



REAL-TIME INDOOR TRACKING SYSTEM FOR MINING

Make business processes safer, more controlled and easier by tracking the personnel and equipment involved in the production processes in the mine in real time.



TRACEONIX



Real-Time Indoor Tracking System for Mining

How can assets such as personnel, vehicles, and heavy equipment within mining operations be effectively monitored? In high-risk environments like mines, is it possible to regulate the movements of assets and manage vehicle-to-vehicle as well as vehicle-to-pedestrian interactions? Furthermore, can the precise locations of employees be identified during emergencies arising from the unpredictable nature of mining environments? The TRACEONIX indoor positioning system provides solutions to these and similar challenges by enabling real-time tracking of personnel, equipment, and vehicles in enclosed areas, such as mines, where GPS technology is unavailable and environmental conditions are harsh. During this solution process, the TRACEONIX indoor positioning system considers requirements such as cost, coverage, and positioning accuracy; it offers the most suitable and efficient system through its intelligent algorithms, allowing for the integrated or independent use of various technologies.



Areas of Usage



Personnel Tracking

The TRACEONIX Indoor Positioning System enables real-time tracking of personnel operating within mining facilities, ensuring the seamless execution of internal operations—such as inspections and safety protocols—and the optimization of associated processes.



Object Tracking

The TRACEONIX Indoor Positioning System enables the tracking of key assets, materials, equipment, and machinery within production processes to reduce costs and enhance both agility and productivity.



Security Check

The TRACEONIX Indoor Positioning System utilizes its location tracking and geofencing capabilities to prevent unauthorized access to restricted areas or to generate alerts within specific zones. By enabling the automatic triggering of events when vehicles enter or exit a designated area, the system ensures that comprehensive safety measures are implemented and violations are reported within industrial environments.



Emergency Management

TRACEONIX enhances emergency response capabilities through real-time tracking and SOS alerts. By providing instantaneous localization of personnel and vehicles, the system facilitates rapid evacuation and effective coordination. By reducing response times and delivering critical situational data, TRACEONIX strengthens workplace safety and crisis preparedness.

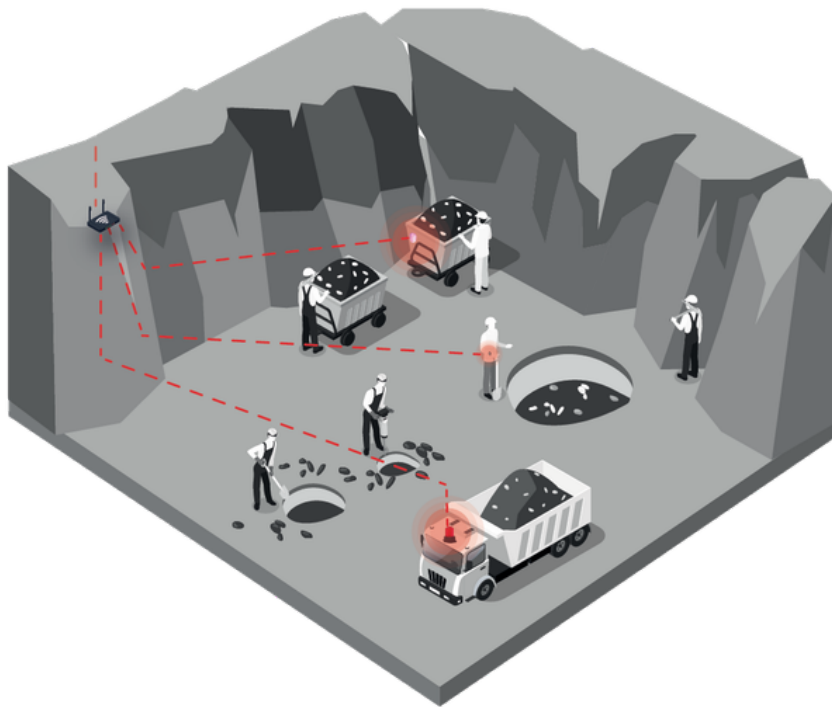


Vehicle Pedestrian Safety

TRACEONIX reduces the risk of collisions between vehicles and personnel in high-traffic areas. Through proximity detection coupled with visual or auditory alerts, it instantaneously informs operators regarding unsafe distances. This real-time awareness facilitates safer movement, enhanced visibility, and a more secure industrial environment.

How Does It Work?

To track mobile assets within mining operations using the TRACEONIX indoor positioning system, tags that transmit signals must be attached to the assets to be monitored, and receivers must be installed at fixed locations to capture these transmitted signals. Consequently, a network comprising multiple fixed receivers and moving tags is established. Through the receivers within this network, signals from the tags are transmitted to a location server. The location server utilizes this signal data to calculate the coordinates of the asset tags and visualizes them on a map. By repeating this process at specific intervals, real-time location tracking is achieved.



Basic Features

Installation

- Minimum infrastructure requirement
- One flexible infrastructure that is scalable and suitable for the future business case

Positioning

- Cost-effective positioning with BLE technology
- Location detection with high accuracy with UWB

Mapping

- Real-time location tracking
- Real-time visibility of asset (personnel, object) locations

Virtual Zone

- Creation of descriptive virtual zones within the environment

Emergency Management

- Real-time notification of emergency situations

Analytics

- Rich customizable reports for requirements (heat map, asset movement analysis, etc.) and screens



Indoor Positioning Solution

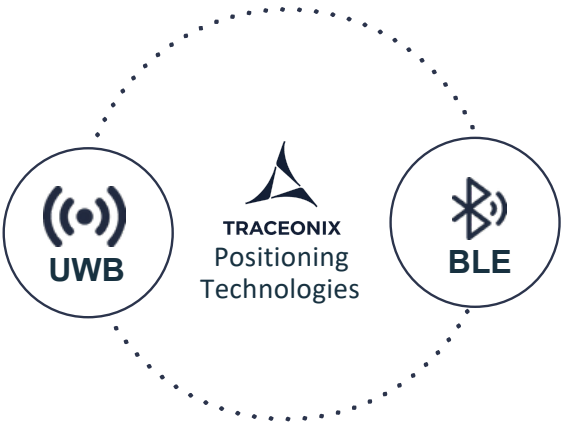
The TRACEONIX indoor positioning system provides a localization framework that enables the use of different positioning technologies, such as Ultra-Wideband (UWB) or Bluetooth Low Energy (BLE), either independently or in combination, depending on specific requirements (e.g., cost, accuracy) and environmental conditions. This system integrates the capabilities of each technology to establish a more adaptable tracking infrastructure capable of addressing current and future operational requirements. For instance, in an industrial environment, BLE technology and its hardware components may be deployed in areas where high precision is not a primary concern, whereas UWB technology and its hardware components may be utilized in machinery-dense zones where precision is critical.

The TRACEONIX indoor positioning system based on BLE technology.

- Low power consumption
- Low cost
- 3-5m positioning accuracy

The TRACEONIX indoor positioning system based on UWB technology.

- High cost hardware elements
- High positioning accuracy (80cm)
- Resistance to environmental and other signal interference



System Components

The TRACEONIX indoor positioning system delivers professional real-time indoor localization for diverse indoor environments through intelligent algorithms and the use of BLE and UWB technologies, either independently or in combination. In this context, the TRACEONIX indoor positioning system consists of technology-specific transmitter, receiver, and location server components.

Tag

These are devices attached to mobile assets (personnel, equipment, vehicles) to monitor their movements within the environment.

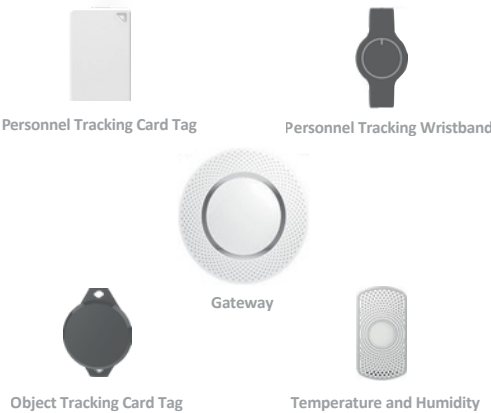
Gateway

These are devices placed at fixed points within the environment that collect location-specific tag signals and transmit them to the location server.

Location Server

It is the software component that processes the collected signal data to perform location calculation, visualization, analysis, and related operations.

BLE System Components



UWB System Components

