

## **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  $\leq 1$  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**

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