

Multi-Functional Intelligent Helmet for Construction Workers

1. Technology:

The multi-functional intelligent helmet for construction workers consists of a lightweight, user-friendly skull unit made from a durable material. This unit includes air vents to ensure proper ventilation, allowing workers to wear the helmet for extended periods comfortably. The helmet has a headlamp that automatically activates based on the surrounding light conditions. It also features a pulse rate sensor to monitor the worker's vital signs. Additionally, a force sensor and a gas sensor are integrated to detect potential hazards in the environment and provide immediate alerts to the wearer. A GPS module tracks the worker's location on the job site, sending updates to a central server via LoRaWAN, which helps generate big data on workplace safety and environmental conditions. This data, collected from multiple workers, is stored on a server for analysis. The helmet also includes Bluetooth connectivity, enabling seamless interaction with other smart devices in the work area.

2. Problem Addressed:

The multi-functional intelligent helmet addresses several key challenges in construction safety and worker well-being. One primary concern is the need for long-range communication, addressed through the integration of LoRaWAN technology, enabling seamless, real-time data transmission over extended distances. This ensures that the location and safety status of workers are continuously monitored. Additionally, the helmet tackles the issue of individual worker health by incorporating a pulse rate sensor to monitor vital signs in real-time. An emergency button allows workers to send immediate distress signals in case of accidents or health issues. These combined features enhance workplace safety by allowing quick responses to potential hazards and ensuring that workers' health is continuously monitored, significantly improving overall safety standards on construction sites.

3. Industrial Applications:

The multi-functional intelligent helmet has a wide range of industrial applications, particularly in the construction, mining, and oil & gas sectors, where worker safety is critical. In construction, the helmet ensures real-time monitoring of workers' health and location, improving safety protocols on large job sites. Its integration with LoRaWAN technology allows for long-range communication, making it ideal for vast construction areas or remote locations. In mining, the gas sensor detects hazardous gases, protecting workers from potential toxic exposure. Similarly, in the oil & gas industry, the helmet's environmental monitoring capabilities help detect volatile compounds, reducing the risk of explosions or health hazards. The collected data can be analysed to improve workplace safety standards, predict risks, and streamline emergency responses across various industries. This intelligent helmet's ability to adapt to different hazardous environments makes it a versatile tool for ensuring worker safety in high-risk industries.

4. Patent Application Number: 202441041296