

TDI

Safety @ Work
Division of Workers' Compensation



Connected Safety Technology and the Internet of Things (IoT)



**Workplace
Program**



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INTRODUCTION



Today's workplaces rely on more technology than ever before. Tools, vehicles, equipment, and even personal protective equipment (PPE) can now connect through sensors and wireless networks to collect and share information in real time.

This connected system — often called the **Internet of Things (IoT)** — can help employers identify hazards earlier, respond faster to emergencies, and prevent injuries before they occur.

Instead of reacting after an incident, employers can use real-time data to spot warning signs and correct unsafe conditions right away. When used properly, IoT supports stronger safety programs and helps protect workers across many industries.

What is IoT in workplace safety?

In simple terms, IoT uses **connected sensors, smart devices, and monitoring systems** to gather information about:

- Worker location and health.
- Equipment condition.
- Environmental hazards.
- Job site activity.

These devices send information to a central dashboard or safety system. Supervisors and safety staff can review alerts, track trends, and take action before someone gets hurt.

IoT does not replace safe work practices or training. Instead, it adds another layer of protection by providing better visibility into workplace risks.

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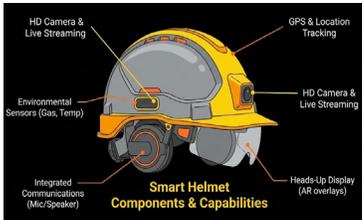
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Common IoT tools used to protect workers

Many employers use connected technology to reduce risk. The tools below show how IoT can monitor hazards, prevent incidents, and improve emergency response:



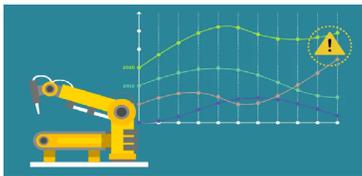
- **Wearable technology.**

Smart helmets, safety vests, badges, wristbands, and other wearable devices can track worker location, motion, and vital signs such as heart rate or body temperature. Many systems also detect falls or “man-down” events and automatically notify supervisors. These tools are especially useful for lone workers and high-risk tasks.



- **Environmental sensors.**

Fixed or portable sensors monitor conditions such as oxygen levels, toxic or flammable gases, dust, smoke, heat, humidity, noise, and air quality. When readings exceed safe limits, the system can trigger alarms, ventilation, or evacuation alerts. Environmental monitoring is commonly used in confined spaces, industrial plants, warehouses, and construction sites.



- **Predictive maintenance.**

Sensors installed on equipment measure vibration, temperature, load, and power use. This data helps identify worn or overheating components before failures occur. Addressing problems early reduces breakdowns, fires, and injuries caused by malfunctioning equipment.



- **Proximity detection and geofencing.**

Tags or beacons placed on workers, forklifts, trucks, or heavy equipment can detect when people and vehicles get too close. Systems may warn operators, slow equipment, or restrict access to hazardous areas. These controls help prevent struck-by and caught-between incidents.



- **Fall detection and work-at-height monitoring.**

Wearables and connected fall-protection systems can detect sudden falls or lack of movement and send immediate alerts so rescue efforts begin quickly. Faster response times can reduce the severity of injuries.



- **Lone-worker monitoring.**

Connected devices allow employees working alone to share their location, send panic alerts, or automatically signal for help if they stop moving. Supervisors can check worker status in real time and respond to emergencies faster.



- **Automated emergency response systems.**
Some connected safety systems can automatically activate alarms, unlock exits, shut down equipment, start ventilation, or guide workers along evacuation routes. These features help control hazards and speed response during fires, gas releases, or other emergencies.



- **Ergonomics and overexertion prevention.**
Wearable motion sensors and smart exoskeletons monitor posture, lifting frequency, and repetitive movements. These tools coach safer body mechanics and help reduce sprains, strains, and other musculoskeletal injuries.

Benefits of using IoT in the workplace

When integrated into an overall safety and health program, these technologies can help employers:



Identify hazards
in real time instead of after an accident.



Improve compliance
through automatic logging and documentation.



Increase situational awareness
across the job site.



Respond faster
during emergencies.



Focus prevention efforts
on the highest risks.

These tools are especially valuable in high-risk industries such as manufacturing, construction, mining, oil and gas, utilities, and large warehousing operations.

Key application overview

You can use this table as a quick reference to key applications:

Application area	What it does for safety	Example technologies
Wearables & smart PPE	Monitor worker health, fatigue, location, and falls; send man-down or overexertion alerts.	Smart helmets, vests, wristbands, smart caps.
Environmental sensors	Detect gas, dust, smoke, heat, noise, and poor air quality; trigger alarms or ventilation.	Gas detectors, air quality monitors, heat sensors.
Predictive maintenance	Identify failing equipment before breakdowns cause injuries or fires.	Vibration, temperature, and power-use sensors.
Proximity and geofencing	Prevent collisions and unauthorized entry into hazardous zones.	Worker or vehicle tags, geo-beacons.
Fall detection and work at height	Detect falls or lack of movement and send rapid alerts for rescue.	Fall-sensing wearables, connected harness systems.
Lone worker monitoring	Protect isolated workers with real-time monitoring and emergency alerts.	Wearables, panic buttons, two-way communication.
Automated emergency response	Speed alarms, shutdowns, evacuations, and communication during incidents.	Smart alarms, connected fire systems, ventilation controls.
Ergonomics and overexertion	Reduce strains and sprains by tracking posture and load.	Motion sensors, smart belts, exoskeletons.

Steps to get started

Employers do not need to adopt every tool. Start with your biggest risks.

- Review injury and near-miss records.
- Identify tasks that would benefit from early warnings or monitoring.
- Pilot one or two solutions, such as gas sensors or lone-worker devices.
- Train employees on proper use and response.
- Maintain equipment and review results regularly.

Choose solutions that support your existing safety program, not replace it.

Looking ahead

Connected safety tools continue to evolve. New systems may use advanced analytics, integrated PPE, robotics, and automation to further reduce risk and keep workers out of hazardous areas. As these technologies become more affordable, more employers may use them to strengthen their safety programs.





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