standing postures generally remain unnoticed and can result in chronic back pain, neck strain, spinal deformity, and loss of productivity.

Traditional methods for correcting posture, such as wearable sensors or posture belts, are sometimes uncomfortable to wear and not practical for extended use.

Therefore, there is a pressing need for a low-cost and camera-based system to detect improper posture in real-time, which can provide on-the-spot feedback or alerts to correct the same.

Objectives:

- Design a real-time human posture detection and analysis system based on computer vision using a webcam or camera feed.
- To identify poor or incorrect postures, including slouching, leaning forward, and/or uneven shoulder alignment.
- It will provide corrective feedback or visual/audio alerts in cases of improper posture detection.
- To record and analyse posture data over time for the purpose of monitoring user improvements and patterns.
- The objective is to create a light and easy-to-use interface for both desktop and mobile applications.

Solution Approach:

The proposed solution of Body Posture Correction System includes several stages:

1. Data Acquisition:

- Capture live video feed using web-camera or camera.
- Use MediaPipe, OpenPose, or OpenCV with Deep Learning-based pose estimation models to extract human body key-points (e.g., shoulders, neck, spine, hips).

2. Posture Detection & Analysis:

- Calculate angles between key joints to evaluate alignment of the spine, shoulders, and neck.
- Define threshold values for “good” vs. “bad” posture based on ergonomic standards.
- Classify posture status using machine learning models.

3. Feedback Mechanism

- Display a visual alert (e.g., change in colour indicator) when posture deviates from the ideal range.

- Show real-time posture visualization on the screen (skeleton overlay).

4. Performance Monitoring

- Log posture data (time spent in poor posture, improvements over time).
- Generate simple analytics dashboards for user progress tracking.

5. Tools & Technologies

- Python, OpenCV, MediaPipe/OpenPose, TensorFlow/PyTorch, NumPy, Matplotlib/Streamlit for visualization.
- Optional: Raspberry Pi + camera module for an embedded posture monitoring setup.

Expected Outcomes:

- A real-time posture monitoring system that accurately detects poor posture.
- Automated corrective feedback mechanism for posture improvement.
- Improved user awareness and long-term ergonomic health benefits.
- Potential integration into smart workplaces, online learning environments, or fitness apps.