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ClairGeo-MP Parking Solution

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System Overview

Wireless Parking Guidance & Management

- The Smart Parking Guidance System consists of geomagnetic vehicle detectors, parking information display screens, a parking management cloud platform, and a mobile parking guidance mini-program. The system uses geomagnetic vehicle detectors as parking space status collection devices to perform real-time detection of parking space occupancy. The real-time parking status information is then collected and transmitted to the cloud platform of the smart parking guidance system via the operator's network or Ethernet.
- The cloud platform analyzes and processes the collected data, displaying the parking information in real time on the guidance screens. Users can view parking space availability in real time through the backend management platform or the mobile mini-program.
- The technical solution of the Smart Parking Guidance System enables fast and orderly parking of vehicles, significantly reducing the cost of personnel management while eliminating the hassle of searching for parking spaces. It also speeds up the turnover of vehicles in parking lots, improving utilization and economic efficiency. Additionally, it helps prevent inconveniences and safety risks associated with searching for parking spaces.

Geomagnetic Sensor



LoRa Gateway



Parking Management Platform

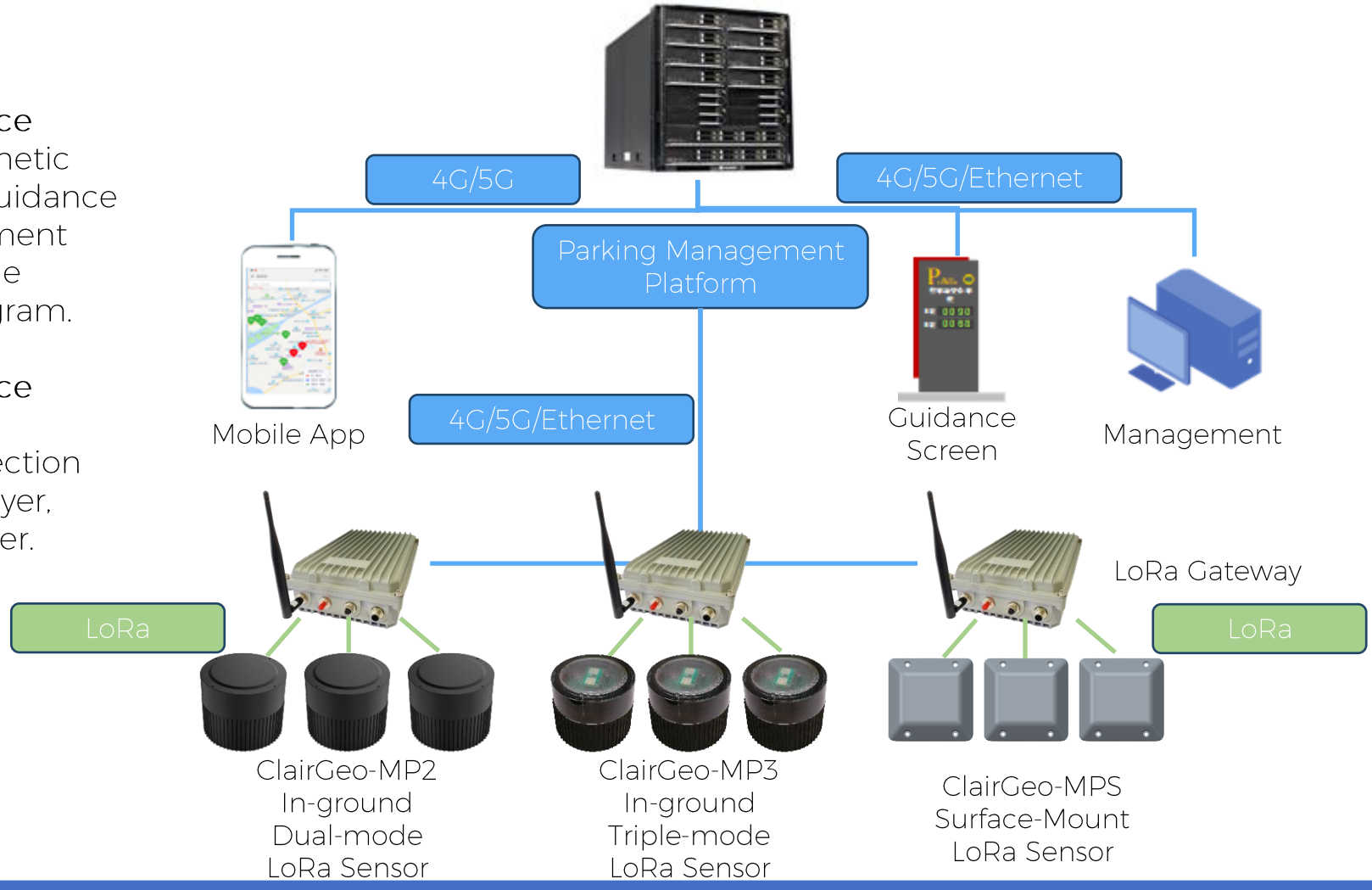


Guidance Screen



System Architecture

- The **Smart Parking Guidance System** consists of geomagnetic vehicle detectors, parking guidance screens, a parking management cloud platform, and a mobile parking guidance mini-program.
- The **Smart Parking Guidance System Solution** is mainly composed of the Data Collection Layer, Data Management Layer, and Information Display Layer.



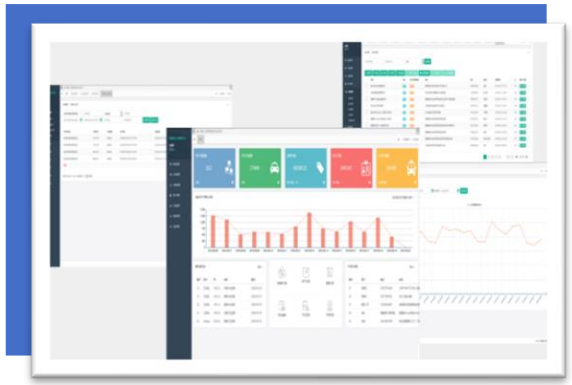
System Architecture

Information Display Layer



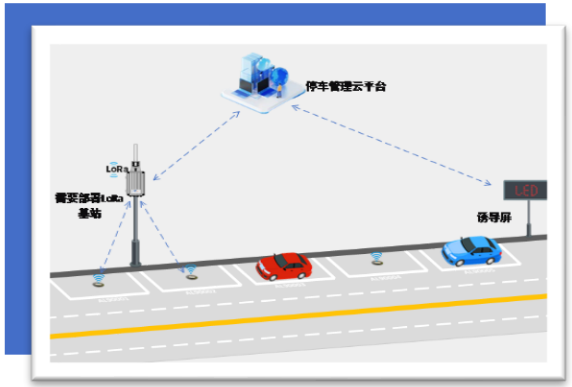
- The real-time parking space status information released by the management center allows drivers to easily and quickly find available parking spaces near their destination based on the published data before setting out.

Data Management Layer



- The main function is to organize the data reported by the data collection layer, process it through logical algorithms in a modular manner, and present it. This enables real-time collection, transmission, and publication of dynamic parking information.

Data Collection Layer



- The system's primary function is to obtain basic data on the status of parking spaces, specifically collecting and reporting whether each parking space is occupied or vacant.

System Benefits

Wireless

- Cost-Effective Installation
- Real-Time Data Access
- Scalability and Flexibility
- Remote Monitoring
- Integration with Smart Technologies

Reliability

- Fault Tolerance Capability: Ensures stable operation.
- Adaptive Mode: Extends battery life.
- Multimodal Technology Utilization: Reduces geomagnetic false alarm rates.
- High Sensitivity Detection Frequency: Improves detection response speed.

Compatibility

- Supports Multi-Band Access: Adapts to connect with various operational networks.
- Supports Multiple Protocols: Ensures seamless information flow.
- Fast and Simple Installation: Significantly reduces hardware costs.

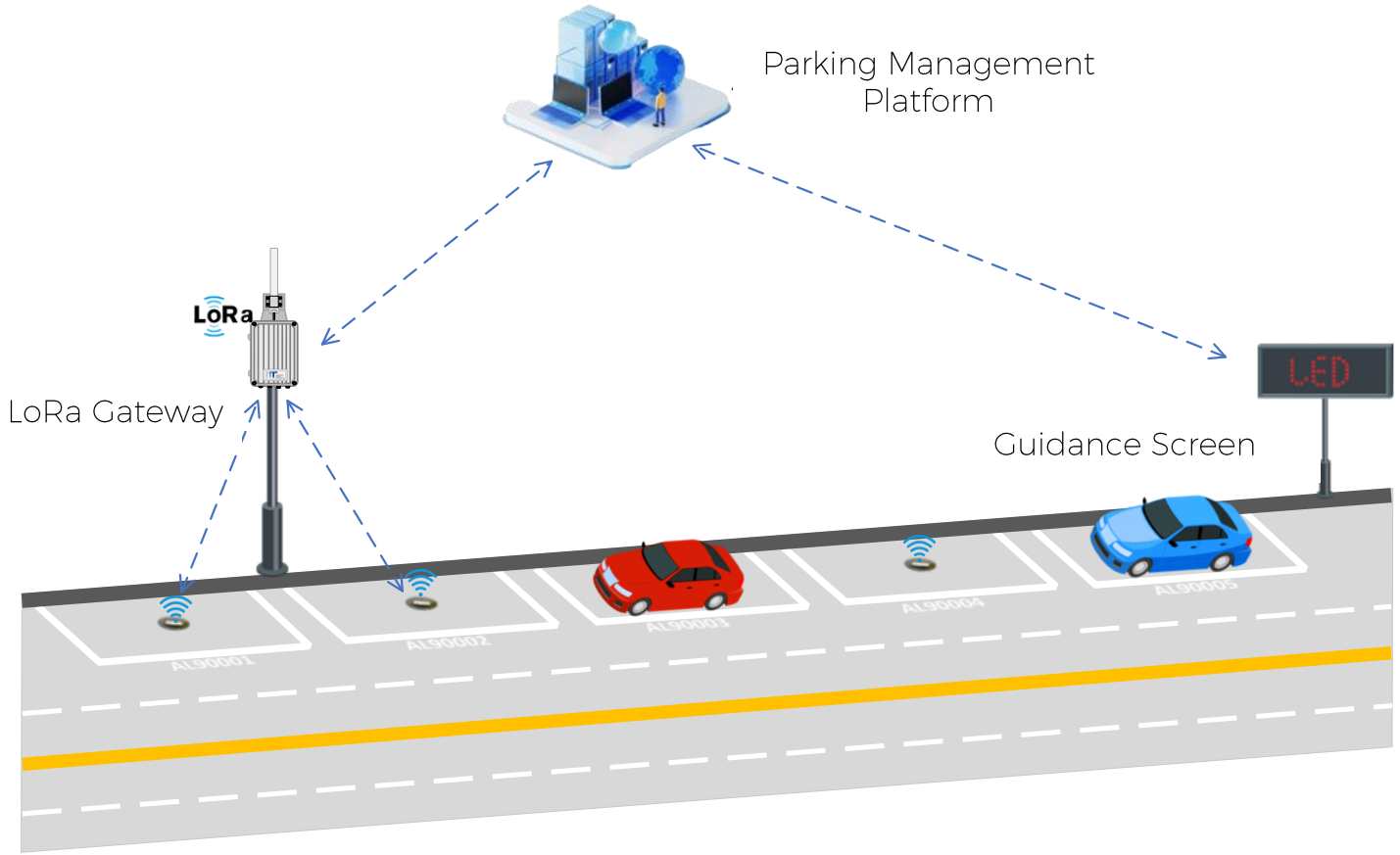
Efficiency

- Fully Leverage Platform Advantages: Extract value from big data.
- Provide Multidimensional Statistics and Analysis Reports.
- Share Processed Parking Information: Integrate with other systems.
- Modular Design: Facilitates rapid fulfillment of customer customization requirements.

LoRa Communication

The system architecture of this solution requires the deployment of a control gateway. The geomagnetic sensors use LoRa wireless communication to transmit data in real-time to the control gateway, which then sends the effective data to the parking management cloud platform via 4G/Ethernet communication.

Features of this solution:
- Long-Distance Transmission
- Low Power Consumption
- Strong Anti-Interference Capability
- High Capacity
- Self-Organizing Network Capability

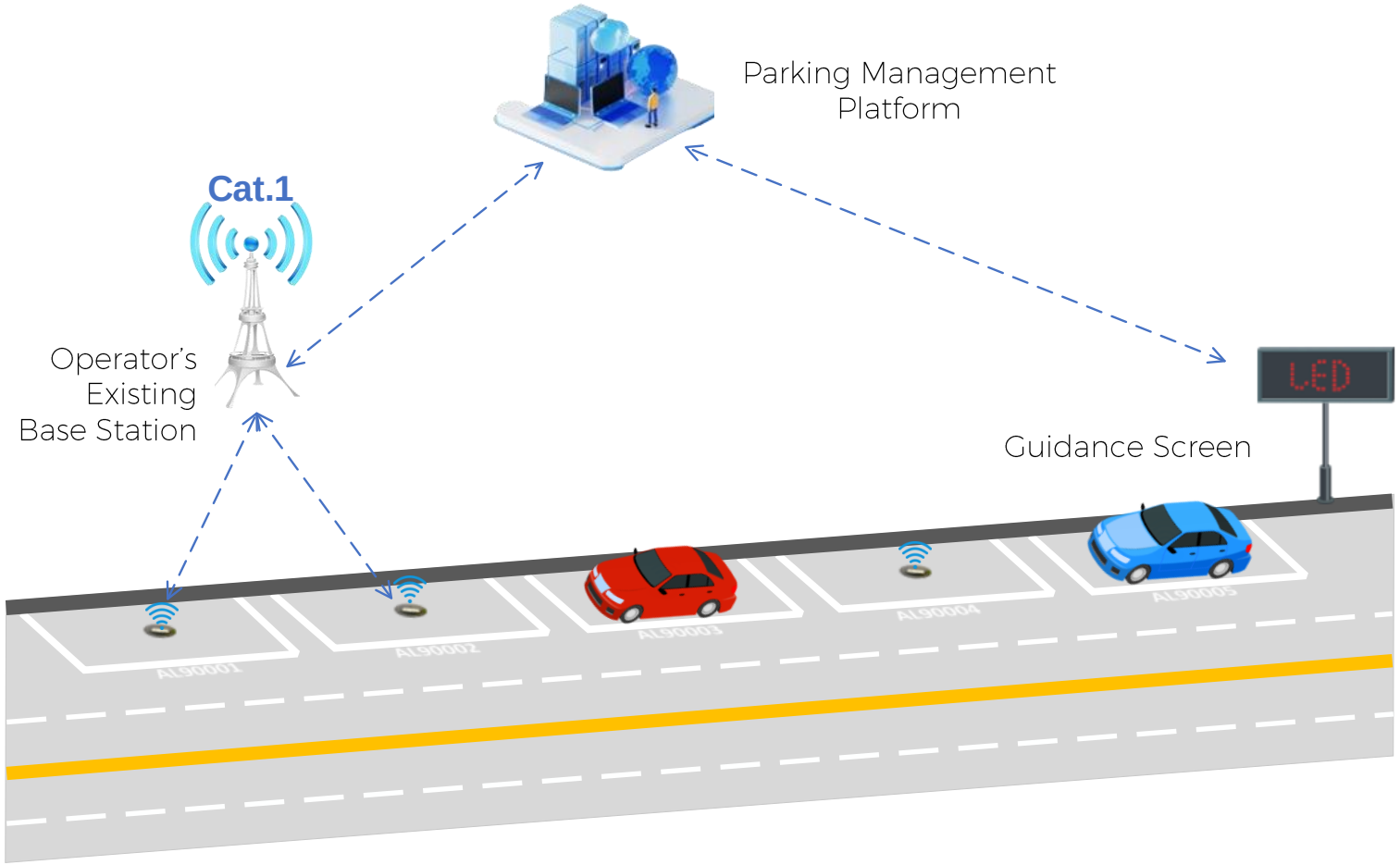


LoRa 433MHz (868MHz, 915MHz customizable)

Cat.1 Communication

This system architecture does not require the deployment of base stations. The geomagnetic sensor uses carrier Cat.1 wireless communication to send real-time data to the parking management cloud platform, eliminating the need for base station deployment.

Key features of this solution include: high reliability, low latency, low power consumption, low cost, and medium data rate. It is seamlessly compatible with existing 4G infrastructure, without the need to deploy receivers.



ClairGeo-MP Wireless Magnetic Parking Detectors

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ClairGeo-MP2

- ✓ Radar Sensor
- ✓ Geomagnetic Sensor



- ✓ LoRa
- ✓ NB-IoT
- ✓ CAT.1

ClairGeo-MP3

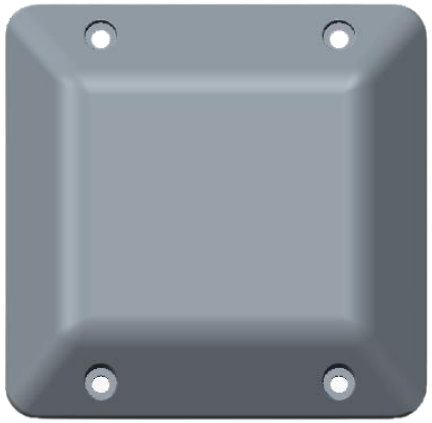
- ✓ Radar Sensor
- ✓ Geomagnetic Sensor
- ✓ Photosensitive Sensor



- ✓ LoRa
- ✓ NB-IoT
- ✓ CAT.1

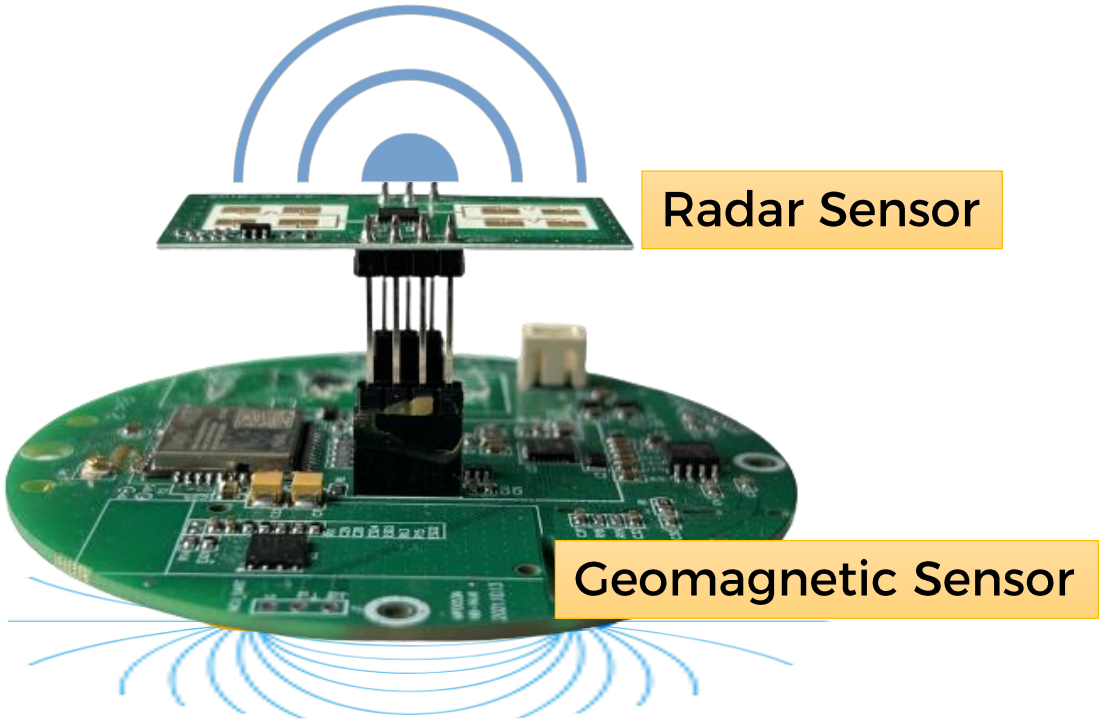
ClairGeo-MPS

- ✓ Radar Sensor
- ✓ Geomagnetic Sensor



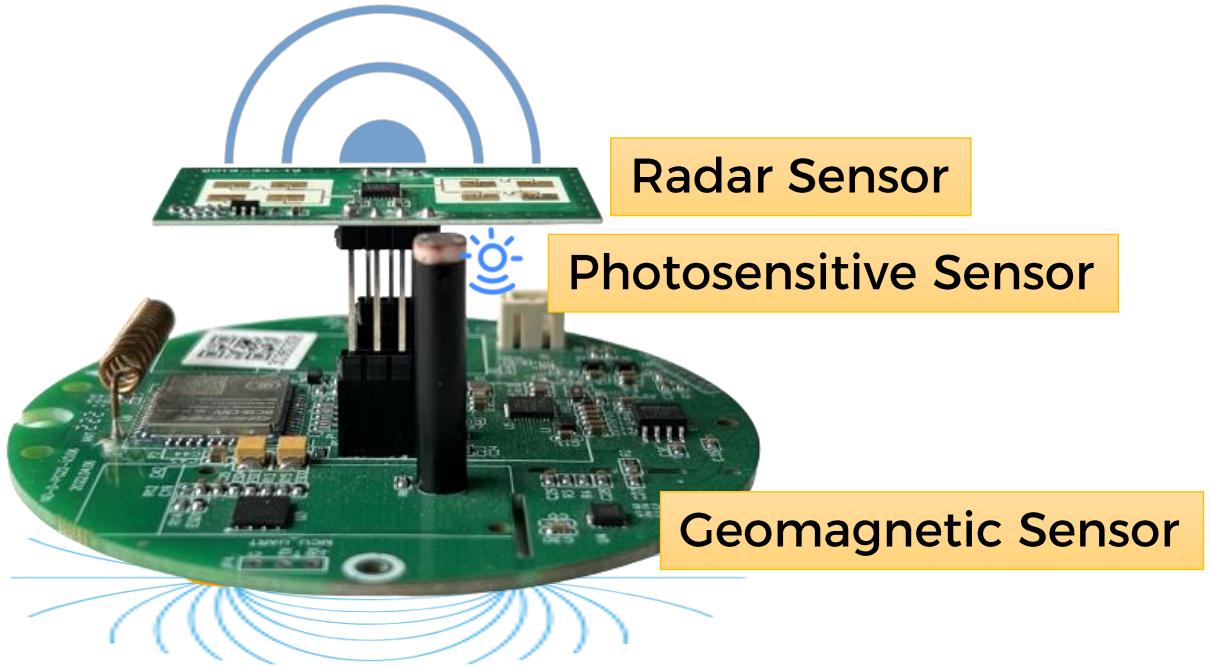
- ✓ LoRa

Innovative Triple Insurance for Precision Detection



Dual Mode

Dual verification significantly enhances accuracy.



Triple Mode

To compensate for the failure of millimeter-wave modules on rainy days



The ClairGeo-MP2 in-ground installation dual-mode packing detectors are designed for front-end data collection, real-time monitoring of parking space status, and utilizes highly sensitive magnetic resistance sensors and 24GHz millimeter-wave radar to detect vehicle information. It determines vehicle parking by detecting changes in the Earth's magnetic field and microwave pulse signals. The detection data is then sent to the intelligent parking management cloud platform, with communication support for LoRa, NB-IoT, and CAT.1 (LTE).

	ClairGeo-MP2LR
Detection Method	Geomagnetic + Microwave Dual Mode Sensor
Communication Method	LoRa 433MHz (868MHz, 915MHz customizable)
Detection Accuracy	≥99%
Power Supply	38AH Industrial-Grade Lithium Battery (3.6V)
Transmit Power	20±3dBm
Receiver Sensitivity	-119dBm
Platform Response Time	Not exceeding 1.5 seconds
Detect Vehicle Types	All motor vehicles
Coverage in Water Operations	Normal operation in water with a depth not exceeding 35cm
Communication Protocols	
Platform Support	
Installation	Drill hole in-ground installation
Protection Rate	IP68, double-layer enclosure
Operating Temperature	-40 to 85°C, (-49 to 185°F)
Dimension	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)
Weight	0.5kg (1.10pounds)

	ClairGeo-MP3LR
Detection Method	Geomagnetic + Microwave + Photosensitive Triple-Mode Detection
Communication Method	LoRa 433MHz (868MHz, 915MHz customizable)
Detection Accuracy	≥99.9%
Power Supply	38AH Industrial-Grade Lithium Battery (3.6V)
Transmit Power	20±3dBm
Receiver Sensitivity	-119dBm
Platform Response Time	Not exceeding 1.5 seconds
Detect Vehicle Types	All motor vehicles
Coverage in Water Operations	Normal operation in water with a depth not exceeding 35cm
Communication Protocols	
Platform Support	
Installation	Drill hole in-ground installation
Protection Rate	IP68, double-layer enclosure
Operating Temperature	-40 to 85°C, (-49 to 185°F)
Dimension	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)
Weight	0.5kg (1.10pounds)



The ClairGeo-MP3 geomagnetic vehicle detector is used for front-end data collection and real-time monitoring of parking space status. It employs a triple-mode detection approach with highly sensitive magneto-resistive sensors, 24GHz millimeter-wave radar, and photosensitive sensors to detect vehicle information. By detecting changes in the Earth's magnetic field, microwave pulse signals, and photosensitive resistance values, it determines the parking status of vehicles. The detected data is then sent to the intelligent parking management cloud platform, supporting communication via LoRa, NB-IoT, and CAT.1. When geomagnetic and radar detection is affected by heavy rain and water accumulation, the photosensitive sensor ensures that the three-mode detector maintains consistently good detection efficiency.



The ClairGeo-MPS surface-mount installation packing detector is used for front-end data collection, real-time monitoring of parking space status, and utilizes highly sensitive magnetic resistance sensors and 24GHz millimeterwave radar to detect vehicle information. It determines vehicle parking by detecting changes in the Earth's magnetic field and microwave pulse signals. It is based on LoRa wireless communication with a control gateway, sending realtime effective data to the intelligent parking management cloud platform.

The ClairGeo-MPLRG LoRa gateway manages the MP2LR and MP3LR geomagnetic vehicle detectors based on LoRa wireless communication. It performs functions such as parsing, encrypting, sending, and storing data from the geomagnetic vehicle detector.



Detection Method	Magnetic resistance sensor (5Hz sampling frequency) + Microwave detection technology dual sensor
Communication Method	LoRa wireless communication
Communication Advantages	Low-speed, long-range, flexible self-organizing network, meeting the requirements of various scenarios
Receiver Sensitivity	-119dBm
Transmit Power	20±3dBm
Battery Capacity	16AH Industrial-Grade Lithium Battery (3.6V)
Detection Accuracy	99%
Installation Method	Surface-mounted, secured with screws or strong adhesive
Enclosure Material	PC Casing
Dimension	152*152*28 (mm), 5.98*5.98*1.10 (inches)
Operating Temperature	-40 to 85°C, (-49 to 185°F)
Product Features	Accurate, adaptive, all-weather, anti-interference, high stability, accuracy ≥99.9%
Remote Maintenance	Supports remote wireless upgrades and configurations, with the upgrading process not affecting parking space data detection.

Wireless Communication	LoRa wireless communication
Power Supply	Grid power (AC220V), solar power, lamppost power supply (AC220V)
Transmit Power	20±3dBm
Receiver Sensitivity	-119dBm
Communication Method	2G/3G/4G, Ethernet
Communication Protocol	TCP/IP
Platform Response Time	Not exceeding 4 seconds
Installation	Adopting pole-mounted installation method, quick and easy to install.
Protection Rate	IP66
Operating Temperature	-40 to 85°C, (-49 to 185°F)
Dimension	280*186*85 (mm), 11.02*7.32*3.35 (inches)
Weight	3kg (6.61 pounds)

Coverage: 64 sensors or radius=150m
Installation height: Above 2.2m on a pole

Products: Inductive Screen



Induction Screen (Three-Level)

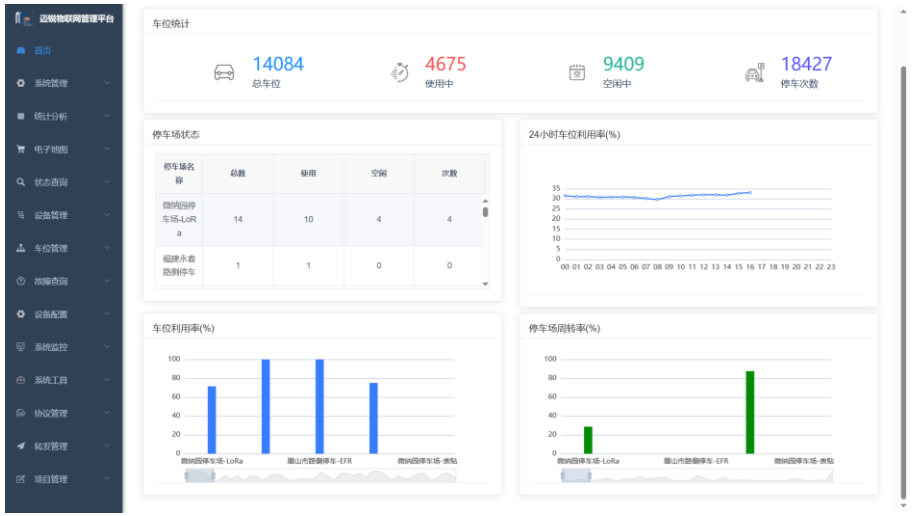
- Dimensions: Width 0.6m x Height 2.2m
- Three sets of parking space LED display windows, with each individual LED display window size of 320mm x 160mm
- Brightness: ≥8000 cd/㎡
- Display colors: Red, Green, Yellow (mixed colors)
- Direct-insert 346 high-brightness light-emitting diodes, with a luminous angle of 70°
- Overall average power consumption: ≤40W, maximum power: ≤80W
- Operating temperature: -40℃ to 55℃
- Average service life: ≥100,000 hours



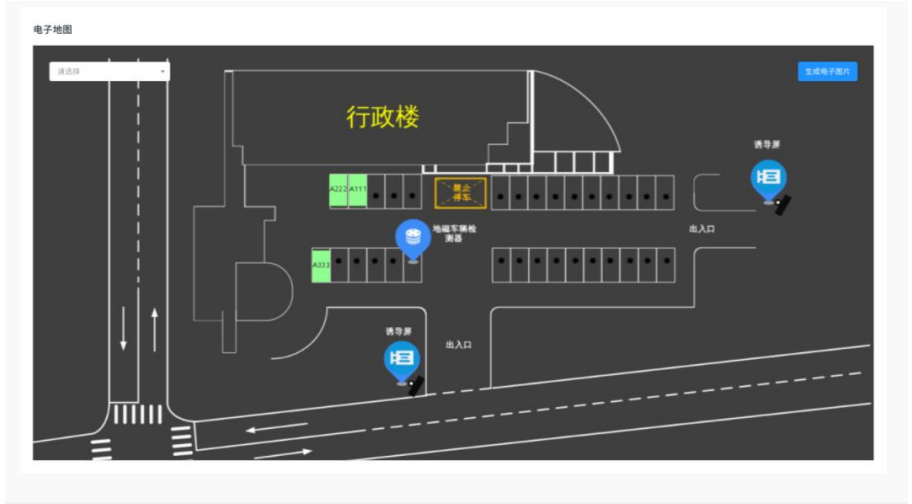
Induction Screen (Four-Level)

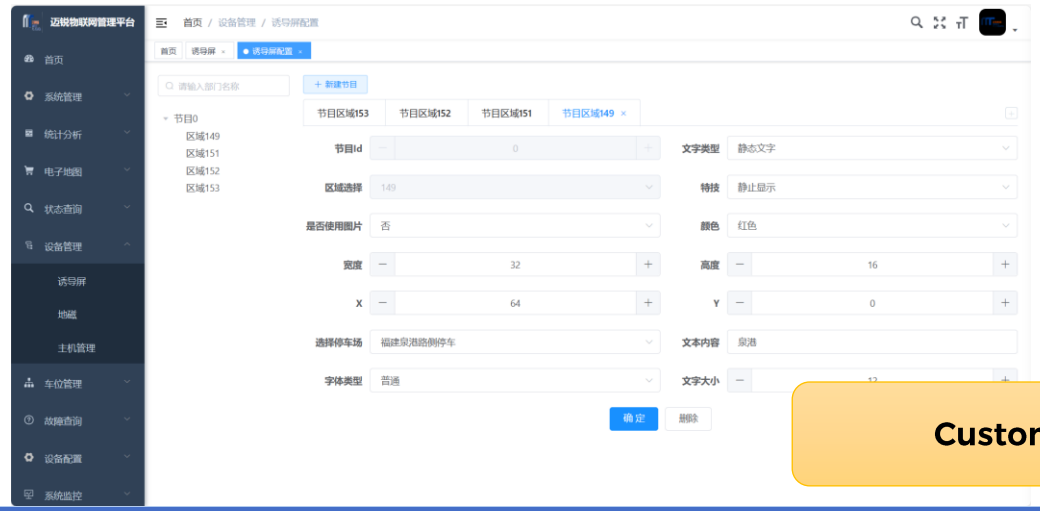
- Dimensions: Length 1.2m x Height 0.8m
- One set of parking space LED display window, with LED size of 320mm x 160mm and LED pixel pitch of 10mm
- Brightness: ≥8000 cd/㎡
- Module resolution: 32 x 16
- Optimal viewing distance: ≥10m
- Display colors: Red, Green, Yellow (mixed colors)
- Direct-insert 346 high-brightness light-emitting diodes, with a luminous angle of 70°
- Overall average power consumption: ≤10W, maximum power: ≤20W
- Operating temperature: -40℃ to 55℃
- Average service life: ≥100,000 hours

Products: Parking Management Cloud Platform









Customizable

Products: Parking Management Cloud Platform

Menu	Description	Menu	Description	Menu	Description
Login	- Identity verification - Verification code reset	**Electronic Map**	- Electronic parking space map	**Failure Query**	- Host failure - Magnetic failure - Induction screen failure
Home	- Parking space statistics - Parking lot status - Parking space utilization rate - 24-hour parking space utilization rate - Parking lot turnover rate	**Status Query**	- Parking records - Parking lot status - Parking space status - Induction screen status	**Device Configuration**	- Configuration management - Version management - Lora magnetic monitoring - NB magnetic monitoring - Anomaly monitoring
System Management	- User management - Role management - Log management	**Device Management**	- Host management - Magnetic management - Induction screen management	**Project Management**	- Project information - Device information - Anomaly handling
Statistics & Analysis	- Parking lot report - Data forwarding statistics - Lost connection magnetic statistics - Low battery magnetic statistics - Cockpit	**Parking Space Management**	- Area management - Parking lot management - Parking space management	**Mobile App**	- Login - Home page - Parking space status inquiry - Parking record inquiry

Products Advantages



Adaptive: Features self-learning and self-calibration capabilities, eliminating concerns about reference deviations leading to inaccurate detection data.



No debugging required: Easy to install, no manual adjustment needed; can be used immediately after installation, reducing labor costs.



Magnetic sensor technology: Ensures all-weather detection, unaffected by rain or snow.



Anti-interference: Designed for complex application environments such as underground rail transit, substations, base stations, and areas with disturbances in the geomagnetic field.



Low power consumption: Utilizes a 38 AH industrial-grade lithium battery, pre-configured for operational status at the factory, eliminating the need for additional technical control of the power supply status.



High accuracy: Backed by strong research and development capabilities and technical reserves in magnetic sensors and radar technology, achieving a detection accuracy of up to 99.9%.

Parking Scenarios



Roadside Parking Spaces



No-Parking Zones



Parking Guidance



Residential Parking Spaces



Highway Service Areas



Airport Parking Guidance

Use Case

- **Application Case – Beijing Yizhuang Industrial Park Project**
- The ground-level parking areas of the Yizhuang Industrial Park are divided into four zones: East, South, West, and North. Vehicles enter the park through the West Gate. To guide drivers in quickly finding available parking spaces, geomagnetic vehicle detectors are installed in each parking space within these zones. The system monitors the occupancy and availability of parking spaces in real-time, providing rapid guidance for parking and reducing the time spent searching for a spot.
- Solution Configuration:
  - LoRa Geomagnetic Vehicle Detectors: Installed at individual parking spots to detect vehicle presence.
  - Control Gateways: Serve as communication hubs, gathering data from the detectors and sending it to the cloud.
  - Induction System: Displays real-time parking availability, guiding drivers to available spaces effectively.
- This solution enhances operational efficiency by enabling real-time monitoring and reducing the time needed for parking, contributing to a smoother parking experience in the industrial park.



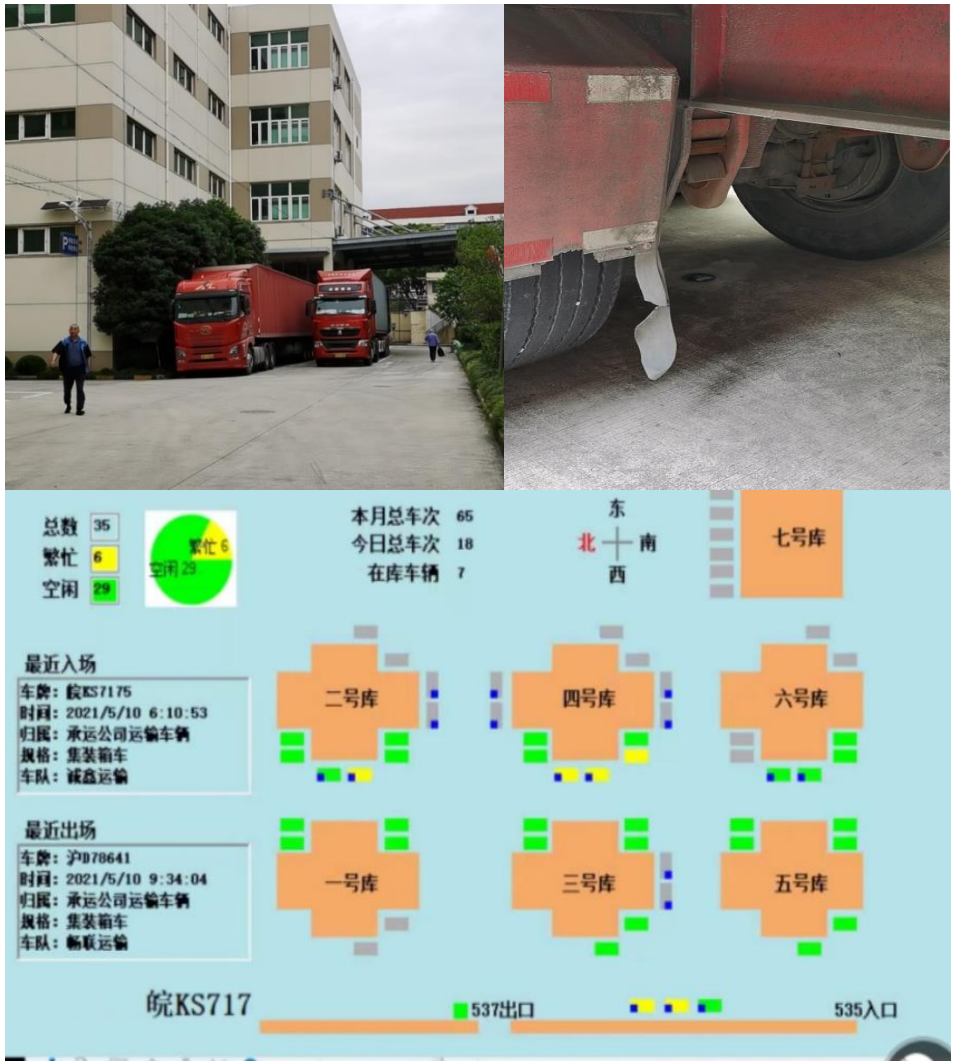


Use Case

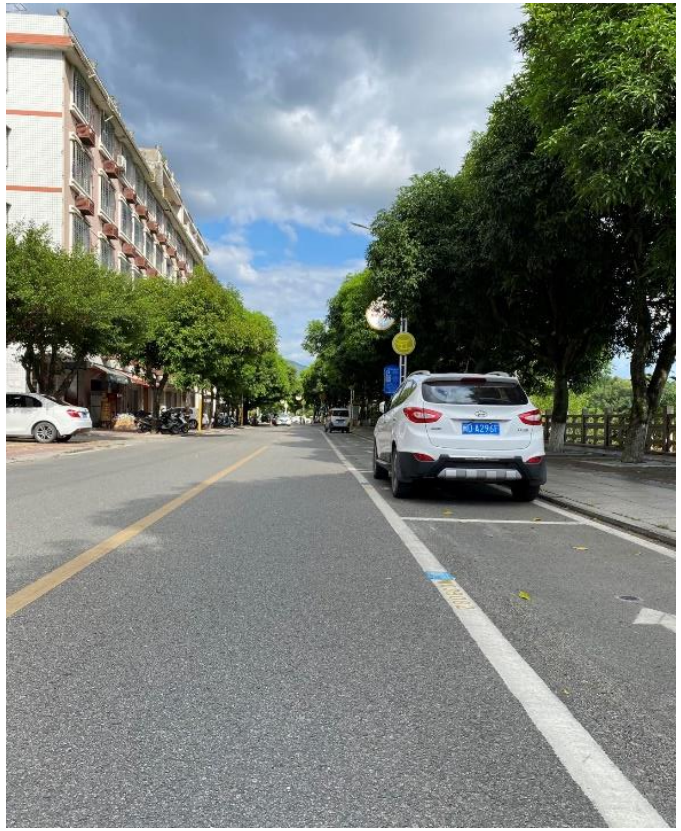
- **Application Case: Shanghai Tobacco Company Logistics Park Project**

- The logistics park is divided into unloading zones, loading zones, and waiting areas. When vehicles enter the logistics park, geomagnetic detectors are installed at each parking space in these areas to quickly guide vehicles to the appropriate zone. These detectors monitor the occupancy and availability of every parking space in real time. Management staff can use a large display to see which spaces are available and swiftly assign parking spots to drivers. This reduces congestion in the logistics park and enhances personnel safety.

- Solution Configuration: NB IoT Geomagnetic Vehicle Detectors, Guidance System.



Case Study: Roadside Parking





Quanzhou's Yongchun County Smart Parking Project covers 5,673 parking spaces across 55 key road sections in the county town.

Case Study: Roadside Parking





The smart parking system in Yangzhou now covers all on-street parking spaces in the urban area, with over 9,000 parking spaces deployed across the city.

Case Study: Roadside Parking





Shandong's Dezhou Smart Parking initiative has successfully deployed over 8,000 parking spaces across the urban area.

Case Study:
Highway Service Area Parking





As one of the host cities for the Beijing 2022 Winter Olympics snow events, Zhangjiakou has installed magnetic vehicle detectors in parking spaces at service areas such as Chicheng South Station, Dahaituo Station, Huailai North Station, and Taizicheng Station.



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Thanks