

Document 2: Intelligent Safety Compliance System (ISCS)

1. Project Title

ISCS – AI-Driven Safety Monitoring & Compliance Assistance

2. Problem Statement

Industrial and construction environments require strict safety compliance.

Challenges include:

- Manual safety inspections
- Inconsistent reporting
- Delayed identification of hazards

Current issues:

- High human error
- Slow response to safety violations
- Inadequate knowledge of regulatory standards

3. Proposed Solution

Build an AI-powered safety agent that:

- Monitors equipment and personnel safety
- Analyzes hazard reports and safety documents
- Recommends corrective actions
- Generates compliance reports automatically

4. Project Objective

- Ensure compliance with OSHA / ISO safety standards

- Reduce workplace accidents
- Automate safety reporting
- Provide real-time safety insights

5. System Architecture

- **Data Collection:** Sensors, CCTV feeds, and logs
- **AI Processing:** NLP for safety document analysis, ML for anomaly detection
- **Frontend Dashboard:** React + Tailwind CSS for live alerts
- **Backend:** FastAPI, PostgreSQL for logs

6. Technology Stack

- Python (NLP + ML), OpenCV (video analysis)
- LangChain + GPT-4 for document reasoning
- Vector DB (FAISS) for SOP retrieval

7. Dataset Details

- Safety inspection reports
- Incident logs
- Regulatory manuals
- Employee safety training records

8. Features

- Hazard detection & alerts
- Automated safety compliance checks
- Safety trend analysis

- Incident report auto-generation

9. Sample Use Cases

| User | Use Case |
|----------------|---------------------------------|
| Safety Officer | Detect missing PPE in real-time |
| Supervisor | Track compliance KPIs |
| Manager | Review weekly incident summary |

10. Metrics of Success

- Safety incident reduction $\geq 30\%$
- Compliance report generation ≤ 1 minute
- Hazard detection accuracy $\geq 90\%$

11. Future Enhancements

- Predictive hazard analysis
- Integration with wearable IoT devices
- Voice & AR-based safety guidance

12. Why This Project is Valuable to John Cockerill

- Enhances plant safety culture
- Aligns with industrial safety standards
- Demonstrates AI integration in operational monitoring

13. Conclusion

ISCS automates safety compliance and hazard detection, reducing risk and improving industrial operations.

14. Author

Developed By: Prakriti Sharma

Specialization: AI, Safety Analytics, Automation