⚙ Patient Monitoring AI - Model Explanation

1. Overview

This project is an AI-powered system designed to monitor patients using video feeds.

It detects two critical emergencies in real time:

Patient falls

Respiratory issues (apnea, erratic breathing)

When such events are detected, the system triggers alerts (sound, email, Telegram) and stores snapshots and logs for review.

2. Core Algorithms

Convolutional Neural Networks (CNNs)

Deep learning models specialized for image and video analysis.

In this system, CNNs detect 33 human body landmarks (e.g., shoulders, hips).

These landmarks are used to:

• Detect falls (via torso angle).

• Track chest movement to estimate breathing cycles.

CNNs are accurate, fast, and optimized for real-time healthcare applications.

Motion Detection Fallback

A classical computer vision algorithm based on frame differencing.

Steps:

• Define chest region from shoulder landmarks.

• Convert to grayscale for efficiency.

• Compute pixel differences between consecutive frames.

• Mean difference = chest motion value.

If the value is too low → possible apnea.

If too high → erratic breathing.

Ensures reliability when CNN-based pose estimation fails (poor lighting, bad camera angle, occlusion).

3. Key Benefits

->Works with ordinary cameras (no wearable sensors needed).

->Detects both falls and respiratory problems.

->Provides real-time alerts to doctors/caregivers.

Hybrid approach: AI (CNNs) + Classical Vision (motion detection).

Lightweight and feasible for hospitals, ICUs, and elderly care homes.