1. Project Title: Occupational Safety Using Object Detection

2. Problem Statement

Industrial and construction workplaces face a persistent challenge in ensuring that workers comply with safety standards and wear appropriate Personal Protective Equipment (PPE) such as helmets, vests, and masks. Despite strict regulations, manual supervision often fails to detect safety violations in real time, leading to workplace accidents, injuries, and productivity loss. There is a pressing need for an automated, intelligent safety monitoring system that can continuously track and identify PPE compliance using computer vision — ensuring worker safety, regulatory adherence, and operational efficiency.

3. Project Description

This project aims to develop an occupational safety system that leverages object detection to automatically monitor and identify safety gear compliance among workers in industrial and construction environments. Using YOLOv8 (You Only Look Once) — a state-of-the-art deep learning model for object detection — the system detects whether workers are wearing essential protective equipment such as helmets, masks, and vests in real time. The model is trained on a large dataset of labeled images from various workplace scenarios to ensure high detection accuracy and adaptability.

The system provides visual alerts for safety violations, enabling supervisors to take immediate corrective actions. It also serves as a training aid, helping organizations analyze compliance trends and enhance worker awareness. The ultimate goal is to create a data-driven, real-time, and scalable safety monitoring solution that fosters a safer work culture and minimizes workplace hazards.

4. Problem It Solves

- Prevents workplace accidents caused by missing or improper use of PPE.
- Enables real-time monitoring and automated detection of safety violations.
- Reduces dependency on manual supervision and human error.
- Enhances compliance with safety standards and regulatory requirements.

- Promotes data-driven insights into workforce safety and behavior.
- Acts as a visual training and awareness tool for industrial workers.

5. Abstract

This project presents an intelligent Occupational Safety and Training System using Object Detection, developed to enhance safety compliance in industrial and construction environments. The system employs the YOLOv8 object detection model to automatically identify Personal Protective Equipment (PPE) such as helmets, vests, and masks from live video feeds or recorded footage.

By leveraging computer vision and deep learning, the model processes real-time frames, classifies objects, and detects violations with high precision. Visual alerts and bounding box indicators provide immediate feedback, ensuring quick response to unsafe conditions.

The project's architecture is designed for scalability and can be deployed across various industries, from manufacturing to logistics. Its integration capability with cameras, IoT devices, and data dashboards makes it a practical tool for both safety compliance and workforce training.

Through automation and AI, this system aims to reduce workplace accidents, improve safety awareness, and establish a proactive safety management culture — making workplaces smarter, safer, and more efficient.