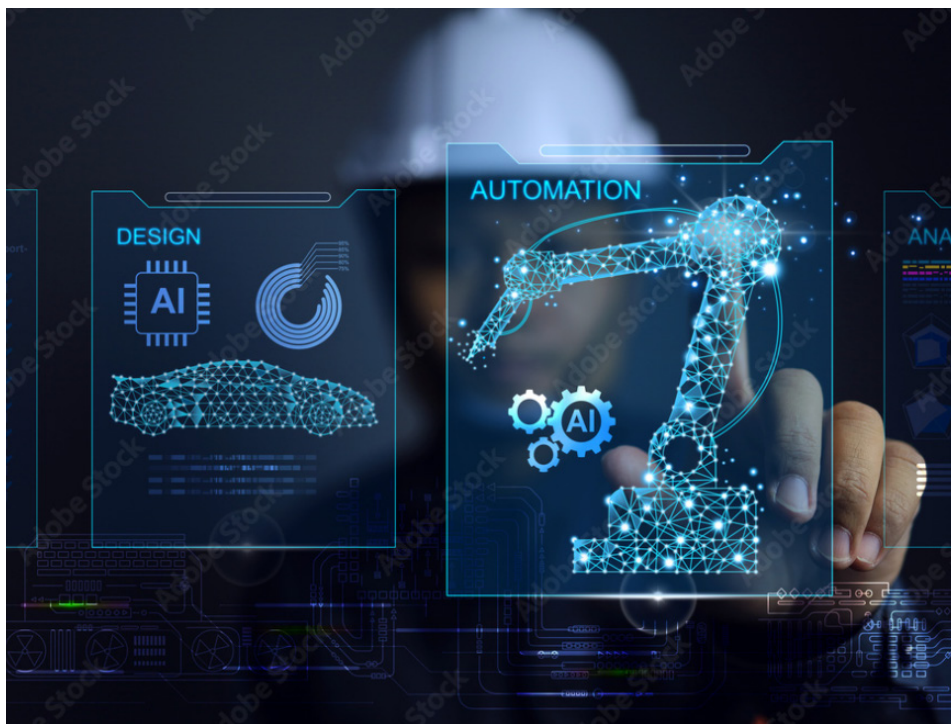


AI's Role in Preventing Workplace Hazards Fact Sheet

HS25-001A (04-25)

Artificial Intelligence (AI) is changing the way industries operate, making workplaces safer and healthier. From construction sites to manufacturing plants, AI is being used to predict and prevent accidents, injuries, and illnesses. With tools like real-time monitoring, predictive analytics, and wearable technology, AI helps identify risks before they lead to harm. For example, AI systems can detect unsafe conditions such as equipment malfunctions, toxic gas leaks, or worker fatigue, allowing for quick action to avoid accidents. This proactive approach is helping reduce workplace fatalities and injuries across industries.



Key ways AI enhances workplace safety

1. Real-time hazard detection.

- AI-powered sensors monitor workplaces for dangers such as spills, gas emissions, equipment malfunctions, or safety violations.
- These systems send instant alerts to supervisors or workers, enabling immediate intervention to prevent accidents.

2. Predictive analytics for risk prevention.

- AI analyzes historical safety data to predict where and when accidents are likely to occur.

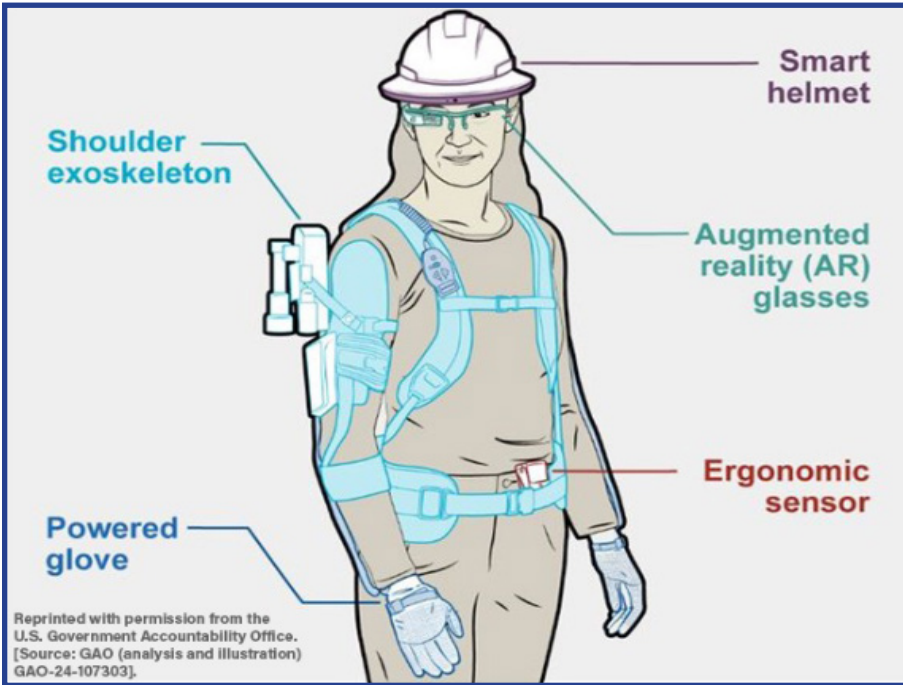
- This allows companies to address potential risks before they escalate into emergencies.

3. Wearable technology.

- Wearables equipped with AI track workers' vital signs and environmental conditions.
- These devices can alert workers or supervisors when someone is at risk of injury or illness due to exhaustion or hazardous conditions.

4. Leak detection in oil and gas and chemical industries.

- AI-powered thermal cameras and geospatial analytics detect pipeline leaks and hazardous chemical releases in real time.
- These systems use satellite imagery, drones, and infrared cameras to locate leaks quickly, minimizing environmental damage and health risks.



Benefits of using AI for workplace safety

- **Fewer accidents:** By identifying risks early, AI helps prevent injuries and fatalities.
- **Cost savings:** Reducing accidents lowers costs related to workers' compensation, legal fees, and lost productivity.
- **Improved compliance:** AI ensures adherence to safety regulations by monitoring workplace conditions and employee behavior in real-time.
- **Enhanced worker health:** Wearables and monitoring systems help detect issues like fatigue or stress before they lead to accidents.

- In chemical plants, AI identifies toxic or corrosive substances through advanced data analysis, ensuring safer handling of hazardous materials.

5. Virtual training and simulations.

- AI creates realistic virtual environments for workers to practice safety procedures without real-world risks.
- This improves preparedness for emergencies such as chemical spills or equipment failures.

6. Automated safety monitoring.

- AI ensures compliance with safety protocols by monitoring the proper use of personal protective equipment (PPE) and restricting access to hazardous areas.

7. Predictive maintenance.

- AI detects early signs of equipment failure by analyzing performance data.
- This prevents accidents caused by malfunctioning machinery while reducing downtime.

Real-life applications across industries

1. **Construction:** AI-powered tools assess scaffolding risks and monitor PPE usage, helping reduce falls and other injuries.
2. **Manufacturing:** Generative AI optimizes workflows, identifies faulty machinery, and provides real-time hazard alerts.
3. **Logistics:** Sensors track forklift operations to prevent collisions and ensure safe practices in busy warehouses.
4. **Health care:** AI systems analyze vast amounts of data to identify patterns in workplace illnesses, enabling targeted prevention strategies.
5. **Chemical plants:** AI-powered sensors detect toxic fumes such as nitrogen dioxide with precision, preventing respiratory illnesses among workers.

6. **Oil and gas:** Geospatial analytics and thermal cameras identify pipeline leaks early, reducing the risk of explosions or environmental disasters.

Challenges of implementing AI

While the benefits are significant, challenges include:

- **High costs:** Initial investments in AI technology can be expensive for smaller businesses.
- **Privacy concerns:** Continuous monitoring raises questions about worker privacy.

- **Integration issues:** Adapting existing safety protocols to work with new technology requires effort and training.

A safer future with AI

AI is transforming workplace safety by shifting from reactive measures to proactive prevention. By integrating tools like real-time monitoring, predictive analytics, and wearable devices, employers can protect their workforce more effectively than ever before. While challenges remain, the potential for reducing injuries and saving lives makes AI a valuable ally in creating safer workplaces.



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