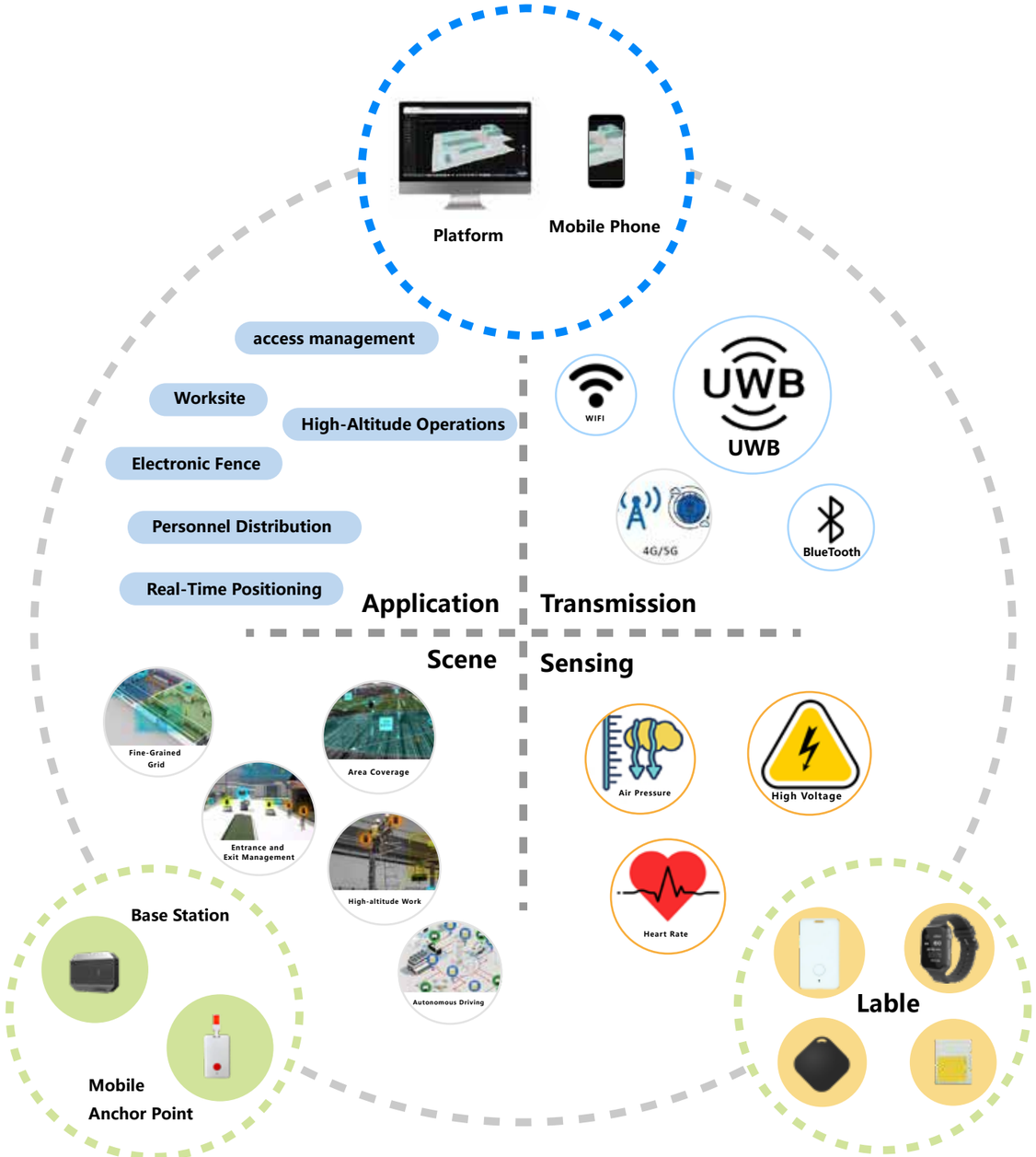
Shanghai Covond Security Technology Co., Ltd.
www.covond.com

Location
Space
Perception

UWB+BLE

System architecture



UWB+BLE

All-wireless deployment

Autonomous location algorithm

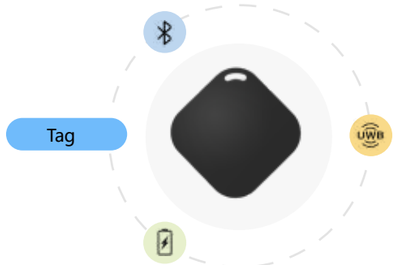
Diversified site location

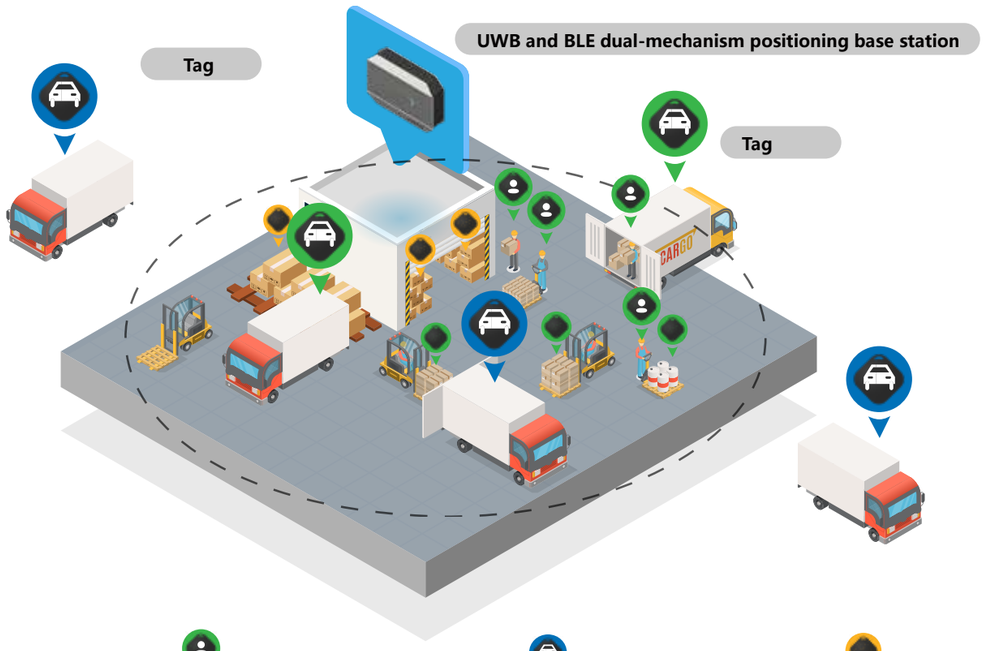
Product Advantages

UWB BLE

Positional spatial awareness, IoT data sensing, high precision, and optimal power consumption strategy are key features of our system.

Our system offers dual wireless communication support for both UWB (Ultra-Wideband) and BLE (Bluetooth Low Energy) for both base stations and tags. It implements optimal power consumption mechanisms for tags based on BLE, enabling efficient operation. Additionally, it utilizes BLE for IoT data collection and achieves high-precision distance measurement and accurate location awareness through UWB technology.





Base station

The BLE periodic broadcast includes the following information: location scenario, UWB activation/deactivation, UWB operating frequency, data transmission, and alarms. During UWB reception, CH5 or CH9 channels are used, along with TOF or TOA , for scene-based location calculation.

Tag

Entering the positioning zone involves BLE periodic scanning reception, UWB activation and operating modes, BLE periodic reception of nearby Bluetooth IoT device broadcasts, UWB periodic heartbeats transmission, SOS alarms, and IoT data.

Tag

Leaving the positioning area: When no BLE broadcasts from base stations are received for an extended period, the UWB enters into a dormant state.

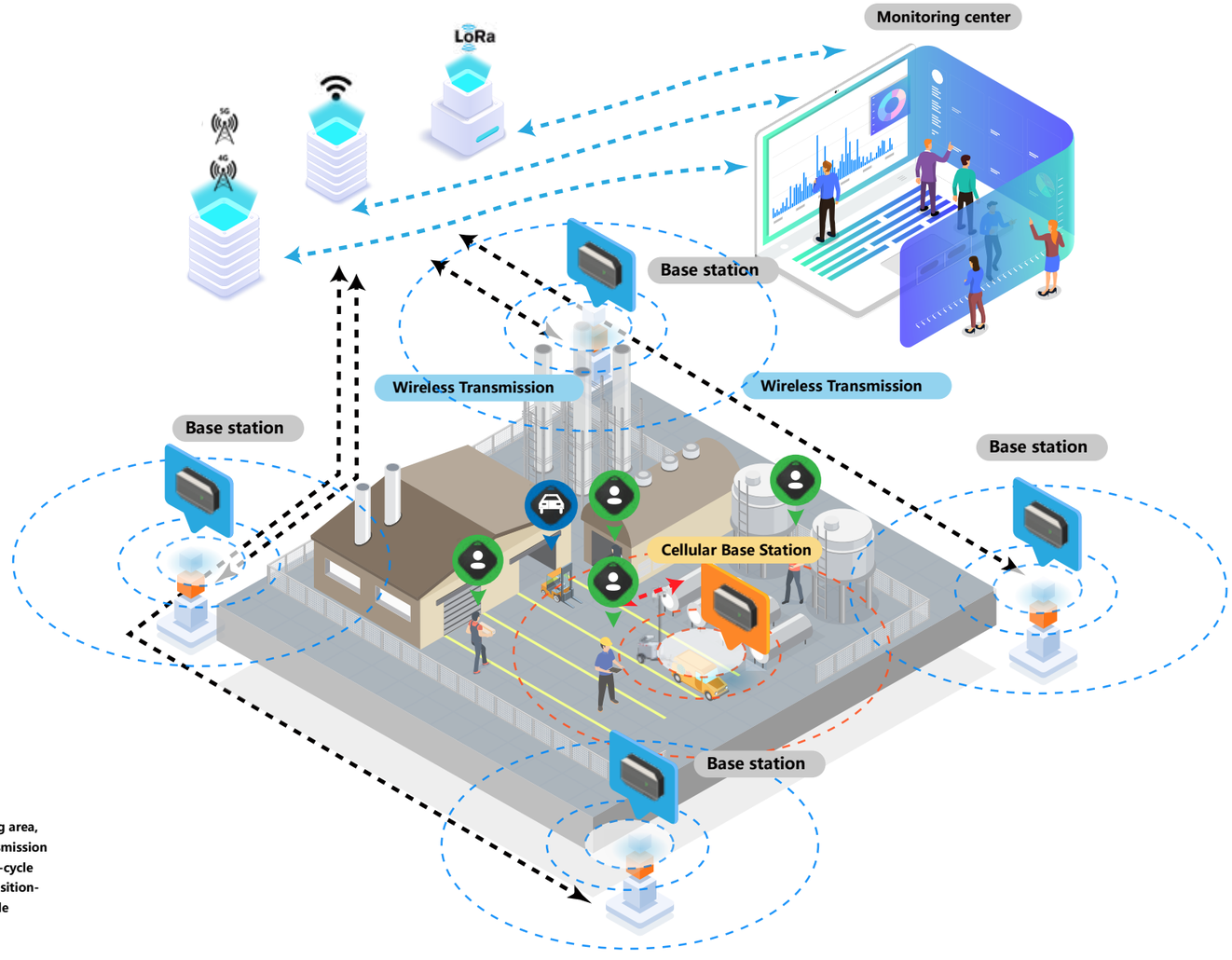
Tag

Static Mode: In the positioning area, UWB enters a long-cycle transmission mode, and BLE performs long-cycle scanning reception. In non-positioning areas, BLE enters long-cycle scanning reception mode.

Wireless deployment

The distributed RTLS (Real-Time Location System) positioning system with pre-positioned base stations offers greater scalability and stability compared to centralized RTLS systems.

Our positioning system supports multiple wireless data communication methods, including wired Ethernet (PoE), 4G/CAT-1, LoRa, and WiFi. We have transitioned away from a centralized positioning engine in favor of a distributed RTLS (Real-Time Location System) positioning system with pre-positioned base stations. This system utilizes both scene-based positioning and coordinate-based positioning methods, offering greater adaptability to different environments and increased practicality.



Autonomous Positioning Algorithm

Entrance and Exit Algorithm

Fine Grid Algorithm

Directional Positioning

Altitude Positioning

Compatible with traditional one-dimensional and two-dimensional coordinate positioning, independently developed entrance, grid-based, directional positioning, and altitude positioning based on scenario-specific requirements.

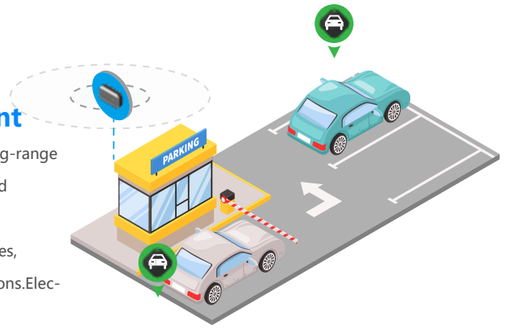
Entrance and Exit Algorithm

UWB Target Entrance and Exit Intelligent Management

Replacing face recognition, license plate recognition, and RFID object recognition, achieving long-range recognition (50-100 meters) of individuals, vehicles, and objects, with real-time identification and statistics of their entry and exit directions.

Applications include:Wide-ranging access management scenarios such as entrances/exits of gates, buildings, and factories.Entry/exit points of parking lots.Passageways/corridors.Roads/intersections.Electronic timing for long-distance running, marathon races, and athletic training.

Highways and parking lots for Electronic Toll Collection (ETC) scenarios.



Ultra-Wideband (UWB) Signal Fine Grid Positioning

High-precision area matching positioning technology utilizes advanced positioning techniques that employ deep learning and fuzzy matching. It enables the monitoring of events related to target entry, exit, and presence within arbitrarily defined areas. This technology finds wide applications in complex industrial environments, both indoors and outdoors, for tasks such as electronic fencing, grid-based personnel management in work areas, and the integration of physical location and video data. It doesn't require on-site map surveying or wireless base station coordinate calibration and supports rapid and fully wireless deployment. The shapes of defined areas can be arbitrary, with boundary precision reaching 30-50 centimeters, classifying it as a high-precision area positioning technology.

Directional Positioning

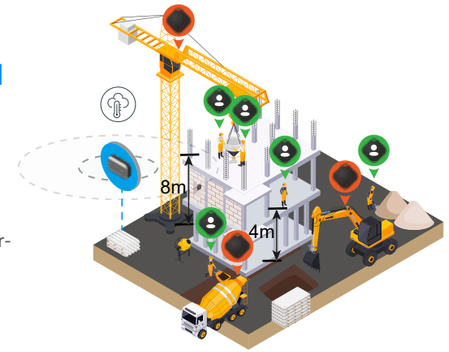
Based on TOF precise ranging and AOA accurate angle measurement, achieve target orientation positioning. Orientation positioning involves determining the target's direction and distance relative to anchor points and can be implemented without the need for map surveying, making deployment straightforward.

Applications include:Inventory of large fixed-area assets.Remote inventory management of goods and materials.Spatial tracking and management of large items such as automobiles, engines, or critical components.Intelligent management in logistics and port stacking areas.UWB landmark-assisted positioning for autonomous vehicles in industrial environments.

Autonomous Positioning Algorithm

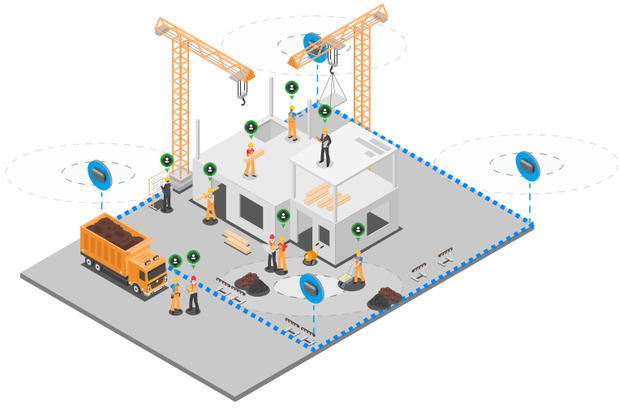
Altitude Positioning Based on Pressure Differential

Base stations and tags are equipped with built-in atmospheric pressure sensors. Utilizing the pressure differential between base stations and tags, along with compensation and correction algorithms, altitude positioning is achieved. This technology is suitable for indoor and stable airflow environments, with an accuracy of up to 50 centimeters. Altitude positioning enables real-time monitoring of high-altitude operations.



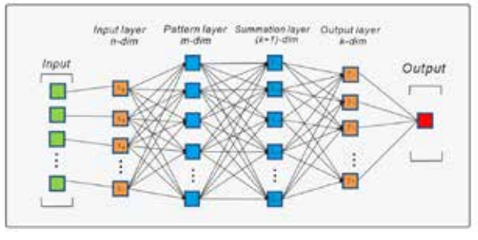
UWB-Based Rapid Electronic Fencing

Using UWB signals between anchor points to establish indoor and outdoor electronic alert zones and boundaries; supports fully wireless deployment without the need for map surveying, making deployment simple and fast.



UWB AI Deep Learning Algorithm

Based on TOF ranging or TDOA data, a model is created using Keras. The model architecture includes an LSTM layer with 32 neurons, employing softmax activation for multi-class classification, enabling arbitrary definition of UWB signal coverage space.



UWB
Industrial Site Digital Management

Digital Asset Management

Tracking and Management of Equipment Circulation Inside and Outside the Facility

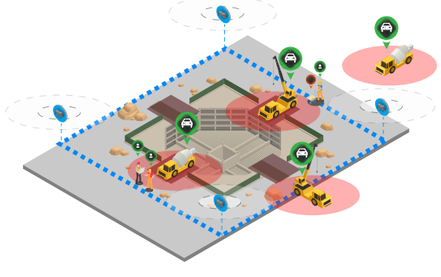
Passive Asset Tracking

Inventory of Large Bulk Storage and Finished Product Fixed Areas

Mobile/Flow Inventory of Large Assets

Location Tracking of Finished Products and Rework Vehicles

Unmanned Monitoring of People, Vehicles, and Objects' Entry and Exit

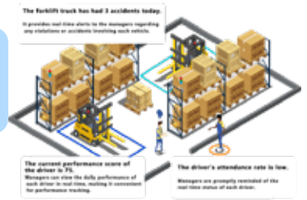


UWB
Industrial Site Digital Management

Digitalization of Safety Production

Management of Personnel/Materials in Hazardous Areas

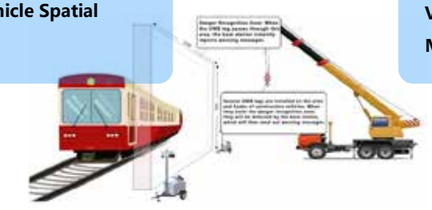
Forklift Collision Prevention and Safe Operations Management



Collision Avoidance and Safe Operation Management for Vehicles

Platform Crossing Truck Positioning and Monitoring

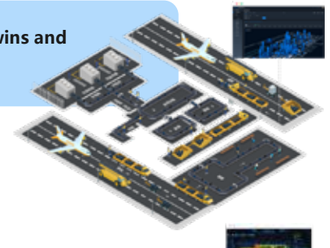
Management of Vehicle Spatial Operations



Visitor/Employee Safety Contact Management

Digitalization of Operational Elements

Scenario Digital Twins and Business Analysis



Personnel Tracking and Performance Tracking Statistics

Vehicle Trajectory and Performance Tracking Statistics

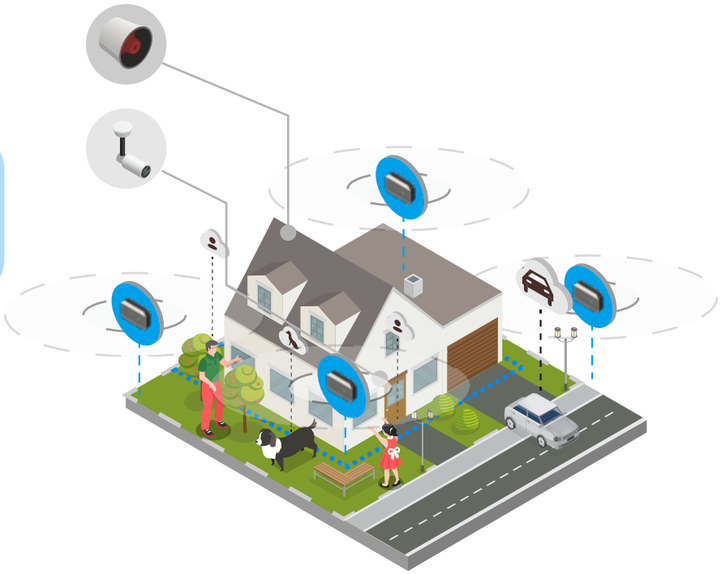
Traffic Statistics Monitoring (Sniffer)

UWB Home Security

UWB Home Security provides security management while safeguarding individual privacy rights. The inherent data communication security mechanisms of UWB further enhance information confidentiality.

1. Monitoring of Activity Areas for Elderly Individuals, Children, and Pets

Monitoring of Multiple Scenario Areas including Front Yard, Backyard, Swimming Pool, Leisure Area, Indoors, and When Away from Home



2. Monitoring of People and Vehicle Entry and Exit

Intelligent Recognition of People and Vehicle Entry and Exit, Linked to Automatic Doors, Lighting, Video Surveillance, and Alarm Systems.

UWB Home Security

3. Monitoring of Important Items and Equipment

Alarm for the Departure of Valuables or Important Items (e.g., firearms) from the Area; Alarm for the Departure of Smart Mobile Devices like Lawn Mowing Robots from Authorized Zones.

4. Indoor Space Monitoring

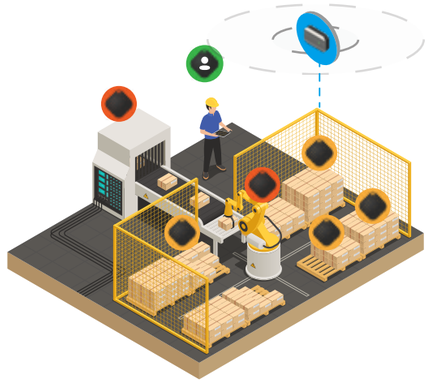
Indoor Activity Monitoring for Pets, Seniors, and Children.

1. Unmanned Entry and Exit Monitoring for People, Vehicles, and Objects

Authorized Entry and Exit of People, Vehicles, and Objects

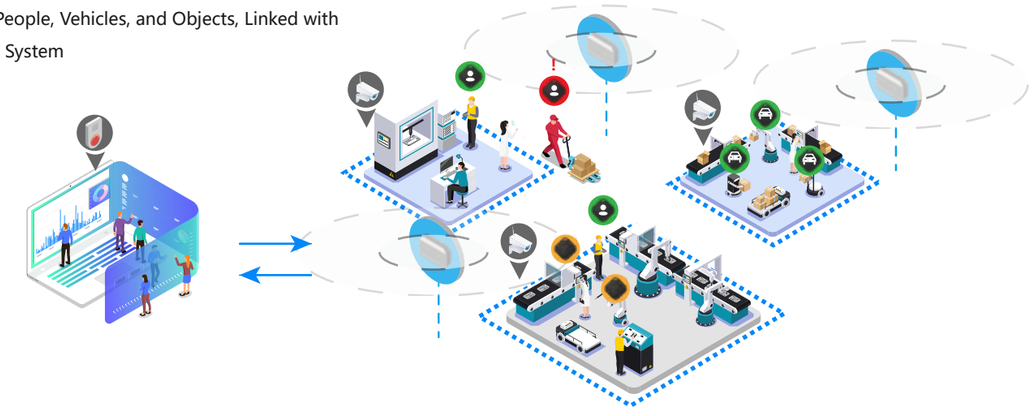
2. Fixed Asset Area Inventory and Mobile Inventory

Fixed Asset Management



3. Grid-Based Management of Work Sites for People, Vehicles, and Objects

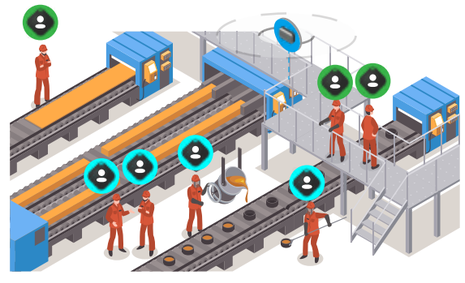
Rapid 3D Electronic Fence, Integrated Management and Alarm System for People, Vehicles, and Objects, Linked with Video Surveillance System



4, Collision Prevention for People and Vehicles, and Vehicle-to-Vehicle Collision Avoidance at Work Sites

Industrial Site Collision Prevention for People and Vehicles, and Vehicle-to-Vehicle Collision Avoidance

5, Equipment and Operator Pairing Management



6, High-Precision Landmark-Assisted Autonomous Driving

1. Intelligent Management of People, Vehicles, and Objects' Entry and Exit

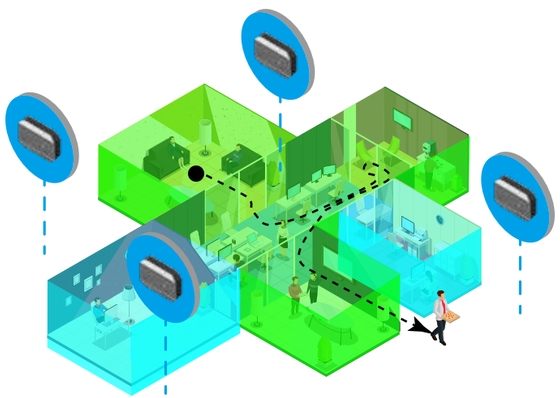
UWB-Based Personnel and Vehicle Entry and Exit Management

Vehicle Entry and Exit

Parking Management

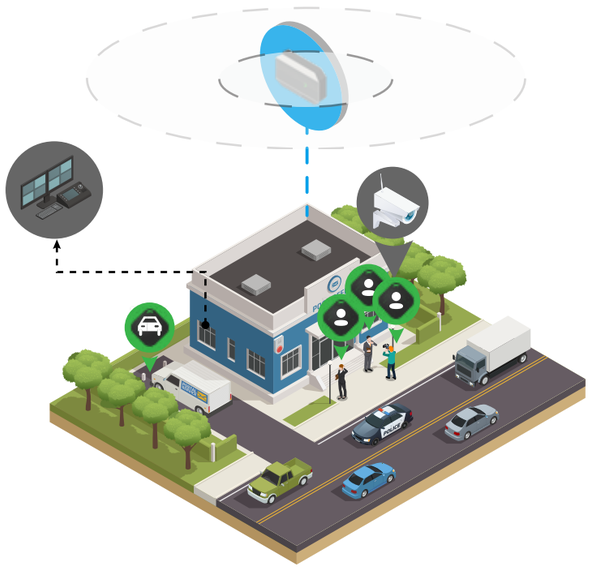
2. Visitor Trace Management

Visitor Management and Area Management



3. Area Entry and Exit Authorization Management

4. Fixed Asset Management



5. Integration of Access Control, Lighting, Elevator Control, and Video Surveillance

Base Station & Lable

UWB

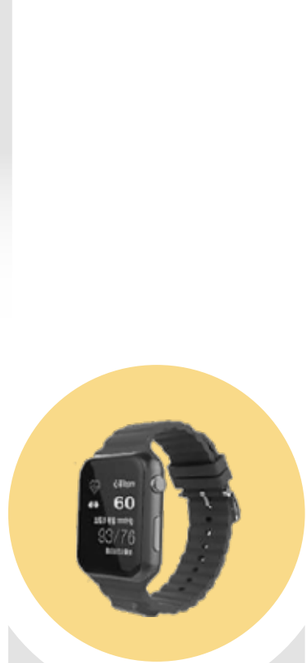
Indoor / Outdoor
Built-in UWB, BLE, WIFI6, 4G antenna
UWB support CH5&CH9, support LNA
、optionalPA
BLE support 5.1, optional PA
Transmission supports wired and wireless WiFi, 4G
The network support gigabit PSE, gigabit POE
Built-in SD card, data and log storage
Support two alarm outputs
Built-in scene location algorithm
Built-in atmospheric pressure sensor
battery, support 3*24 hours of work

AOA
mobile inventory
anchor point

External UWB, BLE, 4G, WiFi, LoRa antenna
UWB support CHS and CH9, LNA, optional PA
Transmission support wired and wireless WiFi, 4G, LoRa
support gigabit PSE, Gigabit POE
Support two alarm outputs
Built-in scene location algorithm
Built-in atmospheric pressure sensor

upplies tags
Sports training tags

Options: Black, white, or color (can be chosen)
Size: 33X33X9mm
Battery: CR2032 button battery
Supports energy-saving through motion and static detection
Operates at 1Hz frequency
Range: 50-80 meters
Can be worn in multiple ways, such as using a strap or waterproof jacket



UWB Health Bracelet

Dimensions: 43 x 23 x 13 mm
Weight: 25g
Lithium battery: 160mAH
IP67 waterproof
Magnetic charging
Heart rate, body temperature, blood oxygen monitoring
SOS alarm/low battery alarm
LCD display
Vibration motor supported

Base Station & Lable

ID badge

Adopting a chest card wearing method
Lithium battery,
TYPEC charging
Detection area of 120°, 50-80 meters
1Hz, 500 target detection
Supports PAD visual display.

Multi-purpose label

Size: 137X70X36mm
Supports multiple installation methods (clamping, magnetic, bundling), can be worn and installed on shoulders, safety helmets, and other places, combined with UWB/Bluetooth positioning technology, can achieve multi-scene positioning.

UWB landmark

Dimensions: 40 x 32 x 12mm
Battery model: CR2032 button battery
Supports battery replacement mode
Supports motion detection for energy saving
Operating frequency: 1Hz
Measurement distance accuracy: 10cm
Angle accuracy: 2-3°