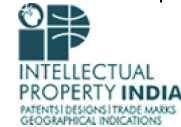


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## Patent Search

Invention Title	IoT-Enabled Smart Helmet for Environmental Monitoring and Worker Safety
Publication Number	01/2026
Publication Date	02/01/2026
Publication Type	INA
Application Number	202541126343
Application Filing Date	13/12/2025
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	TEXTILE
Classification (IPC)	A42B 3/30, A42B 3/04, A42B 1/24, G08B 21/02, A42B 3/28

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### Abstract:

The present invention relates to an IoT-enabled smart safety helmet configured to enhance worker protection in mining and industrial environments through continuous environmental monitoring and real-time location tracking. The helmet integrates a multi-gas sensor, temperature and humidity sensor, and ambient-light sensor coupled to a microcontroller that evaluates sensed parameters against predefined safety thresholds. A GPS/Wi-Fi module determines worker location, while an IoT communication interface transmits sensor data and emergency alerts to a remote monitoring system. A local alerting unit provides immediate audible, visual, or vibratory warnings, and an emergency mechanism allows manual or automatic distress signaling. Powered by a rechargeable supply and housed within a rugged protective shell, the system offers proactive, autonomous, and reliable safety monitoring in hazardous conditions.

**Complete Specification****Description:FIELD OF THE INVENTION**

[001] The present invention relates to the field of occupational safety and industrial hazard-monitoring systems, particularly those employing Internet of Things (IoT) technologies for real-time sensing and communication. More specifically, the invention concerns an intelligent, wearable safety helmet integrated with environmental sensing modules, including multi-gas detectors, temperature and humidity sensors, and ambient-light sensors, together with GPS and Wi-Fi-based geolocation capabilities for continuous tracking of personnel in hazardous environments. The invention further pertains to automated alerting mechanisms, remote supervisory monitoring, and emergency-signaling features designed to enhance worker protection in high-risk sectors such as mining, oil and gas, chemical plants, construction sites, and other industrial facilities where exposure to toxic gases, restricted visibility, and communication delays pose significant dangers.

**BACKGROUND OF THE INVENTION**

[002] Mining, construction, oil and gas exploration, and other heavy industrial activities expose workers to a multitude of environmental hazards, including toxic and combustible gases, oxygen-deficient atmospheres, extreme temperatures, poor illumination, and physically unstable working zones. Conventional safety practices in such industries continue to rely heavily on manual supervision, periodic site inspections, and handheld instruments for gas monitoring and location tracking. These methods are inherently limited, as they depend on worker attentiveness, supervisor availability, and uninterrupted communication channels. In high-risk industrial scenarios, the time

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Page last updated on: 26/06/2019